

ABET
Self-Study Report
for the
Computer Science and Engineering Program
at
The Ohio State University
Columbus, Ohio

June 2017

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Program Self-Study Report for Computer Science and Engineering

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Program Self-Study Report
for
CAC/EAC of ABET
Reaccreditation

Background Information

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B. Program History

The *Bachelor of Science in Computer Science and Engineering (BS-CSE)* program has existed in its current form since the mid-nineties and has been accredited by the EAC and the CAC since 1999¹. The last general review of the BS-CSE program was in 2011.

One major change was in 2012 when Ohio State moved from the *quarter calendar* to *semesters*, effective

¹The BS-CSE program is in the *Computer Science and Engineering Department* in the *College of Engineering*. The department also offers two other programs, a *BS in Computer and Information Science (BS-CIS)* degree and a *BA in Computer and Information Science (BA-CIS)* degree, both in the *College of Arts and Sciences*. Neither of those programs is accredited by ABET nor are they being currently evaluated. Only the BS-CSE program is being evaluated.

Summer, 2012. In preparing for the change, our approach was to retain the essential strengths of the then-existing program while introducing carefully considered revisions based on extensive discussion among faculty and results of some of our assessments. As an example of the former, we decided to continue offering a variety of capstone design courses –rather than a single course as some programs do– so that students interested in different areas of computing can fully pursue their interests by engaging in an intense design project in the specific areas. As an example of the latter, results from our *exit survey*, one of our assessment tools, showed that while students were mostly satisfied with the conceptual focus of our introductory *software engineering* sequence, many were unsatisfied with the use of RESOLVE/C++, a discipline of software development in C++ that is related to research conducted here at OSU. Many students expressed a preference for learning the concepts we taught in the sequence with a different programming language as the delivery mechanism; i.e., a language used more commonly in industry positions of the sort they are most likely to secure for internships and after graduation. Thus, in the semester version of the sequence (CSE 2221, 2231), the conceptual focus of the introductory software courses has very much remained, but we switched to using Java as the programming language and focus more attention on current industry best practices. Details of the process used in designing the semester program were described in an appendix to the self-study we submitted in June 2011 (and will be available during the team’s site-visit).

One change that we made during the transition to semesters was the elimination of the requirement that each student complete one of several *technical elective options*, ranging from *software systems*, to *information assurance*, *AI*, etc. Each option listed a number of CSE (and, in some cases, a related field) courses relevant to the particular option that the student was required to include among her elective courses for her program. One of the technical elective options was called the *individualized* option. This allowed students, in consultation with their faculty advisors, to tailor unique combinations of elective courses to meet their particular technical interests which may not fit exactly with any of the specified options. In the transition to semesters, we decided to eliminate all of the specified options and allow each student to choose an appropriate set of elective courses based on her particular interests; in other words, effectively, have all the students follow the individualized option. As it turned out, however, while this ability to tailor unique combinations of technical elective courses was appropriate for some students, for many others, the guidance provided by the other options that we had under the quarter system was indeed very useful; it allowed students, fairly early in their program, to plan out their future courses, based on their technical interests. Perhaps equally importantly, an employer interested in hiring an intern or a full-time employee for a specific position and interested in students/graduates with matching interests could identify them simply on the basis of their tech-elective option (assuming it was not “individualized”!), rather than having to carefully go through the students’ course records. Hence, we recently reintroduced *specialization options*, similar to but somewhat more flexible than the technical elective options under the quarter system, with each option requiring students to include, in their respective programs, an appropriate set of CSE (and in some cases related field) courses appropriate to their chosen specialization option. More details of the specialization options appear in subsection (C) below with more complete details later in the self-study under *Criterion 5. Curriculum*, page 40.

Another change that may be worth noting has to do with the courses related to analog circuits and digital logic that our students are required to take. Under the quarter system, the curriculum included 13 quarter-credit hours of courses related to these topics. During the transition to semesters, the Electrical and Computer Engineering (ECE) Dept. which teaches these courses reorganized them and part of some other courses (taken by ECE majors but not part of the BS-CSE program) into two 4 (semester) credit hour courses. The resulting sequence, ECE 2000, 2100 dealt with not just analog circuits and digital logic but also signal processing. While the signal processing material was of some interest to a small number of CSE

majors, for most it was not directly relevant. We started receiving negative feedback about the sequence from the student representatives on our Undergraduate Studies Committee as well as the broader student population during our Annual Forum; in essence, the feedback was that portions of each of these courses were very inaccessible and irrelevant to many CSE majors. ECE faculty had also, in the meantime, received negative feedback about the sequence from ECE majors (although the details were somewhat different from the feedback from CSE majors). In any case, the ECE faculty went through extensive discussions, including input from the CSE Undergraduate Studies Committee, and came up with a completely revised sequence of courses. In the revised version, CSE majors take two 3-credit hour courses, ECE 2020 and 2060, the first devoted to analog systems/circuits, the second devoted to digital logic; additional courses on the signal processing-related material are available and may be taken as technical electives by interested CSE majors.

As the field of computing continues to evolve, we have developed new courses and revised existing courses to enable our students to get an understanding of important new ideas and techniques. One important example is CSE 5914, one of our capstone design courses. Originally, the main project in this AI-focused course was based on *expert systems*. But, over the last several years, *machine learning*-based approaches have become the focus of attention, especially applications built using such systems as IBM's *Watson*; and it was clear, on the basis of feedback from our students, that they would like to gain some experience with such applications. As it turns out, there is a fairly large IBM office in central Ohio, it has a fair sized *Watson*-focused group, and some of our AI faculty had some technical contact with the people in that group. Hence, with some input from the IBM group, we were able to tweak the project in CSE 5914 to be one that builds an interesting application that exploits key machine-learning facilities offered by *Watson*. Further, we were able to recruit some senior members from the *Watson*-group as senior adjunct faculty to *teach* some offerings of the course. This version of 5914 has proven quite popular.

On a different note, as is the case with many CS programs across the country, the demand for our BS-CSE program has been steadily climbing. This is matched by the trend in the job market with our recent graduates being highly recruited for interesting and challenging positions. While these are certainly welcome and reflect very positively on the potential of our program and the field as a whole, the increase in demand for the program has put substantial pressure on enrollments in both required and elective courses and we have been working to address this in various ways. First, we have recruited a number of tenure-track faculty, specializing in areas that are likely to be important in the coming years. Second, we continue to look for and hire part-time faculty from among local computing professionals to teach specific courses including some of the capstone design courses where their industry experiences and insight can be of great value. Third, we continue to look for qualified computing professionals with excellent teaching skills who are interested in teaching full-time, to hire them as non-tenure-track faculty. One particularly valuable pool of such candidates is our own recent PhD's, in particular those who have already obtained classroom experience as *graduate teaching associates*. While these efforts have helped, the demand is so great that in spite of these efforts, enrollment pressures in our courses has continued to increase. Hence, a couple of years ago, we instituted a GPA-based enrollment management process to restrict the number of students who are admitted to the major program. This means that a pre-major will be admitted to the major only if, after completing the specified pre-requisite courses (including CSE 2221 (Software I), Math 1151 (Calculus I), Physics 1250, Engineering 1181, 1182, and English 1110), he/she has a specified minimum cumulative-point-hour-ratio (CPHR); currently, this minimum is 3.2 (on a 4.0 scale). This effectively means that well over 50% of otherwise qualified pre-majors, i.e., ones who have satisfactorily completed all the prerequisite courses, will nevertheless not be admitted to the major program; and will have to pursue alternate majors. The CSE Advising Office and the College of Engineering do assist these students in finding suitable alternatives.

Clearly, though, this is not a desirable situation since *computer science & engineering* was these students' first choice. We hope that our efforts at improving our ability to serve a greater number of students pays off in the near future and that we will be able to admit more of these students to the major program.

C. Options

The full details of the BS-CSE curriculum appear under *Criterion 5. Curriculum*, page 40. Each student's program is required to include courses meeting the requirements of his/her chosen *specialization option*. The possible options are *artificial intelligence, computer graphics and game design, database systems and data analytics, information and computation assurance, computer networking, computer systems, software engineering*, and the *individualized* option. For example, the computer networking option requires the student to have taken the foundational networking course as well as two additional courses from a list of specified courses on network programming, wireless networking, security projects, and network security. The database systems and data analytics option requires the student to have taken the introduction to database systems course, the advanced database systems course, and either the course on data mining or the course on machine learning & statistical pattern recognition; etc. The full details of each option are considered under Criterion 5 but here it is worth noting that the courses needed to meet the requirements of any given option are not *additional* hours added to the student's program; instead, they serve to provide guidance to the student on choosing a suitable combination of technical elective courses, core choice courses, capstone design course, junior project course, etc., that are appropriate, given his or her choice of specialization option, and that meet the other requirements of the program such as the number of credit hours of technical electives.

D. Program Delivery Modes

Conventional day classes.

E. Program Locations

The program is offered primarily on the Columbus campus of The Ohio State University and all graduates of the program come from that campus. The courses comprising the first year of the program that are common to a number of the engineering (pre-)majors are offered at four regional campuses of the university, located in Newark, Marion, Mansfield, and Lima. Additional courses in the BS-CSE program, mainly CSE 2221 and 2231, are offered at the Lima campus and the Marion campus. The CSE faculty in those campuses, Dr. Roman at Lima and Dr. Mirzaei at Marion, work very closely with the course coordinators on the Columbus campus to ensure that the courses that they offer are essentially identical to the ones on the Columbus campus so that when students transfer to the Columbus campus to continue with the rest of their program, they are as well prepared as students who take all their courses on the Columbus campus. All requirements for admission to the major and academic progress are identical on all campuses, and students must complete a campus-change to Columbus to finish their program of study. Students who transition from a regional campus to the College of Engineering must have a 2.5 OSU cumulative grade-point average, a C- or higher in Math 1151, and completed one of the following science courses: Chemistry 1210, Chemistry 1250, or Physics 1250.

F. Public Disclosure

The Program Educational Objectives (PEOs), Student Outcomes (SOs), the annual student enrollment and graduation data are published on the College of Engineering's web site at:

<http://go.osu.edu/CoECSEPEOsAndSOs>

The PEOs and SOs are also published on the CSE Department's web site at:

<http://go.osu.edu/CSEPEOsAndSOs>

They also appear in the undergrad brochure that is on the web site:

<http://go.osu.edu/CSEUndergradBrochure>

Hard-copies of the brochure are available to students and visitors, including prospective students who are considering applying to Ohio State. We should note that the brochure describes not just the BS-CSE program but also the other undergraduate programs offered in the CSE Department.

G. Deficiencies, Weaknesses or Concerns from Previous Evaluation

No deficiencies, weaknesses or concerns were reported following the previous evaluation.

General Criteria

Criterion 1. Students

A. Student Admissions

Admission to The Ohio State University is handled centrally in the *Office of Undergraduate Admissions and First Year Experience* and is competitive. Selection is based on a holistic review consisting of 10 criteria. These criteria are (in no particular order):

- Successful completion of the minimum college prep requirements.
- High school performance(class rank and GPA), including participation in accelerated programs like Honors, AP and IB; Ohio State does not have minimum requirements for class rank or GPA.
- Standardized test scores(ACT or SAT); Ohio State does not have minimum requirements for ACT or SAT scores.
- Ability and desire to contribute to and engage with a diverse campus community.
- Experiences that demonstrate leadership or engaged involvement(e.g., co-curricular activities, work experiences or military service).
- Status as a first-generation college student.
- Demonstration of outstanding talent in a particular area.
- Academic competitiveness of the high school.
- High school performance if adversely affected by physical, mental or learning environment factors.
- Eligibility for and likelihood of benefiting from organized support services at Ohio State.

After admission to the university, an additional review is conducted for admission to the College of Engineering. Admission to the college is competitive and requirements are designed to identify students who are prepared for the rigors of engineering study. Admitted students enroll as *pre-majors*.

There are no stated cut-offs for test scores or grades. Factors considered include:

- ACT/SAT scores with emphasis on math;
- Strong college prep curriculum with emphasis on rigorous course work in math and science;
- Class rank or GPA.

Students admitted to the university but who do not meet the College of Engineering requirements are admitted to the University Exploration program and may apply for admission to the College of Engineering when they meet the following criteria:

- C- or higher in Math 1151 (or equivalent);
- Credit for one of the following science courses: Physics 1250, Chemistry 1210, Chemistry 1250, Biology 2100;
- OSU cumulative GPA of 2.5 or higher;
- At least one term of full-time undergraduate enrollment at Ohio State.

Students admitted to the *regional campuses* may apply for admission to the College of Engineering when they meet the following criteria:

- 2.5 OSU cumulative grade-point average;
- C- or higher in Math 1151;
- Completion of one of the following science courses: Chemistry 1210, Chemistry 1250, Physics 1250.

To be admitted to the BS-CSE major, the following criteria must be met:

- Completion of CSE 2221;
- Completion of Math 1151;
- Completion of Physics 1250;
- Completion of Engineering 1181 and 1182;
- Completion of Engineering 1100.06;
- Completion of English 1110;
- Completion of at least 15 credit hours earned at Ohio State;
- A CPHR (cumulative point hour ratio, i.e., GPA) of at least 3.2 and an MPHR (major point hour ratio) over CSE courses that can be included in the major program of at least 2.0; OR a CPHR of 3.0 to 3.199, completion of CSE 2221, 2231, and 2321, and an MPHR over CSE courses that can be included in the major program of at least 3.2. As explained in the section on *Background Information* (subsection B, Program History), we are using this requirement as a means to ensure that the number of students admitted to the major programs is somewhat in line with our resources, specifically the size of our faculty, available to teach adequate number of sections of the required and elective courses.

During the term in which these requirements are expected to be met, pre-CSE majors apply for admission to the major and are formally admitted to the major at the end of the term.

B. Evaluating Student Performance

Students are advised and their progress monitored through the CSE Advising Office, which is staffed by three full-time professional academic advisors who are assisted by a graduate administrative associate. Students admitted to the CSE major also have an assigned faculty advisor who is available for consultation about curricular, career and other technical matters. The main components of the system for monitoring student performance are as follows:

1. Students are monitored at the end of each term (Autumn, Spring, and Summer). Those students who are not making satisfactory progress are put on *special action probation* and advised of what they need to do to get back in good standing. Failure to overcome the deficiencies (cumulative GPA below 2.0 and/or GPA in CSE courses below 2.0) within an appropriate number of terms –which depends, to an extent, on the individual circumstances of the particular student– may result in dismissal from the program. Probation and dismissal decisions are made by the *Academic Standards and Progress Committee* (ASAP Committee), a standing committee of the College of Engineering consisting of chairs of Undergraduate Studies committees (or representatives thereof) and advising representatives from the various programs. Students who are put on probation receive official notification (via e-mail to the students' official OSU address) from the department that indicates the reasons for the action,

explains what they need to do in order to get back in good standing, and urges them to discuss their situation with the CSE Advising Office. This allows the professional advisors in the CSE Advising Office to suggest possible corrective actions and also to provide referrals to other university resources, as appropriate. A copy of the policies of the ASAP Committee will be available during the site visit.

2. Advising reports recording the progress of their advisees are available to faculty advisors (on request to the CSE Advising Office). The advising report lists all of the courses the student has taken and the grades in each course. Any transfer credits the student has been awarded for courses taken elsewhere are also listed. The report also provides general information about the student such as the high school the student graduated from and the student's test scores (ACT/SAT, AP, etc.). Faculty advisors do not routinely look at their advisees' advising reports; however, in exceptional situations, for example, where a student is considering an unusually challenging technical elective course, having access to the report enables faculty advisors to provide the most appropriate advice based on the individual student's background and abilities. Students can also access their own advising reports through Buckeyelink, Ohio State's online student information system.
3. The Degree Audit is an online program that enables students to verify what requirements they still need to meet in order to complete the program. This enables the students to monitor their progress through the curriculum.
4. With respect to course prerequisites, each course syllabus lists the prerequisites for the course and students are expected to make sure that they have completed all the prerequisites before taking a course. Prerequisites for most core courses are automatically enforced by the Ohio State's student information system, allowing only students who have completed the prerequisites or are enrolled in the prerequisites at the time of course registration to schedule the courses.

For the courses not automatically enforced, the instructor of each course will typically go over the prerequisites for the course at the start of the term so that students are fully aware of what the prerequisites are and can make sure that they have completed them. In some cases, because of some unusual circumstances, such as part-time employment or internships, etc., a student may not have been able to take a given prerequisite course when it was offered in an earlier term and may, because of his or her particular background and knowledge, feel that he or she can nevertheless succeed in the course in question. In such cases, the instructor talks to the student and, based on the particular student's background and knowledge, may agree that the student may be able, possibly with extra effort, to succeed in the current course. In other cases, a student may contact the CSE Advising Office to see if he or she would be able, because of scheduling issues, to take a particular course without having taken a prerequisite course or possibly take the course concurrently with the prerequisite course. In such cases, the CSE Advising Office refers the student to the course coordinator who again handles the situation in the manner just described. Ultimately, however, it is the responsibility of the individual student to make sure that he or she takes the courses in the prescribed order. Typically, it is rare for a student to take a course without having completed the prerequisites.

C. Transfer Students and Transfer Courses

1. In order to determine if a transfer student is eligible for admission to the university, admissions staff review the student's academic record. Additional non-academic factors may also be considered:

- Ability and desire to contribute to and engage with a diverse campus community;

- Experiences that demonstrate leadership or engaged involvement(e.g., co-curricular activities, work experiences or military service);
- Status as a first-generation college student;
- Demonstration of outstanding talent in a particular area;
- High school performance if adversely affected by physical, mental or learning environment factors;
- Eligibility for and likelihood of benefiting from organized support servicesat Ohio State.

2. Once admission to the university is determined, the student’s academic record is reviewed for enrollment in the College of Engineering. Transfer students with at least 30 transferable semester hours (or the equivalent), including credit for at least one calculus course, and a GPA of 3.0 or higher (on a 4.0 scale) enroll as pre-majors. Transfer students with fewer than 30 semester hours (or the equivalent) are considered using the freshmen criteria (see Section A).

3. Transfer students who do not meet the College of Engineering direct enrollment requirements begin their studies in University Exploration – Science, Technology and Environment Exploration. Such students may apply for admission to the College of Engineering when they meet the following criteria:

- C- or higher in Math 1151 (or equivalent);
- Credit for one of the following science courses: Physics 1250, Chemistry 1210, Chemistry 1250, Biology 2100;
- OSU cumulative GPA of 2.5 or higher;
- One term of full-timeundergraduate enrollment at Ohio State.

4. Transfer students who are Ohio residents and who have earned at least a 2.0 GPA in previously completed coursework may apply for admission to a regional campus. A review of a student’s academic performance in college will determine eligibility for admission. Transfer to the College of Engineering is the same as for transfer students who begin their studies on the Columbus campus in University Exploration – Science, Technology and Environment Exploration.

5. State Mandated Articulation Programs:

The Ohio Transfer Module (OTM), which is a subset or the complete set of a public college’s or university’s general education requirement that represents a common body of knowledge and academic skills, is comprised of 36-40 semester credit hours of courses in the following fields: English composition and oral communication; mathematics, statistics and logic; arts and humanities; social and behavioral sciences; and natural sciences. Additional elective hours from among the five areas make up the total hours for a completed Ohio Transfer Module. Students are guaranteed the transfer of OTM credits among Ohio’s public colleges and universities and equitable treatment in the application of credits to admissions and degree requirements: <https://www.ohiohighered.org/transfer/transfermodule>

The Transfer Assurance Guides (TAGs) are advising tools that include the Ohio Transfer Module, pre-major/beginning major courses called “TAG courses”, advising notes, and foreign language requirements, when applicable. All courses in TAGs are guaranteed to transfer and apply directly to the major requirements accordingly. In totality, the TAGs are guaranteed pathways for students and are very useful advising tools for faculty and other advisors. TAG courses are developed, endorsed, and reviewed by faculty in the content areas: <https://www.ohiohighered.org/transfer/tag>

6. For assessing CSE-specific coursework, the CSE department is careful to ensure both that students get credit for coursework they have completed elsewhere and that transfer students are indeed well prepared to continue with the rest of the program. With this in mind, transfer credits are handled through a two-tiered system. The department supplies the university's Transfer Credit Center within the Office of the Registrar with a *transfer-credit course list*, identifying specific courses from specific universities and the equivalent courses in our program. Any student who has taken course X in university Y gets transfer credit for the equivalent course Z of the program as per this list. A designated CSE faculty member, currently Dr. Gojko Babic, acts as the *transfer credit coordinator*. The coordinator works with the Transfer Credit Center to ensure the currency and accuracy of the list. Students also have access to the equivalency list as well as other detailed information about transfer credits on the Registrar's web site.

For courses not listed on the *transfer-credit course list*, students must submit materials, via an online system, for evaluation to the CSE Advising Office. An academic advisor reviews each student's submission to make sure all required materials have been submitted (including the syllabus for each course to be reviewed and the student's initial transfer credit report from the Transfer Credit Center). Once a submission has been verified, the transfer credit coordinator is notified that the materials are ready for evaluation. The coordinator then evaluates each submission carefully; if additional materials are required, the coordinator contacts the CSE Advising Office and an advisor will work with the student to obtain the requested material. If, on the basis of this examination, the coordinator determines that the course covers almost all of the material and at a comparable (or greater) depth as a CSE course, the student is assigned credit for the CSE course. In some cases, the transfer coordinator may not have sufficient expertise in an area to determine if a transferred course is equivalent to a CSE course. In such cases, the coordinator works with the chair of the Undergraduate Studies Committee and the coordinator of the most relevant course to determine the proper course of action. In either case, in arriving at the decision, the main considerations are such questions as whether the text book used in the other university's course is comparable to the one used in our program, whether the list of topics covered and the depth of coverage of the topics are comparable, whether the student obtained a reasonable grade in the course, etc. If, on the basis of this examination, it is determined that the course covers almost all of the material and at a comparable (or greater) depth as a CSE course, the student is assigned credit for the CSE course; the transfer credit coordinator informs the Transfer Credit Center so that the credit can appear in the student's official university record.

One issue having to do with transfer credits concerns the sequence CSE 2221 and 2231. These two courses form a tightly integrated sequence focusing on software engineering issues, rather than mere programming experience in a particular language. We often have students who may have taken one or two courses in programming at another university, and these students often assume that they would get transfer credit for one or both courses in the sequence. But even if the course(s) the student has taken elsewhere did indeed provide him or her considerable programming experience, giving such credit would not be in the best interest of the student unless the student had also learned and internalized the relevant software engineering principles. Hence our policy is that, in general, a student may not receive credit for the first course in this sequence unless the student has taken courses sufficient to allow awarding of credit for *both* courses. In a few cases transfer students may indeed have obtained a sufficient background in software engineering but the programs they come from, as is the case with many programs around the country, do not place the same emphasis on the ideas of design-by-contract that our sequence does. In such cases, the student may be given transfer credit for CSE 2221 and a warning about the expectations and preparation necessary for taking and succeeding in CSE 2231.

D. Advising and Career Guidance

The CSE Advising Office serves as the first stop for any questions that pre-majors and majors may have on all matters related to the program as well as such matters as research and scholarship opportunities, internships, possible full-time positions after graduation, graduate school options, etc.

1. Pre-CSE students are advised by the three professional advisors in the CSE Advising Office. Once they are admitted to the CSE major (as described under “A. Student Admissions”), they are also assigned a faculty advisor. The faculty advisor is usually assigned to the student based on the area of expertise that the student expects to specialize in; and can be changed upon request from the student (to the Advising Office). The faculty-student relationship is expected to be an on-going interaction until the student has graduated from the program, with the faculty advisor providing assistance in areas such as selection of technical elective courses, industry questions, research opportunities, and technical and other content questions. The professional advisors remain available for all program and university concerns, including academic planning, minors, graduation requirements, petitions, and referrals to campus resources. All of this, including information about the assigned faculty advisor, is explained in the letter that is sent to the student (via e-mail) when he or she is admitted to the CSE major. The students’ on-line account (“Buckeyelink”) also includes the name of the student’s current faculty advisor and the name of at least one of the advisors in the CSE Advising Office.

2. Complete information about the program, its curricular requirements, requirements for admission to the major, information about technical elective and specialization options, computing facilities, honors programs, scholarship and undergraduate research opportunities, transfer credits, etc., as well as policies and procedures for graduation, is available to majors and pre-majors from the CSE Advising Office and on the program’s website. The CSE Advising Office also provides, where needed and appropriate, referrals to other services on campus such as counseling and consultation, study skills workshops, tutoring, etc.

3. For new (and relatively new) faculty, detailed information about the advising process and suggestions on how to work with undergraduate advisees is available through consultation with the advising coordinator in the CSE Advising Office (currently Dr Nikki Strader). In addition, an advising workshop for faculty advisors is presented by the chair of the Undergraduate Studies Committee and advising coordinator from the CSE Advising Office on an as-needed basis. This ensures that faculty advisors have a good understanding of the program, its requirements, the various technical elective options and courses, etc., and are able to provide appropriate advice to their advisees. Faculty advisors always have the option of consulting with the CSE Advising Office and/or with the chair of the Undergraduate Studies Committee on questions from their advisees that they are unsure about. Typically, faculty advisors tend to have many questions during their first couple of years and then they become comfortable dealing with most questions on their own.

4. Career guidance is provided by the CSE Advising Office, by faculty advisors, and by the Engineering Career Services (ECS) office. ECS serves CSE students who seek co-op and internship opportunities prior to graduation, as well as those seeking full-time career opportunities following graduation. ECS provides services to students for up to one year after completion of the BS-CSE degree. ECS is heavily utilized: in 2015-16, 88% of the BS graduates (across all the programs that ECS serves, not just BS-CSE) used at least one ECS service in their job searches and 84% of graduates with firm plans at graduation had engineering-related work experience.

E. Work in Lieu of Courses

There is no mechanism for awarding course credit for a student’s work experience. If a student, possibly

because of prior work experience, believes that he or she has a sufficiently thorough grasp of the material in a course, the student may contact the course coordinator to arrange to take an examination in which the student's proficiency can be demonstrated. The examination is typically similar to the final examination in the course, but without use of notations or appeal to details that may be specific to the manner in which the course is taught in the CSE Department so that the student is not disadvantaged by being unfamiliar with those specifics; in other words, the examination is intended to test the student's conceptual grasp of the principles as well as the technical details of the topic in question. If the student displays a satisfactory level of performance in this examination, he or she is awarded EM credit for the course. But the situation is rare; no student has requested such course credit in the last several years.

Advanced Placement (AP) credit is awarded based on the requirements set forth by legislation from the State of Ohio and is managed by the Office of the Registrar.

Dual enrollment credit not taken at Ohio State is treated as transfer credit and subject to the process outlined for Transfer Students above. Dual enrollment credit earned at Ohio State is part of the student's Ohio State record and treated as any other Ohio State course.

F. Graduation Requirements

The graduation requirements are summarized in the table.

Graduation Requirements	
	No. of Credit Hours
Engineering Core	20
CSE Core	22
Non-CSE Core	15
CSE Core Choices	20
Math/Sc. Electives	8
Technical Electives	17
General Education	24
Total	126

Name of Degree Awarded: Bachelor of Science in Computer Science and Engineering (BS in CSE).

Graduation Certification: All students complete an online application to graduate at least one semester in advance of their anticipated graduation. Dr. Nikki Strader, the senior advisor in the CSE Advising Office manages graduation. She reviews students' applications, and if the schedule projection the student lists will meet all degree requirements, approves the application in the online system.

Throughout the final semester, the college's graduation coordinator and CSE academic advisors monitor students' academic records to ensure all remaining degree requirements are in progress; e.g., checking that the student does not withdraw from a course that is required for graduation. At the end of the semester, immediately after final grades are posted, the academic advisors update each graduating student's status to show that degree requirements are either complete or incomplete.

The college's graduation coordinator confirms degree requirements are met according to the online degree audit system. Students whose degree requirements have been confirmed as complete by both the CSE academic advisors and the college graduation coordinator have their degrees conferred and receive diplomas at commencement. Students who did not complete requirements receive information about resolving issues

and applying to graduate in a future term.

Under exceptional circumstances, students may petition for course substitutions. For CSE courses, the departmental Undergraduate Studies Committee will approve such petitions only if, after careful consideration, it is determined that doing so would not materially diminish the strength of the student's program or compromise the extent to which the student outcomes are achieved. Petitions involving the general education portion or the engineering core of the program are first reviewed by the CSE Advising Office, and then forwarded to the Petitions Committee of the college. Again, these petitions are approved after careful consideration, provided doing so would not materially reduce the strength of the student's program.

G. Transcripts of Recent Graduates

The program is transcribed as "Bachelor of Science in Computer Science and Engineering" on the transcript, with the specialization option (one of Artificial Intelligence, Computer Graphics and Game Design, Database Systems and Data Analytics, Information and Computation Assurance, Computer Networking, Computer Systems, Software Engineering, and Individualized) completed by the student noted as a "sub-plan."

Criterion 2. Program Educational Objectives

A. Mission Statement

The Ohio State University's vision is to be "the model 21st-century public, land grant, research, urban, community engaged institution". The mission of the College of Engineering is, "[to be] the leader in engineering and architecture education among public universities by creating fundamental and practical knowledge and by preparing professionals ready to sustain and advance our society."

B. Program Educational Objectives (PEOs)

The educational objectives (PEOs) of the BS-CSE program are:

- I. Graduates of the program will be employed in the computing profession, and will be engaged in learning, understanding, and applying new ideas and technologies as the field evolves.
- II. Graduates with an interest in, and aptitude for, advanced studies in computing will have completed, or be actively pursuing, graduate studies in computing.
- III. Graduates will be informed and involved members of their communities, and responsible engineering and computing professionals who take appropriate account, in their professional work, of such issues as privacy, security, copyright etc. in ways that are consistent with the ACM/IEEE Code of Conduct.

These PEOs have been published on the CSE Department's BS-CSE program web site:

<http://go.osu.edu/CSEPEOsAndSOs>

The PEOs are also published on the College of Engineering's web site at:

<http://go.osu.edu/CoECSEPEOsAndSOs>

C. Consistency of PEOs with Mission

The first PEO, in particular that "graduates of the program will be ... engaged in learning ... and applying new ideas and technologies", will ensure that our graduates will contribute to "preparing professionals ready to sustain and advance our society." The second PEO, that (some) graduates will have completed (or be pursuing) advanced degrees in computing, will ensure that these graduates will be "creating fundamental and practical knowledge". The third PEO, that graduates will be responsible professionals and involved members of the communities, will ensure that they will be "community engaged" and that they will mature into "professionals ready to sustain and advance our society."

D. Program Constituencies

The main constituencies of the BS-CSE program are our current students, alumni, and employers of our graduates. One of the key results, over the last several years, from our exit surveys is the very high importance that graduating seniors place on ensuring that our graduates are employed in the computing profession and will be engaged in challenging activities related to recent developments in computing. The first PEO directly addresses this need. Alumni, via results of the alumni survey, have also expressed the importance of ensuring this.

Employers repeatedly stress the importance of ensuring that our students (and graduates) are well prepared to apply the newest ideas and computing technologies to solving a range of problems. Thus the first PEO directly addresses this need. But, unavoidably, given the tremendous pace of developments in the field, the BS-CSE program cannot ensure that its graduates thoroughly understand every recent development and

are well-versed in applying every idea, tool and practice. What it can do, and this is addressed by the second PEO of the program, is to ensure that students with the interest in and aptitude for pursuing the most advanced ideas in the field are prepared to pursue and succeed in graduate studies in computing.

Many employers also stress the importance of ensuring that our graduates act in ways that, while meeting their responsibilities to the employer, are also consistent with ethical and professional norms; as well as that they are involved in their communities since, indeed, the welfare and well-being of the community can have a major impact on businesses in the community. Alumni, via results of the alumni survey, have similarly, but to a lesser extent (see below), stressed the importance of our graduates' being responsible CSE professionals. The third PEO of the program directly meets this need.

E. Process for Review of PEOs

We use two processes for the review of PEOs. First is an *alumni survey*, conducted every other year, that is sent to students who graduated from the program two or three years prior to the date of the survey. One of the questions on the survey asks the respondent to rank, on a scale of *Not important*, *Somewhat important*, *Important*, *Very important*, through *Extremely important*, the importance of each PEO for the respondent's professional career. The first PEO, related to the graduates being employed in the computing profession and applying new ideas and technologies was rated, by most respondents, to be "very important" or "extremely important". The third PEO, related to graduates being informed members of their communities and responsible professionals, received a somewhat lower rating with most respondents rating it important or very important. The second PEO, related to the graduates pursuing advanced studies in computing, received the lowest rating of the three, the average being "important", although, interestingly, the distribution was bimodal with highs on the lower and higher levels of importance. The survey also asked the respondent to offer ideas for changes to any aspect of the program including the PEOs. Although there were suggestions on changes to specific courses etc., there were none with respect to the PEOs.

The second process for the review of PEOs involves the departmental *Advisory Board*. The board consists of a dozen or so members, many of whom obtained their undergraduate and/or graduate degrees from the department and have then gone on to distinguished professional careers, mostly in the IT industry with a few in academia. The idea is that the members of the board, because of their professional experience combined with their intimate knowledge of the department, will be able to provide deep insight into the needs of our constituents. The board meets once a year near the end of the Spring semester for an (almost) day-long meeting. One part of the meeting is devoted to a presentation about the undergraduate programs in the department including, specifically, the PEOs for the BS-CSE program. In the course of the presentation to the board during its Spring 2016 meeting, there was an extended discussion of the PEOs. During the earlier part of the presentation, one topic that had come up was the importance of ensuring that our students develop an understanding of the ACM/IEEE Code and ability to apply it in practice. The question then in the context of the PEOs was, why not mention the code explicitly in our PEOs? Prior to that point, our third PEO read as follows: "Graduates will be informed and involved members of their communities, and responsible engineering and computing professionals." The suggestion by the board was to try to revise this PEO to include mention of specific concerns such as privacy and include a reference to the ACM/IEEE Code.

Following the board meeting, the Undergraduate Studies Committee (UGSC), a standing committee consisting of a number of full-time faculty closely involved with the program, advisors from the Advising Office, and including student representatives, considered the board's recommendation and, after some discussion, came up with the current version of the PEO; and this was approved by the full faculty during Autumn 2016.

Criterion 3. Student Outcomes

A. Student Outcomes

Students in the BS-CSE program will attain:

- a. an ability to apply knowledge of computing, mathematics including discrete mathematics as well as probability and statistics, science, and engineering;
- b. an ability to design and conduct experiments, as well as to analyze and interpret data;
- c. an ability to design, implement, and evaluate a software or a software/hardware system, component, or process to meet desired needs within realistic constraints such as memory, runtime efficiency, as well as appropriate constraints related to economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability considerations;
- d. an ability to function on multi-disciplinary teams;
- e. an ability to identify, formulate, and solve engineering problems;
- f. an understanding of professional, ethical, legal, security and social issues and responsibilities;
- g. an ability to communicate effectively with a range of audiences;
- h. an ability to analyze the local and global impact of computing on individuals, organizations, and society;
- i. a recognition of the need for, and an ability to engage in life-long learning and continuing professional development;
- j. a knowledge of contemporary issues;
- k. an ability to use the techniques, skills, and modern engineering tools necessary for practice as a CSE professional;
- l. an ability to analyze a problem, and identify and define the computing requirements appropriate to its solution;
- m. an ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices;
- n. an ability to apply design and development principles in the construction of software systems of varying complexity.

The student outcomes are published on the CSE Department's web site at:

<http://go.osu.edu/CSEPEOsAndSOs>

They are also published on the College of Engineering's web site at:

<http://go.osu.edu/CoECSEPEOsAndSOs>

Outcomes (a) through (k) correspond closely to the EAC Criterion 3 outcomes but, in some cases, are elaborations of those outcomes. These elaborations are based mainly on the outcomes/characteristics of the CAC Criterion 3; for simplicity, in the rest of this document, we frequently use the term "outcomes" to refer also to "characteristics" of the CAC Criteria. Our outcomes (a) through (k) serve to specialize the EAC outcomes to apply to *computer science and engineering*. Thus, outcomes (a) and (c) above were obtained as a natural combination of the corresponding outcomes in the EAC and CAC Criteria 3. Outcome (b) of the CAC Criterion was substantially different from (b) of the EAC Criterion; hence, we included both in our set; (b) above corresponds to the EAC outcome (b), (l) above corresponds to the CAC outcome (b).

Outcomes (f)–(h) are natural combinations of the corresponding outcomes from the EAC and CAC Criteria. Outcome (k) is a combination of (k) of the EAC Criterion and (i) of the CAC Criterion. Outcomes (m), (n) are outcomes (j), (k) of the CAC Criterion. The remaining outcomes are based directly on the corresponding outcomes in the EAC Criterion. In summary, our outcomes set is essentially a *union* of the EAC Criterion 3 outcomes and the CAC Criterion 3 outcomes.

B. Relationship of Student Outcomes to PEOs

The student outcomes (a) through (n) contribute directly to preparing graduates to attain each of the three PEOs, I, II, and III. Thus outcomes (a) through (c), (e), and (k) through (n) ensure that graduates will be well prepared to succeed in challenging positions in the computing profession thus contributing to achieving PEO (I). Outcomes (d) and (g) will prepare graduates to work effectively as part of teams of CSE professionals, further contributing to their success as CSE professionals. Outcome (i), along with the solid technical background ensured by outcomes (a), (b), (e), and (l) through (n) will prepare graduates to achieve PEO (II), pursuit of advanced/graduate studies in computing. Outcomes (f), (g), (h), and (j) will prepare graduates to be informed and involved members of their communities and to be responsible engineering and computing professionals, thereby helping them achieve PEO (III).

Table 1. Contribution of Student Outcomes to PEOs

PEO	a	b	c	d	e	f	g	h	i	j	k	l	m	n
I. Grads will employed in computing profession, learning ... applying new ideas & technologies ...	***	**	***	***	***	**	**	*	**		***	***	***	***
II. Grads with interest/ aptitude will be pursuing advanced studies ...	**	**	**	**	***	**	***	**	***		***	**	***	**
III. Grads will be informed/ involved members of communities and responsible professionals ...	*	**	***	***	**	***	***	***	***	***	**	*	**	*

Table 1 summarizes the contributions made by the various outcomes to preparing graduates to achieve the three PEOs, with “*”, “**”, “***” indicting increasing levels of contribution made by the respective outcomes. Thus outcome (a) contributes substantially to PEO I, moderately to PEO II, and minimally to PEO III.

C. Process for Establishment and Revision of the Student Outcomes

The primary process for establishing and reviewing student outcomes consists of the deliberations, in its regular meetings, of the Undergraduate Studies Committee (UGSC). As noted earlier, the committee consists of a number of full-time faculty closely involved with the program, advisors from the Advising Office, and student representatives. Ideas for changes to the outcomes are presented to the departmental faculty, as a whole, for its approval.

A key input for UGSC’s process for review of student outcomes comes from the *Exit Survey*, completed by graduating seniors typically during their last semester. One part of the exit survey asks the respondent to rank, for each student outcome, its importance on a scale of *very-unimportant/ somewhat-unimportant/ somewhat-important/ very-important*. The responses are weighted using weights of 0%, 33%, 67%, and 100% to the four possible ratings. Overall, the graduating seniors felt that the outcomes were appropriate with the ones related to computing knowledge and abilities, such as outcomes (a), (c), (k), (l), receiving very high ratings; and ones related to societal issues, such as outcomes (h) and (j), receiving somewhat lower ratings.

D. Enabled Student Outcomes/Characteristics

As described in Section 3.A, our student outcomes, (a) through (n), in effect, is a union of the EAC Criterion 3 (a)-(k) outcomes, the CAC Criterion 3 (a)-(i) characteristics, and the CAC characteristics (j)-(k) applicable to Computer Science programs. The table below shows the correspondence between the CAC characteristics and the student outcomes of the program. The first row of the table lists the CAC characteristics and the second row lists the particular student outcome that corresponds to that characteristic.

CAC characteristic	a	b	c	d	e	f	g	h	i	j	k
Program's student outcome	a	l	c	d	f	g	h	i	k	m	n

All these outcomes are enabled in a range of required courses as shown in Tables 2 and 3. The outcomes listed in the top row of the tables are our student outcomes; the corresponding CAC characteristic is listed (in parentheses) immediately below each student outcome; note that three of our student outcomes do not have a directly corresponding CAC characteristic. They are included in the tables since the information in the tables comes directly from the syllabi, see Appendix A (page 65 onward), for the courses in the first column and those syllabi include information about the contributions made by each course to each of our student outcomes, including the ones that do not have a directly corresponding CAC characteristic.

As in Table 1, “*”, “**”, “***” in Tables 2 and 3 indicate increasing levels of contribution made by the courses in the first column of the tables to the various program outcomes and, hence, the corresponding CAC characteristics. However, the notation in the current tables has a more specific definition, and is the one used in the syllabi in Appendix A:

- “***” means the substance of the student outcome is a primary theme of the course; a significant fraction of course time (7 hours or more, often woven through the fabric of the course) is directly related to this outcome.
- “**” means the substance of the outcome is a secondary theme of the course; a smaller fraction of course time (3–6 hours) is directly related to this outcome.
- “*” means the substance of the outcome is not a theme of the course, but it is still treated in the course a non-trivial way; a smaller fraction of course time (perhaps 1-2 hours) is directly related to this outcome.

More complete details of several of the courses listed in Tables 2 and 3 are discussed under Criterion 5 (page 40). Here, we note the following. The first set of courses, labeled “CSE Core”, consists of two courses on software development, including key ideas related to developing reliable software; two courses on “systems”, the first on computer systems including such topics as CPUs, memory structure, etc., the second on operating systems; and two courses on theoretical foundations, the first on discrete structures, the second on algorithms and data structures. These six courses are required of all students and provide a solid foundation in the discipline. As such, as shown in the table, each of these courses contributes to several of our student outcomes and enable the corresponding CAC characteristics.

CSE 2501 is a one-credit hour course on social, ethical, and professional issues in computing that includes oral presentations by students, in addition to student papers, on appropriate topics; Phil 1338 is a 4-credit hour course on the same topic, taught by the Philosophy Department, with the additional course time being devoted to a thorough coverage of ethical theory. Students are required to take one of these courses; if they take Phil 1338, the additional 3 credit hours count towards their *general education* requirements. Thus these courses enable the characteristics related to communication skills, professional and ethical issues, impact of computing on society, etc.

The next four pairs of courses are the *core choice pairs*. Each student is required to take at least one course from each pair; if the student takes both courses of a given pair, the second course counts as a technical elective in that student's program. The courses in each pair are somewhat similar in nature. For example, CSE 3321 of the second pair is on formal languages and automata theory; the other course, CSE 3341, is on programming language concepts. By requiring each student to take one course from each of the four pairs, the program ensures that the student acquires sufficient breadth in more advanced CS topics that build on the six foundational core courses. At the same time, by allowing the student to take both courses in the pair with the second course counting as an elective, students interested in that particular set of topics can go into greater depth. Each of these courses enables a range of characteristics although the extent to which they contribute to specific characteristics varies with the course. Thus, for example, CSE 3341, given the extensive discussion of how programming languages are implemented and the associated project in the course, contributes strongly to characteristic (c); by contrast, CSE 3321, given its theoretical focus, does not contribute as much to enabling this characteristic.

Table 2. Curriculum to Student Outcomes (part 1)

Course	a (c.a)	b (-)	c (c.c)	d (c.d)	e (-)	f (c.e)	g (c.f)	h (c.g)	i (c.h)	j (-)	k (c.i)	l (c.b)	m (c.j)	n (c.k)
CSE Core Courses														
CSE 2221	***	*	***		**		*		*		***	**	*	***
CSE 2231	***	*	***	**	**		*		*		***	**	*	***
CSE 2321	***		**		*				*		**	**	**	
CSE 2331	***	*	**		**				**		**	**	**	*
CSE 2421	**	**	***		**						***	***	***	**
CSE 2431	**	**	**		***				*		***	**	***	**
CSE 2501/ Phil 1338						***	**	***	*	**				
						***	**	***	*	***				
Core Choice Pairs														
CSE 3231	*		**	*	**	*	*	*	*	*	**	**	**	**
CSE 3241	***	*	**	***	**		*		*		***	*	*	*
CSE 3321	***		*		***				**		**	**	*	
CSE 3341	***	**	***	*	***	*	*	*	**	*	***	***	***	***
CSE 3421	***	*	**		**				*	**	*	*	**	*
CSE 3461	**	**	*	**	*	*		*	*	**	**	*	*	*
CSE 3521	***	*	**		**	*		*	*		**	**	*	**
CSE 3541	***	**	**		*	*	*	*	*	*	**	***	***	**
Junior Project Courses														
CSE 3901	**		***	***	**	*	**		*		***	*	*	**
CSE 3902	**		***	***	**	*	**		*		***	**	**	**
CSE 3903	**		***	***	**	*	**		*		***	*	*	**
Capstone Courses														
CSE 5911	***	*	***	***	***	**	***	*	***	**	***	***	***	***
CSE 5912	***	*	***	***	***	**	***	*	***	**	***	***	***	***
CSE 5914	***	*	***	***	***	**	***	*	***	**	***	***	***	***
CSE 5915	***	**	***	***	***	**	***	**	***	**	***	***	***	***

The next set of three courses are the *junior project courses*; the student is required to take one of these courses. Each course culminates in a medium-sized team project, with the different courses focusing on

different sets of topics ranging from web-apps to interactive games to system software². Although each course is centered around the team project, there is also a fair amount of instruction devoted to important tools and techniques and corresponding (smaller) programming assignments; this is because most students in the courses, although they would have heard of the particular tools and techniques, would not have much experience with them, including best approaches to using them. Each course also has a strong focus on principles related to effective software development as well as to communication and team skills; thus each enables a wide range of characteristics.

At the same time as the junior project course, or following completion of the course, the student will typically take a number of *technical elective* courses but the particular courses the student takes and hence the corresponding contributions to the various characteristics will vary substantially from one student to the next. Hence, these courses are not included here.

The final set of courses in Table 2 is the set of four *capstone design courses*. As in the case of the set of junior project courses, the student is required to take one of these courses; but unlike in the junior project courses, no significant class time is, typically, devoted to instruction about tools or techniques. Instead, the focus of the course is almost entirely on the large-sized team project. The capstone course serves as the *culminating* piece of the student's program, where the student is expected to apply the knowledge and skills developed throughout the program and work with the rest of his/her team to engage in a significant design and implementation project to meet the needs of the project sponsor. Each of these courses is organized in a similar manner, the primary difference between them being in the specific area that the team project relates to. In addition to the focus on the technical aspects of the projects, each course also focuses on honing the students' team-working skills as well as communication skills. At the end of each semester, each student team from each of the capstone courses from that semester is expected to present its work at a public poster session which also typically includes demo's of the team's (prototype) system. The session is attended by invitees including, especially, professionals from the local IT industry. The teams are also expected to be aware of any ethical and societal issues that their project may raise and present them, as appropriate, in their posters or in answering questions that the visitors to the poster session may have. Thus these courses contribute to each of the program's student outcomes and enable all of the CAC characteristics.

Table 3 shows how various non-CSE courses that students in the program are required to take enable several of the program's student outcomes/CAC characteristics. ECE 2020 is a 3 credit-hour course on analog circuits and gives students a basic introduction to circuits. ECE 2060 is 3 credit hour course on digital logic and develops students' basic intuition about digital circuits. Engr 1181, 1182 are a year-long sequence of two 2 credit-hour courses taken by all engineering (pre-)majors and help lay the foundation for an engineering orientation in the students and contributes to a range of outcomes.

Math 1151, 1172 is a one-year long calculus sequence; 1172 is designed specifically for engineering majors. Math 2568 is a course on linear algebra which serves as an important prerequisite for several of the technical elective courses such as those on parallel computing, machine learning, and neural networks. Math 3345 is a three credit-hour course on foundations of mathematics; it builds on CSE 2321 and solidifies students' understanding of key ideas such as inductive arguments. These courses mainly contribute to enabling the characteristics related to math abilities. Stat 3470 is a standard course on statistics and probability which

²CSE 3903, the course on system software, although based on a course we offered for many years under the quarter system, has not been offered since Ohio State switched to semesters in the Summer of 2012. It will be offered for the first time in Autumn '17. Please see Section 4.B on *Continuous Improvement* for an explanation of how we decided to reintroduce a project-oriented systems software course.

provides important concepts that help solidify students' grasp of arguments and results concerning tradeoffs and resource usage in software systems. Phys 1250 is a standard 5 credit-hour course on physics with an extensive lab component that sharpens the basic engineering knowledge and skills of the student; it contributes to enabling a range of related characteristics.

Table 3. Curriculum to Student Outcomes (part 2)

Course	a (c.a)	b (-)	c (c.c)	d (c.d)	e (-)	f (c.e)	g (c.f)	h (c.g)	i (c.h)	j (-)	k (c.i)	l (c.b)	m (c.j)	n (c.k)
ECE 2020	***	***	*	**	***						***			
ECE 2060	***	***	*	**	***						***			
Engr 1181, 1182	***	**	*	**	***	*	**	*			***			
Math 1151	***	*			*									
Math 1172	***	*			*									
Math 2568	***		*								*			
Math 3345	***				**						*		*	
Stat 3470	***	**	*		*						*			
Phys 1250	***	***		*	*									
Engl 1110							***							
Engr 2367 Second writing*				*		*	***	**	*	**	*			
Social sciences						***	**	**		**				
Historical study						*	**	*		*				
Arts & hum.						*	**	*		**				

English 1110 is a 3 credit-hour course focused on developing students' writing skills and primarily enables student outcome (g) (characteristic (f)). Students are also required to take a *second writing course*; a range of these, in various disciplines, is available but many students take Engr 2367, American Attitudes About Technology, to meet this requirement. Each second writing course not only further develops students' writing abilities, it also contributes to students' understanding of societal issues although the particular topics that the different courses focus on vary from course to course. Thus the second writing course contributes to enabling the CAC characteristics (c), (f), (g), (h), and (i). The last three rows in the table correspond to general education requirements related to social science, historical study, and arts & humanities which we will see in greater detail under Criterion 5.

Criterion 4. Continuous Improvement

A. Student Outcomes

Student Outcomes (SOs) are assessed using a three-pronged approach for assessing the extent to which the various SOs are being attained. Two of the assessments are *direct* assessments, the third is an *indirect* assessment. The details of the direct assessments are considered in A.1 and A.2 below; details of the indirect assessments appear in A.3.

A.1 Program Outcomes Achievement Test (POCAT)

POCAT (Program Outcomes Achievement Test) is an *exit test* that all BS-CSE majors are required to take prior to graduation. When a BS-CSE major applies for graduation, generally the semester before the expected date of graduation, he or she is asked to sign up to take POCAT during the next semester. The test is offered once each semester, typically in the fifth or sixth week of the semester. Following the test, refreshments, typically pizza and pop, are served.

Although all CSE students are required to take the test, the performance on the test does *not* affect the grades of individual students in any courses, nor are records retained of how individual students performed on the test. When a group of students takes the POCAT, each student receives a unique code that appears on the student's test but only the individual student knows his or her code. Students are instructed *not* to write their names or other identifying information on their tests. Once the tests have been graded, summary results, organized by this code, are posted on electronic bulletin boards so an interested student can see how well he or she did and how his or her performance compared with that of others who took the test; indeed, if a student forgets his/her code before the results are posted, there is no way to recover it nor any way for anyone to find out how the student performed. This was a deliberate decision since we did not want the students to spend a lot of time preparing for the test. The goal of the test is to help assess the *program*, not the individual students, by assessing the extent to which the students have acquired and internalized the knowledge and skills associated with the various outcomes of the program, not assess the individual students. Initially, there was a concern that if the individual students' performance on the test did not affect them in any tangible way, they would not take the test seriously. Our experience with the test since it was instituted has eliminated that concern; most students seem to actually enjoy taking the test and take it quite seriously. Indeed, students have occasionally been noticed having heated debates about particular questions in the pizza session following the test.

The questions on POCAT are based on topics from a number of required courses, many of the core-choice courses, and the most popular elective high-level courses related to a variety of key topics such as software engineering, formal languages and automata theory, databases, programming languages, operating systems, computer architecture, algorithm analysis, AI, computer graphics, etc. Each question is multiple-choice with two or three questions in some topics and one in others. But they are not necessarily the kind of questions one might find in, say, the final exams of these courses. Instead, they are more conceptual and are designed to test how well students understand key concepts from across the curriculum. Some questions attempt to probe whether a student is able to relate concepts presented in one course to problems and concepts presented in a later, related course. For example, a question may probe whether a student is able to apply the concept of finite state machines (from the course on automata theory) to the problem of designing a tokenizer for a compiler for a programming language.

The ideal POCAT question not only has a specific correct answer but has *distractors* that are so chosen

that they correspond to common misconceptions that students might have about the particular concept. It is for this reason that the summary results of a POCAT includes information not only about the percentage of students who answered a given question correctly but also the percentages of students who chose each of the distractors, in other words how many students harbored the particular misconceptions represented by the various distractors about the underlying concept(s). Each question is typically the result of discussions among faculty involved with the corresponding courses. The key goal of the test is to help faculty use the results to identify specific weaknesses in particular courses and help improve the curriculum.

There is one unusual feature of the POCAT questions that is worth remarking on. Each question on the test has, as one of the choices (typically the last one), an answer along the lines of “I don’t know”. The instructions for the test suggest that the student should pick that answer if he or she has no idea what the correct answer is. Since their performance on the test will have no impact on their record, students who do not know the answer to the question and *know that they do not know*, pick this answer. This means we do not have to worry about the student trying to make guesses and confounding our attempt to pin down misconceptions that he or she may have. Moreover, students choosing this answer deliberately also represents their evolution from being students to becoming CSE professionals following their impending graduation. As students, their main goal tends to be to get the best possible scores in the tests; hence they make even wild guesses if there is a possibility that doing so would improve their scores. As professionals, their goal should be to solve problems; and the first step in successfully doing so is recognizing, where appropriate, that they do not know the answer to some question, so they can seek suitable assistance.

Given the nature of the questions on POCAT, the grading of the tests is essentially mechanical. The faculty members responsible for each question also provide an estimate of the percentage of students they expect to answer the question correctly as well as the particular outcomes that the question is related to. All of this information is included in the summary results that are produced. The final aspect of POCAT is the *evaluation* of the results and arriving at ideas for improvement. The main discussion of the results takes place in the program’s Undergraduate Studies Committee (UGSC). The committee consists of several faculty including some who regularly teach the courses included in POCAT; student representatives; and the staff advisor (who also takes care of administering the test). The committee considers such issues as: (a.) Are there any questions for which the percentage of students who got the correct answer differs substantially from the figure that the faculty involved with the corresponding course(s) expected? (b.) Are there any questions for which particular incorrect answers, i.e., distractors that represent particular misconceptions, especially more popular than other incorrect answers? (c.) Are there any longer term trends with respect to questions related to particular concepts? The student members on the committee often provide insight into particular misconceptions that students might have by noting, for example, that a course taught by a particular instructor takes a particular approach to an idea or a topic and that that might lead to certain specific misconceptions with respect, perhaps, to a related concept. And faculty who have taught the particular courses or related courses bring important insights into analyzing and understanding the results.

The student outcomes that POCAT allows us to assess are:

- a. an ability to apply knowledge of computing, mathematics including discrete mathematics as well as probability and statistics, science, and engineering;
- b. an ability to design and conduct experiments, as well as to analyze and interpret data;
- c. an ability to design, implement, and evaluate a software or a software/hardware system, component, or process to meet desired needs within realistic constraints such as memory, runtime efficiency, as well as appropriate constraints related to economic, environmental, social, political, ethical, health

- and safety, manufacturability, and sustainability considerations;
- e. an ability to identify, formulate, and solve engineering problems;
- f. an understanding of professional, ethical, legal, security and social issues and responsibilities;
- g. an ability to communicate effectively with a range of audiences;
- k. an ability to use the techniques, skills, and modern engineering tools necessary for practice as a CSE professional;
- l. an ability to analyze a problem, and identify and define the computing requirements appropriate to its solution;
- m. an ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices;
- n. an ability to apply design and development principles in the construction of software systems of varying complexity.

Item (g), ability to communicate effectively with a range of audiences, may seem surprising. How can a test such as POCAT allow us to assess this outcome? The reason it is here is that one of the questions in the test which is based on the junior project course, concerns what issues one should be aware of when creating documentation of a software system and this, of course, relates to (g). Of course, there are other assessments, described later, of this outcome.

The UGSC maintains a website that documents the results of various offerings of the POCAT. The site also includes a (protected) evaluation page that contains a summary of the committee’s evaluation of the test results and ideas for possible improvements; and a *question bank* of possible questions for use in future POCATs. Copies of recent POCATs will be available during the site visit.

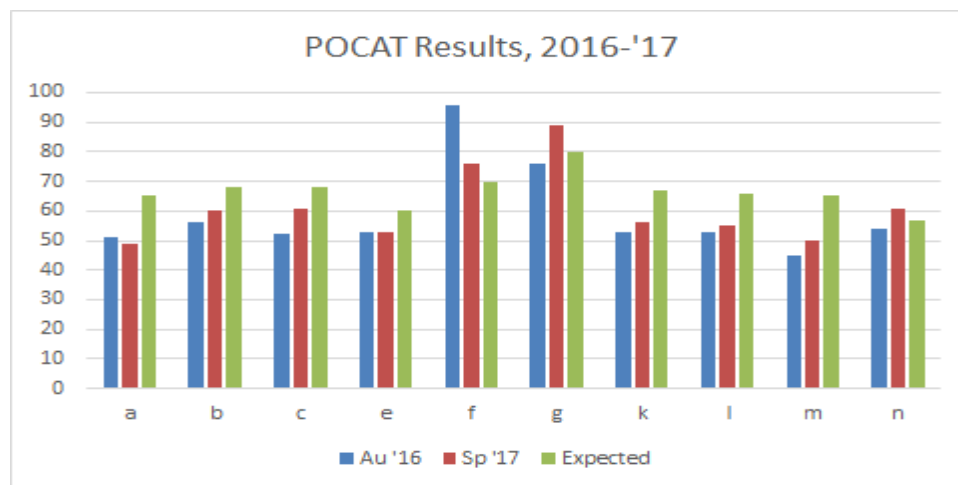


Figure 1: POCAT Summary Results (2016-'17)

Fig. 1 shows the results of the POCAT for Au '16 and Sp '17. One important points worth mentioning here is that, given the broad nature of many of the outcomes, several questions on the POCAT will relate to the

same outcome. Thus the results shown in the figure for each outcome was obtained by averaging the student performance or the expected levels of achievement over the questions corresponding to that outcome. The discussion in UGSC and among the broader faculty, however, focuses on individual questions and student performance in them, rather than averages over multiple questions.

A.2 Rubrics

	1	2	3	4
Oral Communication Skills				
a. Organization	Audience cannot understand presentation because of poor organization; introduction is undeveloped or irrelevant; main points and conclusion are unclear;	Audience has difficulty following presentation because of some abrupt jumps; some of the main points are unclear or not sufficiently stressed;	Satisfactory organization; clear introduction; main points are well stated, even if some transitions are somewhat sudden; clear conclusion;	Superb organization; clear introduction; main points well stated and argued, with each leading to the next point of the talk; clear summary and conclusion.
b. Mechanics	Slides seem to have been cut-and-pasted together haphazardly at the last minute; numerous mistakes; speaker not always sure what is coming next;	Boring slides; no glaring mistakes but no real effort made into creating truly effective slides;	Generally good set of slides; conveys the main points well;	Very creative slides; carefully thought out to bring out both the main points as well as the subtle issues while keeping the audience interested.
c. Delivery	Mumbles the words, audience members in the back can't hear anything; too many filler words; distracting gestures;	Low voice, occasionally inaudible; some distracting filler words and gestures; articulation mostly but not always clear;	Clear voice, generally effective delivery; minimal distracting gestures, etc., but somewhat monotone;	Natural, confident delivery that does not just convey the message but enhances it; excellent use of volume, pace etc.
d. Relating to audience	Reads most of the presentation from the slides or notes with no eye contact with audience members; seems unaware of audience reactions;	Occasional eye contact with audience but mostly reads the presentation; only brief responses to audience questions;	Generally aware of the audience reactions; maintains good eye contact when speaking and when answering questions;	Keeps the audience engaged throughout the presentation; modifies material on-the-fly based on audience questions and comments; keenly aware of audience reactions.

Figure 2: Rubric for CSE 2501/Phil 1338 (part 1)

The second direct assessment mechanism is a set of three *rubrics* that allow us to assess the extent of achievement of a number of outcomes. We consider each one in turn. The first rubric which appears in Figs. 2 and 3, is for assessing the extent to which CSE 2501/Phil 1338 contribute to communications skills, ethical and professional issues, etc. For each of these, several dimensions are defined by the rubric and, for each dimension, four levels of achievement specified. Fig. 2 depicts the portion related to oral communication skills. Fig. 3 depicts the dimensions related to written skills and to ethical, professional,

	1	2	3	4
Written Communication Skills				
e. Presentation of ideas and organization of the paper	Bland presentation; sequencing and pace of topics seems random; doesn't lead up to any clear conclusions;	Some of the ideas are presented well; others are lacking; offers plausible conclusion(s);	Ideas are well organized and help the reader move along; the key points are presented but does not demonstrate in-depth understanding; leads up to convincing conclusion(s);	The paper is clear and focused; relevant, quality details give the reader important information; helps the reader develop insight into the topic.
f. Style	Occasional problems with word choices and sentence structure, leaving the reader unsure of the meaning; often resorts to jargon/ clichés;	Words and sentences are adequate in general but lack energy; reader has to struggle to keep reading to the end;	Good writing style; sentences flow smoothly and evenly;	Compelling writing style; connects strongly with the reader and keeps him or her engaged right to the end.
Ethical/professional issues, local/global impact, contemporary issues				
g. Understanding of ethical and professional issues	Little or no understanding of professional/ethical issues even where there are serious questions involved;	Some consideration of professional, ethical issues raised directly by the topic under discussion;	Good understanding of and reasonable analysis of all the essential relevant issues.	Deep understanding of the professional issues involved and the ethical implications of the topic under discussion; careful, convincing analysis of all relevant factors.
h. Awareness of implications to society at large	Little or no understanding of (or interest in?) implications to society related to the topic under discussion;	Moderate understanding of the implications to society related to the topic under discussion;	Good understanding of the implications to society of the topic, as well as its relation to general societal issues;	Deep understanding of the immediate and longterm implications to society of the topic under discussion, and the related potential benefits and risks to society.
i. Awareness of contemporary issues (political, cultural, ...)	Little or no understanding of (or interest in?) contemporary issues directly related to the item under discussion;	Moderate understanding of the main relevant contemporary issues directly related to the item;	Good understanding of all the relevant contemporary issues directly related to the topic;	Deep understanding of all the relevant issues, whether political, cultural or other, related to the topic, as well as of issues that may be only tangentially related; good analysis of the issues and possible impacts on various aspects of society.

Figure 3: Rubric for CSE 2501/Phil 1338 (part 2)

and social issues. While a student's abilities related to the other dimensions in this rubric will be evidenced primarily during that student's oral presentation(s) and/or paper(s), the student's abilities with respect to the dimensions in this category are likely to be reflected also and, possibly to a greater extent, in the types of questions that he/she raises during presentations by other students and the types of discussions he/she

engages in. For example, if there is a presentation that raises questions related to the security of electronic voting machines, that should present an opportunity, for all students at that session, to engage in a serious discussion about the impact on society of real or perceived insecurity of those machines; similarly for presentations that are related to cyber-espionage; etc. The instructor keeps this in mind when arriving at the assessment of student’s abilities with respect to the dimensions in this category.

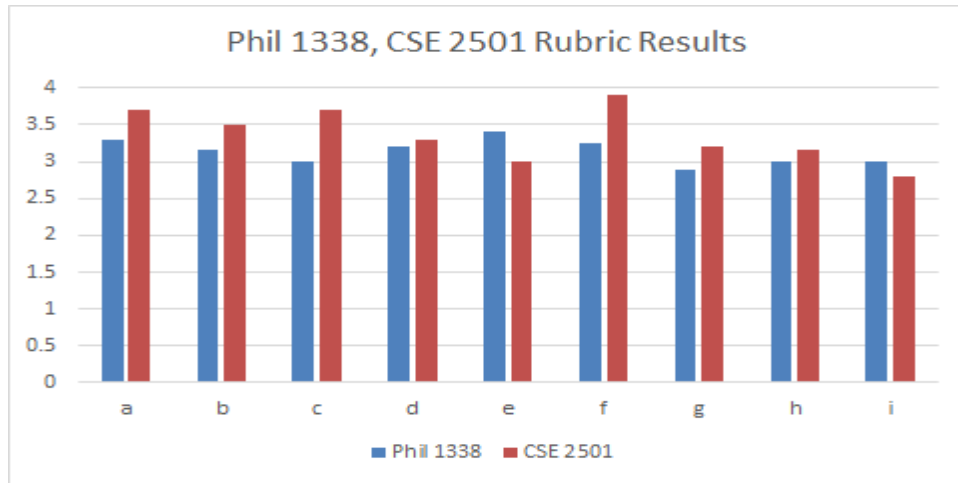


Figure 4: CSE 2501, Phil 1338 Rubric Results (2016-'17)

The results of the evaluation using this rubric appear in Fig. 4 with the labels along the x-axis corresponding to the respective dimensions included in the rubric, see Figs. 2 and 3. These results are presented at a UGSC meeting by the instructors for the two courses and discussed by the committee.

Note: It should be reiterated that the labels along the x-axis of the chart do *not* refer to the *student outcomes*. Indeed, (a) through (f) in the rubric and in the results chart are all dimensions related to student outcome (g), effective communication; and (h) and (i) in the rubric and in the results chart here are dimensions related to student outcomes (f) and (h).

	1	2	3	4
a. Problem formulation	Unclear formulation; Relation to original requirements not mentioned, nor changes in scope	Mostly clear but relation to original requirements and/or rationale for changes in scope not clear.	Satisfactory formulation; Relation to client's original requirements, changes in scope and rationale thereof mostly clear with some gaps.	Excellent problem formulation; Relation to client's original requirements and changes in the scope, if any, explained and justified.
b. Design approach	Poor design; No exploration of alternative approaches; No attention to effective use of resources.	Some attention to alternative design approaches but not a careful analysis of their advantages/disadvantages; Team picked an approach based on superficial comparisons.	Careful consideration of alternative design approaches and their resource requirements; Not all trade-offs fully analyzed.	Thorough consideration and evaluation of a good set of design approaches; Careful analysis of resource requirements of each and the resulting trade-offs; Where appropriate, client's input sought before making final choice.
c. Implementation (including resource considerations, testing approach, adherence to standards, etc.) If implementation is incomplete, assess based on current state.	Not even basic consideration of memory and other resource requirements; System is very buggy. No systematic testing, nor use of standard approaches/ processes such as agile.	Limited amount of attention to memory and other resource usage; Team has followed a standard (agile/ waterfall/ ...) process but not consistently. Team has put some effort into systematic testing but some bugs remain.	Careful attention to memory and other resource usage and how system might scale with increased demand for services; The team adopted and mostly followed a standard process in its work; The team used a systematic approach to testing and the system seems bug-free.	Meticulous attention to resource usage and to user interface factors; Has ensured that system can evolve to deal with increased demand for services. Team has consistently followed a standard process in its work; Adopted a suitable testing approach, followed it systematically, and thoroughly tested the system. Client involved at all appropriate points.
d. Other factors such as use of professional tools, security considerations, ethical issues.	Little attention paid to factors beyond minimal functional requirements; No systematic use of professional tools; Ethical issues related to system and impact on society not considered.	Some use of common tools seen in earlier courses; Modest effort to ensure basic reliability and security properties; Mostly ignored ethical issues and potential impact on society of systems of this kind.	Good use of professional tools going beyond ones previously seen; System designed to be reliable/ secure under normal operation and under stress; Some consideration of impact of system on society including potential harm system may cause in some situations.	Excellent use of professional tools and systems, identified by careful research; Detailed analysis of security holes with implementation designed to deal with ones that can be reasonably handled and documentation of rest; Analysis of ethical issues related to system and its impact on society including implications of ACM/IEEE Code as it applies to the system, in consultation with client.

Figure 5: Rubric for Assessing Capstone Course Projects (part 1)

The next rubric, which appears in Figs. 5 and 6, is for use by instructors of the capstone design courses to help assess the extent of student achievement of the key student outcomes that these courses contribute to. The first four dimensions, which appear in Fig. 5, address *problem formulation*, *design approach*, *implemen-*

tation, and *other factors* such as use of appropriate tools etc. Again, for each dimension, the rubric specifies four levels of achievement. The last three dimensions (Fig. 6) deal with effectiveness of the teamwork, effectiveness of the team’s written documentation, and effectiveness of oral presentations.

	1	2	3	4
e. Effectiveness as a project team	Dysfunctional team; Members blamed each other for problems in project; Team spirit completely lacking.	Team functioned at minimal level of effectiveness; Members concentrated on distinct parts of system without concern for impact on other members’ work. In presentations, individual members did not make any attempt to help other members address audience questions.	Generally effective team; Members interested in presenting a positive picture of the team’s work; Members helped each other during team presentations. Team members had a general idea of other members’ work.	Very effective team; Team members went out of the way to describe how each member contributed to various aspects of project. Team worked as a cohesive unit during presentations, with members seamlessly handing over the conversation from one to another to answer questions, etc.
f. Effectiveness of written communication	Documentation consisted of little more than (poorly commented) system code; Hardly any mention of system’s scope, design rationale, implementation choices, etc.	Documentation mostly effective at conveying main aspects of project including scope and design/ implementation choices (but not the rationale behind the choices); Skimpy user manual; Information future teams may need to evolve system lacking.	Team’s documentation clearly presented all important aspects of project: original scope, changes made, implementation choices, processes used etc. Test scripts and important parts of code explained; Lessons learned were summarized; Well-written user manual	Excellent documentation; Project’s original scope, design choices, relevant code details, processes and tools used, and test scripts all described in a structured and integrated manner; Information to enable future designers to evolve system included; Well-designed user manual provided all necessary information; Illustrations, graphics, and layout executed to excellent effect.
g. Effectiveness of oral communication	Presentations not effective; Failed to present information about some essential aspects of project; Team members ineffective in responding to even simple questions.	Presentations adequate at conveying main ideas behind project including design choices, etc., but not engaging or inspiring. Team responded appropriately to specific questions about specific aspects of project but some responses were unclear.	Presentations were well done and presented all important aspects of project; Team explained rationale behind its choices and summarized important lessons learned; Responses to questions were reasonable although some went into too much technical detail, compromising their effectiveness.	Team’s presentations were polished, informative and engaging. In answering questions, the team provided the right level and type of detail for questions ranging from implementation detail to test methodology to future evolution of project.

Figure 6: Rubric for Assessing Capstone Course Projects (part 2)

One important point worth noting is that the effectiveness of oral communication here is, in part, a reflection of the *team’s* effectiveness since the presentations were all done by the team as a whole.

The figure shows the results of the use of the rubric for all seven dimensions of the rubric. The rubrics were completed by the instructors of each of the four capstone courses and combined to obtain the results shown in Fig. 7.

One important activity, as described earlier (page 23), that is part of each capstone course is the *poster session*. Each student team from each of the capstone courses from that semester is expected to present its work at a public poster session which also typically includes demo's of the team's prototype system. The session is attended by invitees including, especially, professionals from the local IT industry. All members of all the teams are expected to attend the session, participate in the demos of the prototype systems and answer questions that the visitors may have.

Our final rubric, which appears on the next page, is for use at the poster session. In designing the rubric, we decided that it would make sense to include essentially the same dimensions as for the instructor with two changes. First, given that the visitors will be looking at the team's poster and interacting with the team members at the same time, it seemed appropriate to combine the two dimensions of that rubric that are related to communication effectiveness into a single dimension for this rubric.

Second, and perhaps more substantive, is that rather than specifying distinct levels of achievement for each dimension, we decided to specify a set of characteristics corresponding to a high-level of achievement for the given dimension and have the visitor determine to what extent he/she agreed that the given team and its poster demonstrated those characteristics. The four possible levels of agreement were converted into the numerical scores of 2 through 5 in arriving at the average scores, shown in Fig. 8, for each dimension for the poster session that was held at the end of Spring '17.

Again, please note that the labels along the x-axes of these charts refer to the dimensions specified in the rubric, not to the student outcomes. Of course, the dimensions in the rubrics correspond to particular outcomes.

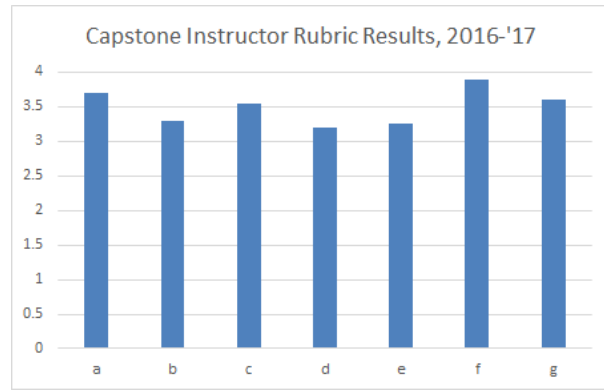


Figure 7: Capstone Instructor Rubric Results

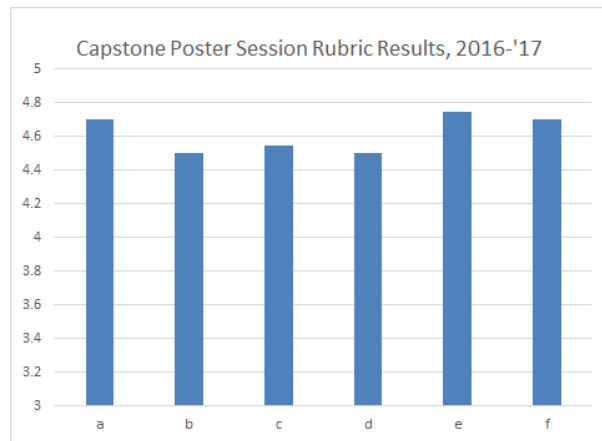


Figure 8: Capstone Instructor Rubric Results

Assessment of Poster Presentations in CSE Capstone Design Courses

Code of capstone project being evaluated:

Information about person completing this rubric (check all that apply):

- CSE/CIS student
 non-CSE/CIS student
 CSE faculty member
 non-CSE faculty member
 IT professional
 other (_____)



This rubric and the assessments it provides are an important part of our continuous improvement process designed to help us identify ways to improve our BS program. The rubric includes six dimensions, these being Problem formulation, Design approach, Implementation approach, Other factors, Effectiveness as a team, and Communication effectiveness, along which the capstone project should be evaluated. For each dimension, there is a description of the corresponding characteristics that are expected of the ideal capstone team and its work. The visitor to the poster session is asked to consider the following statement for each dimension: “Based on what I saw and heard at the poster session, this project team exhibited, in an exemplary manner, all or most of the characteristics corresponding to this dimension”; and then choose one of “Strongly Agree”, “Agree”, “Disagree”, or “Strongly Disagree” (or “Not Applicable” if the item is not relevant to the particular project). Additional comments related to any of the six dimensions or about other aspects of the project may be entered in the box at the bottom of the rubric.

Problem Formulation	Team has come up with a clear formulation of the problem based on sponsor’s goals; any changes in the project scope were clearly explained and justified. <input type="checkbox"/> Strongly Agree <input type="checkbox"/> Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Strongly Disagree <input type="checkbox"/> Not Applicable
Design Approach	The team has produced a high-quality design that, for the most part, meets the sponsor’s goals; in doing so, the team has gone through a suitable iterative process considering various alternatives, including resource (memory, bandwidth, etc.) implications. <input type="checkbox"/> Strongly Agree <input type="checkbox"/> Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Strongly Disagree <input type="checkbox"/> Not Applicable
Implementation Approach	The team has paid careful attention to all key performance factors that may affect the system. The team has also considered scalability issues as well as possible evolution of the system to meet changing needs. The team has, in its implementation (or plans for it), applied important lessons from key courses in the curriculum; and it has adopted and consistently followed a standard process. **Note: If the team has not fully completed an implementation of the project because of midstream changes in its scope or other reasons, please complete this dimension on the basis of briefly discussing, with the team, its implementation plans and ideas. <input type="checkbox"/> Strongly Agree <input type="checkbox"/> Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Strongly Disagree <input type="checkbox"/> Not Applicable
Other factors	The team has effectively used appropriate professional tools and systems. It has carefully analyzed its design and implementation to identify potential security holes and documented them. The team has considered the implications of various aspects of the ACM/IEEE Code as it applies to this system and appropriately discussed the relevant questions with the project sponsor. <input type="checkbox"/> Strongly Agree <input type="checkbox"/> Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Strongly Disagree <input type="checkbox"/> Not Applicable
Effectiveness as a Project Team	The students in this team seem to have worked together very effectively on various aspects of the project from initial formulation based on the sponsor’s goals/ requirements, through exploring design alternatives, working on the implementation details, the documentation of the project, through the preparation of the poster. The students also worked effectively as a team in responding to questions and comments from visitors to the poster session. <input type="checkbox"/> Strongly Agree <input type="checkbox"/> Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Strongly Disagree <input type="checkbox"/> Not Applicable
Communication Effectiveness	The team has produced a well-designed poster that pays careful attention to the items included and the level of detail presented. The poster effectively integrates elements related to basic background of the project with key technical factors. Responses to questions perfectly complemented the poster with the team providing the right level of detail. <input type="checkbox"/> Strongly Agree <input type="checkbox"/> Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Strongly Disagree <input type="checkbox"/> Not Applicable

Comments:

A.3 Exit Survey

Prior to graduation, BS-CSE majors are required to complete an anonymous *exit survey*. In fact, students complete the exit-survey and take the POCAT in the same session. There are two parts to the survey. The first one asks the respondent, for each student outcome, to rank its importance on a scale of *very-unimportant/somewhat-unimportant/somewhat-important/very-important*; and asks how strongly the respondent agreed with the statement “this student outcome has been achieved for me personally” on a scale of *strongly-disagree/moderately-disagree/slightly-disagree/slightly-agree/moderately-agree/strongly-agree*. In averaging the responses, we attached weights of 0%, 33%, 67%, and 100% to the four possible importance ratings; and weights of 0%, 20%, 40%, 60%, 80%, and 100% to the six possible levels of achievement. The second part of the survey asks students to briefly respond to two questions. The first asks, “What single aspect of the CSE program did you find most helpful? Explain briefly.” The second asks, “What single change in the CSE program would you most like to see? Explain briefly.” These parts of the survey, although not directly related to specific student outcomes, are naturally very important to students and provide us a good lens through which to view the program and help identify possible improvements.

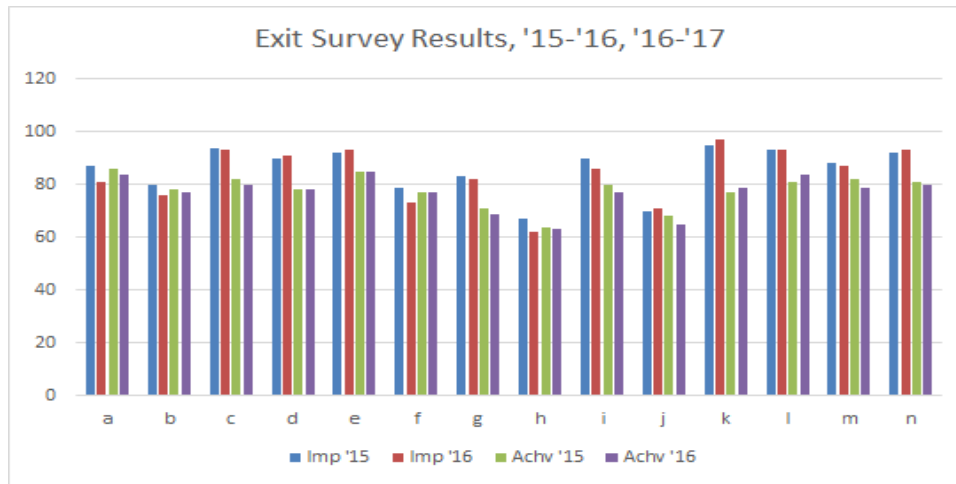


Figure 9: Exit Survey Results (2015-'17)

Fig. 9 shows the results for 2015-'16 and 2016-'17 for the questions concerning the importance and extent of achievement of each of the outcomes.

In summary, our assessment instruments for assessing the extent of achievement of student outcomes consists of: the POCAT; the rubric for use by instructors in CSE 2501/Phil 1338; the rubric for use by instructors in the capstone design courses; the rubric for the capstone poster session; and the Exit Survey. And each assessment is carried out every semester.

B. Continuous Improvement

As already noted at several points, the Undergraduate Studies Committee (UGSC) consisting of CSE faculty, advising staff and student representatives, serves as the main body that coordinates the assessment activities as well as the evaluation of the results. Based on this evaluation, UGSC identifies any problems in the program and possible improvements to address them. The agendas for UGSC meetings are announced in advance to the department's faculty and students. The minutes of the meetings are posted on UGSC's website (and usually include summaries of any extended e-mail discussions that may have occurred after the meeting).

Below we summarize a number of improvements that have resulted from this process. We consider both improvements in a number of individual courses as well improvements in the program. In addition, the process has also helped us improve the assessment instruments; we consider those as well. In some cases, the improvements were based on other information than the assessment results. In each case, we summarize the identified problem, the improvement and the basis for the improvement. In several cases, as we note at various places below, the ideas for the improvement were based on feedback from students rather than directly due to assessment data. In some cases, the improvements are either planned or are still under study.

1. Change in PEO: The second process for the review of PEOs involves the departmental *Advisory Board* (page 18). The board consists of a dozen or so members, many of whom obtained their undergraduate and/or graduate degrees from the department and have then gone on to distinguished professional careers, mostly in the IT industry with a few in academia. The idea is that the members of the board, because of their professional experience combined with their intimate knowledge of the department, will be able to provide deep insight into the needs of our constituents. The board meets once a year near the end of the Spring semester for an (almost) day-long meeting. One part of the meeting is devoted to a presentation about the undergraduate programs in the department including, specifically, the PEOs for the BS-CSE program. In the course of the presentation to the board during its Spring 2016 meeting, there was an extended discussion of the PEOs. During the earlier part of the presentation, one topic that had come up was the importance of ensuring that our students develop an understanding of the ACM/IEEE Code and ability to apply it in practice. The question then in the context of the PEOs was, why not mention the code explicitly in our PEOs? Prior to that point, our third PEO read as follows: "Graduates will be informed and involved members of their communities, and responsible engineering and computing professionals." The suggestion by the board was to try to revise this PEO to include mention of specific concerns such as privacy and include a reference to the ACM/IEEE Code. Following the board meeting, the UGSC, a standing committee consisting of a number of full-time faculty closely involved with the program, advisors from the Advising Office, and including student representatives, considered the board's recommendation and, after some discussion, came up with the current version of the PEO; and this was approved by the full faculty during Au '16. This change is related to student outcome (f).
2. Improvements in required ECE courses: Following the transition to semesters in Summer 2012, the our majors were required to take ECE 2000 and 2100, two 4-credit courses that dealt with analog circuits, digital logic, as well as some material related to signal processing weaving together the material in novel ways. In one of the annual Undergraduate Forums, students expressed serious concerns about the courses. They found the material extremely difficult to understand; moreover, the signal processing material was not only advanced, it was not really directly relevant for most CSE majors. Interestingly, ECE faculty had, at about the same time, started receiving somewhat similar comments

about these courses from ECE majors.

On the basis of this feedback, we worked closely with the ECE faculty and they were able to redesign the courses in a way that would split the two courses into three 3-credit-hour courses, two of which, 2020 and 2060, dealing with analog circuits and digital logic respectively, would be the only ones relevant for CSE majors. Following this change, our program requirements were modified to replace 2000 and 2100 with 2020 and 2060 and adding the additional credit hours to the tech electives of the program. Feedback from the students in more recent forums concerning the new courses has been positive. This change is related to student outcome (c).

3. An IT professional from the central Ohio area who is interested in our program heard about the POCAT and we shared a copy of a recent test with him. He liked the general idea of the test but said that if he were interviewing someone for a position in his company, he would not ask any of the questions that were in the test. This was a serious concern for us because, POCAT being an exit test, our goal was to see, on the basis of the performance of the students on the test, how well they were prepared for the profession. Further discussion with the professional (after he had consulted with some of his industry colleagues) allowed us to pin down the specific issue he was concerned with. It was not that the concepts that the questions in the test were probing were not relevant for software engineers in his company but rather that the *context* in which the questions were presented were too simple, perhaps even simplistic. Of course, trying to set the questions in more realistic contexts would cause difficulties as well because that would require the inclusion of somewhat elaborate explanations in the question and that would change the very nature of the test. But we believe, and the IT professional agrees with us, there might be middle ground possible here and we are exploring ways of reaching that middle ground. This change, once it is implemented, should contribute to outcomes (k) – (n).
4. One of the questions that we have used on the POCAT concerns the relative time it would take two different machines to execute a given program P , given such factors as the cycles per instruction for the compiled version of P on each machine. While this question does probe the student's grasp of important ideas related to architecture, it is easy for the student to pick the wrong numerical answer among the four or five that were listed. Following discussion in the UGSC, the architecture faculty came up with a more directly conceptual question (concerning pipelining) which we now include in the POCATs. This should allow us to assess the achievement of outcomes (c) and (n).
5. During the capstone poster session at the end of Spring '17, a couple of the visitors to the session noted that the rubric that we had developed (page 34) was not ideally suited for some of the games projects as well as some of the machine learning (Watson-based) projects. They suggested that a key element, i.e., "coolness factor" for lack of a better phrase, ought to be included and projects in these genres ought to be evaluated with respect to this factor. We are in the process of trying to come up with language to add to the rubric in such a way that it is somewhat generic but, nevertheless, captures this intent. This change, once implemented, will allow us to evaluate these projects better and, in particular, the extent of achievement of the outcomes corresponding to the dimensions in the poster session rubric.
6. One other observation that was made by several visitors to the capstone poster session at the end of Spring '17 was that there were some easily avoidable flaws in the posters of several of the teams and avoiding those flaws would have substantially improved the posters. In some sections of the capstone courses, the instructors have attempted to talk about useful guidelines to keep in mind when designing the posters but the message doesn't seem to register with the teams, possibly because the discussion

is relatively early in the semester and by the time the teams are working on their posters which is near the very end of the semester, those lessons tend to be somewhat faint memories. We are in the process of creating a written set of guidelines along with online examples of effective posters which will be shared across all sections of the capstone courses. This should improve achievement of outcome (g).

7. Yet another lesson of the capstone poster session at the end of Spring '17 was that it takes much longer than we had expected for a visitor to provide a quality evaluation of a project. Put another way, we had expected each visitor whom we had requested to do the assessments to perform too many of them – roughly 10 in about 60 to 90 minutes; and most visitors found themselves rushing through the projects to get done. We are working on ways to modify the process so that the visitor will have adequate time to spend with each project that he or she will assess (without, however, expecting them to stay much longer at the session); we are shooting to have each visitor evaluate no more than 4–5 projects and have each project assessed by only one visitor rather than two as we tried to do. Again, this change, once implemented, will allow us to evaluate these projects better and, in particular, the extent of achievement of the outcomes corresponding to the dimensions in the poster session rubric.
8. Some of the senior undergraduate students, all members of the ACM-W chapter in our dept., recently undertook, essentially on their own, an initiative to improve student awareness of diversity-related issues and problems by working with the advisors from the Advising Office who teach the 1-credit-hour “survey” class, Engr 1100 (see Table 5-1, page 40). These students had been following the recent stories/scandals surrounding Uber and decided they should do their part to help entering students become alerted to these problems. This is an on-going effort but it is expected that a pilot version should be in place for Au '17; depending on its effectiveness, this will help improve achievement of outcomes (f) and (j).
9. One of the questions that we have included in the POCAT relates to databases concerning the notion of a *key*. This topic is discussed in some depth in CSE 3241, one of the core choice courses that is taken by many students. Unfortunately, performance has been much weaker than is expected by the faculty involved with the course. To pinpoint the precise problem we have tweaked the question in various ways such as, e.g., including language in the question that would remind students of the definition of a *key*; but so far we have not succeeded in pinpointing the problem. We are continuing to work on this problem.
10. Along a different line, and as noted earlier, the *exit survey* includes two questions, one that asks the respondent what single change he/she would like to see made in the program; and a second one that asks what single aspect of the program the respondent found most helpful. One common response to the first question is the addition of more project-oriented courses (such as the course on app development or the one on information security projects). We are indeed interested in doing so and are attempting to hire additional clinical faculty with the right expertise to create and teach such courses. At the same time, several students, in response to the second question, note that while their fellow-students would rather take more project-focused courses, they themselves found the concept-focused courses most useful; these may well be the students who are planning to go on to advanced studies.
11. In one of our annual Undergraduate Forums a couple of years ago, a few students pointed out that there was a duplication of material between CSE 2501 and the (3-cr-hr) Phil 1337 (Ethics in the profession: Introduction to Computing Ethics) which they had taken before 2501 as part of the general education requirement; and the question was, why did they have to take 2501 if they had already taken Phil 1337.

The answer, of course, was that 1337 did not include a strong set of (oral and written) communication activities and that was an important aspect of 2501. The discussion that followed in the forum and in the UGSC meetings after the forum led to our getting in touch with the Philosophy Dept. and, after a very cooperative set of discussions, to the creation of the 4-cr-hr Phil 1338 that effectively combined the content of 1337 and the oral and written communication aspects of CSE 2501 so that now students may take either Phil 1338 or a completely different general education course and CSE 2501; Phil 1337 is still offered but it is intended for students in other majors interested in computing topics rather than CS majors and our students are strongly advised against taking it.

C. Additional Information

All the assessment instruments, including copies of recent POCATs, will be available at the time of the visit. Complete results from all the instruments will be available. Also available will be copies of minutes from UGSC meetings where the results from various assessments were discussed.

Criterion 5. Curriculum

1. Table 5-1

Table 5-1, parts 1, 2, show the four-year plan of study for students in the program, followed by explanatory notes. Most courses are offered every semester; hence the notation “***” is used in the “last 2 offerings” column to indicate that the most recent offerings were in Au ’16, Sp ’17. The figures in the last column are the maximum section sizes over all sections offered during Au ’16 and Sp ’17; and the maximum sizes of the recitation/lab sections, if any, indicated in parentheses.

Table 5-1: Curriculum (part 1)

Course (Dept, No., Title)	Reqd / Elective / Selected Elec. (R/E/SE)	Math & Basic Sc.	Compng topics Fund. / Adv.	Eng. Topics Check if sig. design	Gen. Educ.	Other	Last 2 ofrings (year, sem.)	Max. section enrollment last 2 ofrings (Lecture (Rec.))
Semester 1 ¹ :								
Engr 1100.06: Engineering Survey	R					1	***	53
Engr 1181: Introduction to Engineering I	R			2 (√)			***	72
Math 1151: Calculus I	R	5					***	520 ² (34)
Phys 1250: Mechanics, Thermal phy., Waves	R	5					***	230 (31)
Semester 2:								
CSE 2221: Software I	R		4(F)	4 (√)			***	44
Engr 1182: Introduction to Engineering II	R			2 (√)			***	72
Math 1172 ³ : Engineering Math A	R	5					***	245 (32)
English 1110: First year Engl. Comp.	R				3		***	24
General Education Elective	SE				3		***	varies
Semester 3:								
CSE 2231: Software II	R		4(F)	4 (√)			***	42
CSE 2321: Foundations I	R	1	2(F)	2			***	43
Stats 3470: Probability & Statistics	R	3					***	224
Math/Science Elective ⁴	SE	4					***	varies
General Education Elective	SE				3		***	varies
Semester 4:								
CSE 2331: Foundations II	R		3(F)	3 (√)			***	42
CSE 2421: Systems I	R		4(F)	4 (√)			***	42
ECE 2060: Intro to Digital Logic	R		3(F)	3 (√)			***	212(70)
Math 3345: Fnds of Higher Math	R	3					***	33
General Education Elective	SE				3		***	varies

¹: Students who do not have any computing background also take CSE 1223, *Java Programming, I*, in the first semester. The course is not part of the major program and the hours are not counted in the totals.

²: The typical lecture size for Math 1151 sections is 250+ students; but in Sp ’17, because of an unexpected situation, two sections had to be combined with the resulting 500+ students in that section.

³: Math 1172 is, essentially, Calculus II but is tailored to suit engineering majors.

⁴: The courses in math/science elective group range between 3 and 5 credit hours. Over the course of the program, the student is required to take a minimum of 8 credit hours.

Table 5-1: Curriculum (part 2)

Course (Dept, No., Title)	Reqd / Elective / Selected Elec. (R/E/SE)	Math & Basic Sc.	Cmptng topics Fund. / Adv.	Eng. Topics Check if sig. design	Gen. Educ.	Other	Last 2 ofrngs (year, sem.)	Max. section enrollment last 2 ofrngs (Lecture (Rec.))
Semester 5:								
CSE 2431: Systems II	R		3(A)	3 (✓)			***	42
CSE 3901/3902/3903 ⁵ : Jr. Project	R		4(A)	4 (✓)			***	33
ECE 2020: Analog Systems & Circuits	R			3 (✓)			***	191(59)
Math/Science Elective ⁴	SE	4					***	varies
General Education Elective	SE				3		***	varies
Semester 6:								
2501: Soc., Ethical, Prof. Issues in Cmptng. Phil 1338: Introduction to Cmptng. Ethics ⁶	R		1(F)	1			***	39
CSE 3231: Software Eng. Techniques ⁷ / CSE 3241: Intro to Database Systems	R		3(A)	3 (✓)			***	45
CSE 3421: Intro to Computer Arch. ⁷ / CSE 3461: Networking & Internet Tech.	R		3(A)	3 (✓)			***	40
CSE 3521: AI 1: Basic Techniques ⁷ / CSE 3541: Game & Anim. Techniques	R		3(A)	3 (✓)			***	44
Math 2568: Linear Algebra	R	3					***	64
General Education Elective	SE				3		***	varies
Semester 7:								
CSE 3321: Automata & Formal Langs. ⁷ / CSE 3341: Principles of Prog. Lang.	R		3(A)	3 (✓)			***	44
Technical Elective ⁸	SE		3(A)	3 (✓)			***	44
Technical Elective ⁸	SE		3(A)	3 (✓)			***	44
Technical Elective ⁸	SE		3(A)	3 (✓)			***	44
General Education Elective	SE				3		***	varies
Semester 8:								
CSE 5911/5912/5914/5915: Capstone Design Course ⁹	R		4(A)	4 (✓)			***	26
Technical Elective ⁸	SE					3	***	varies
Technical Elective ⁸	SE					3	***	varies
Technical Elective ⁸	SE					2	***	varies
General Education Elective	SE				3		***	varies
Totals: ABET Basic-Level Requirements ¹⁰		33	53 (F:21; A:32)	60	24	9 ⁸		

⁴: The courses in math/science elective group range between 3 and 5 credit hours. Over the course of the program, the student is required to take a minimum of 8 credit hours.

⁵: See below for details of the three *junior project* courses. Students are required to take one of these.

⁶: Both CSE 2501 (1 cr. hr.) and Phil 1338 (4 cr. hrs.) are on social, ethical, and professional issues in computing. Phil 1338 also spends time on general ethical theory from a philosophical point of view. If the student takes Phil 1338, the additional 3 cr. hrs. is counted towards general education requirements.

⁷: (CSE 3231, 3241), (3321, 3341), (3421, 3461), and (3521, 3541) are the four *core choice pairs*. The student is required to take one from each pair; and may take the other one as a technical elective.

**Notes continued on next page.

⁸: The student is required to complete 17 credit hours of technical electives. Of these, at least 9 credit hours must be advanced CSE courses; the remaining 8 credit hours may be some combination of CSE and non-CSE courses. Many students take only CSE courses to fulfill these hours; others who may be interested in exploring applications of computing to or interactions between computing and other fields ranging from math to music to biomedical engineering, use these courses to acquire some knowledge of those fields. In the table, we have included all 8 of these hours under the “other” column. We should also note that the different *specialization options* described later in this section all fit in this template thus the information in the table applies to all students.

⁹: There are four different capstone design courses, these being 5911 (Software Applications), 5912 (Game Design and Development), 5914 (Knowledge-Based Systems), and 5915 (Information Systems). Students are required to complete one of these courses.

¹⁰: The total credit hours of 33, 53, and 60 for math/basic science, computing topics, and engineering topics, each exceed the minimum ABET requirements of 32, 42.66 (CAC requirement for Computer Science programs), and 48 hours respectively.

2. Alignment of curriculum with PEOs

Every one of the CSE courses in the curriculum contributes to developing students' knowledge and understanding of computing concepts and details; a range of courses including the junior project course, the capstone design course, and a number of other project courses that students often choose as part of their technical electives, as well as the various smaller projects in a number of other required and core-choice courses ensure that students skills and abilities with designing software systems applying suitable principles as well as appropriate technologies is well developed. Thus the curriculum contributes solidly toward achieving PEO I, that “ graduates of the program will be employed in the computing profession, and will be engaged in learning, understanding, and applying new ideas and technologies as the field evolves”.

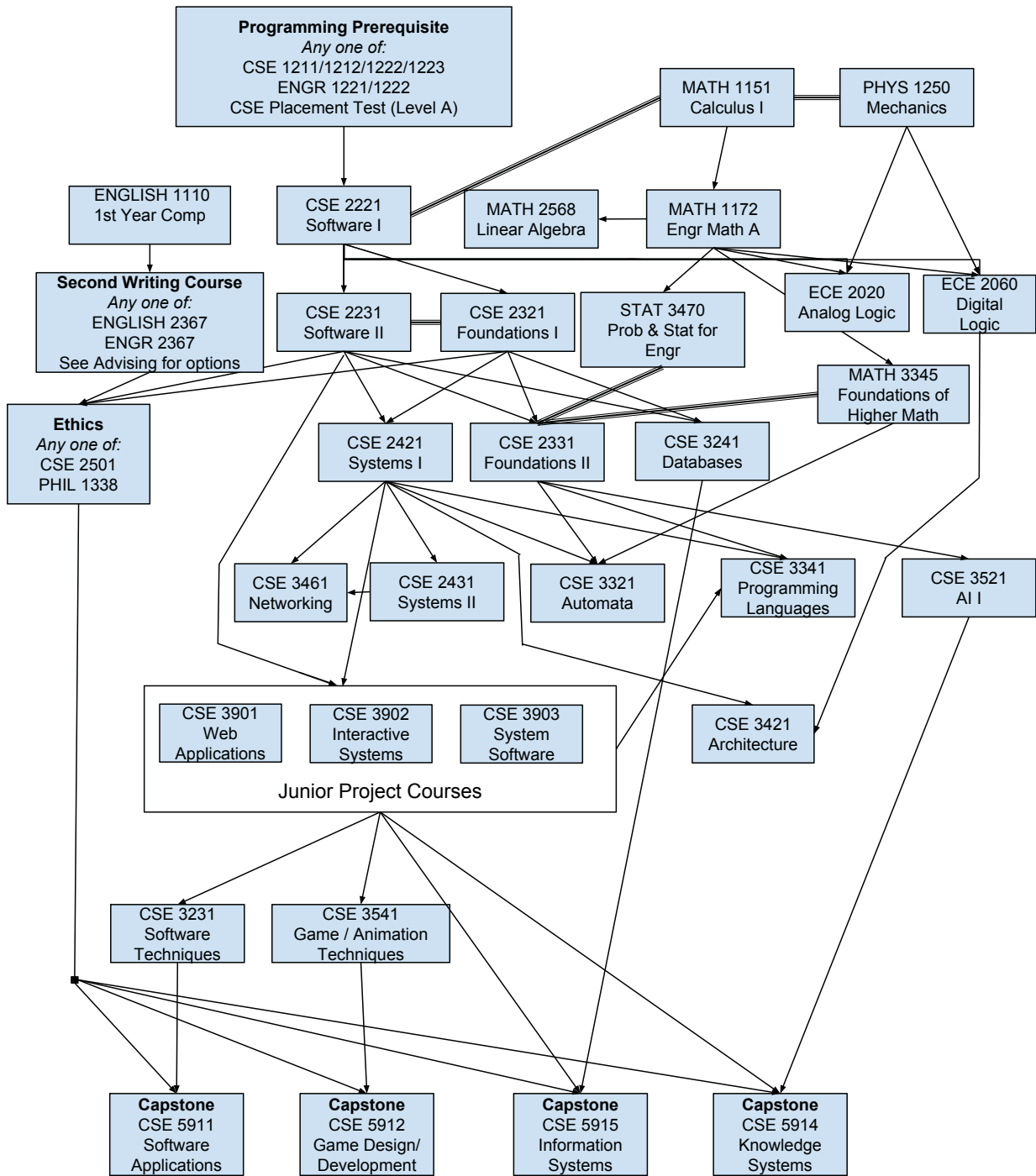
PEO II reads, “graduates with an interest in, and aptitude for, advanced studies in computing will have completed, or be actively pursuing, graduate studies in computing”. Math 3345, Foundations of Higher Math, several of the core-choice courses, a variety of advanced courses on such topics as machine learning, network security, computer vision, speech and language processing, cryptography, etc. from which students may choose their technical elective courses help prepare students with an aptitude for graduate studies in computing to be successful in highly-ranked graduate programs. In addition, the option for students to choose 8 hours of technical elective courses from relevant non-CSE disciplines that they may be interested in helps prepare them to pursue those interests in graduate schools.

PEO III reads, “graduates will be informed and involved members of their communities, and responsible engineering and computing professionals who take appropriate account, in their professional work, of such issues as privacy, security, copyright etc. in ways that are consistent with the ACM/IEEE Code of Conduct”. CSE 2501/Phil 1338 (both of which include discussion of the Code) and a number of the general education courses, as well as the discussions in some of the CSE tech electives will ensure that students recognize the importance of social and ethical considerations and are prepared to play their roles as informed and involved members of their communities. In addition, in the capstone design courses, students are expected to consider any ethical or social issues that may be related to their projects. Thus the curriculum helps prepare students to achieve this PEO.

3. Curriculum's Support for Attainment of Student Outcomes

Tables 2 and 3 on pages 22 and 24 summarize the contributions made by the various courses to the attainment of the student outcomes and the associated discussion in that section elaborates on the contributions. We will not repeat them here.

4. Prerequisite Flowchart for Required Courses



== Indicates co-requisite courses

5. EAC Criteria Requirements for Hours and Depth of Study

The EAC Criteria require 32 credit hours of college level mathematics including probability and statistics and mathematics through differential and integral calculus; and basic sciences, some with experimental experience. The program requires 33 credit hours of college-level mathematics and basic sciences. This includes Stat 3470 (Probability and statistics) and Math 1172 which includes material through integral calculus. The 33 credit hours also include Physics 1250 which includes a lab component.

The criteria require 48 credit hours of engineering topics. The program requires 60 credit hours of courses that include engineering topics. The criteria applicable to CSE programs require these topics to include material necessary to analyze and design complex electrical and electronic devices, software, and systems containing hardware and software components. ECE 2020 (analog circuits) and 2060 (digital logic) each requires Math 1172 and Phys 1250 as prerequisites. CSE 2331 (Foundations II: data structures and algorithms) has Stat 3470 as a corequisite which, in turn, requires Math 1172 as a prerequisite. Further, the criteria applicable to CSE programs require discrete mathematics to be included. This is satisfied by the material in CSE 2321 (Foundations I: discrete structures) and in Math 3345 (Foundations of higher math). Thus all of these requirements are satisfied.

6. CAC Criteria Requirements for Hours and Depth of Study

For computer science programs, the CAC Criteria require 42.66 credit hours (one and one-third years) of computer science topics. The program requires 53 credit hours of computer science topics. The criteria further require coverage of the fundamentals of algorithms, data structures, software design, concepts of programming languages, and computer organization and architecture. CSE 2321 and 2331 provide coverage of fundamentals of algorithms and data structures. CSE 2221 and 2231 provide coverage of software design and concepts of programming languages. CSE 2421 provides additional coverage of programming language concepts and provides coverage of computer organization and architecture.

The criteria require exposure to a variety of programming languages and systems and proficiency in at least one higher-level language. Students learn to use Java effectively in CSE 2221 and 2231. They learn to use C in CSE 2421 which they also use in CSE 2431. Students are exposed to a variety of computing systems in CSE 2421 and 2431; and, depending on which of CSE 3421 or 3461 they choose, they study the details of advanced architectures or network systems, etc. Thus this requirement is satisfied.

The CAC Criteria requires advanced coursework that builds on fundamental coursework to provide depth. CSE 2431 builds on the systems-foundation provided by CSE 2421. Each of the core-choice courses builds on the content of several of 2000-level CSE courses. Further, the junior project course, the capstone design course, and the various CSE technical elective courses further build on these topics and enable students to apply the ideas in specific software projects that are part of these courses. Thus this requirement is satisfied.

7. Major Design Experience

Four specific courses³ have been designated as capstone design courses:

- CSE 5911: Capstone Design: Software Applications
- CSE 5912: Capstone Design: Game Design and Development
- CSE 5914: Capstone Design: Knowledge-Based Systems
- CSE 5915: Capstone Design: Information Systems

Depending on his or her specific area of interest, each BS-CSE major chooses one of these courses to meet the capstone design course requirement of the program. The designation of a specific course as a capstone design course is made by the Undergraduate Studies Committee (UGSC) after careful consideration of the course to see how well it meets the intent of capstone design courses. Specifically, the course should be a senior-level course; it should include, as prerequisites, not only the relevant courses in the particular technical domain of the course but also the junior project course and CSE 2501/Phil 1338 since these courses help students develop important professional skills including team-work, communication and lifelong learning, and these skills are key to success in capstone design projects. Design must be the main component of the course and student teams should explore and evaluate possible design alternatives. Where appropriate, consideration of relevant standards must be included; and, again as appropriate, industry standard techniques such as UML should be used in describing designs. Realistic constraints involving, for example, performance (space and time) considerations in the implementation, or platform restrictions imposed by the sponsor/user should be considered. Maintainability should factor into the design; for example, how to ensure that the system can accommodate changing requirements or scale up to meet increased demand, etc. Issues relating to such matters as security, privacy, etc., are occasionally related to the area of the capstone course and students should be consciously aware of these issues, and account for them as needed. Finally, teams should be alert to new methodologies, languages, tools and systems that may be used in industry and that may be relevant to the particular project.

The faculty coordinators for the four capstone design courses, after extensive discussions, have agreed upon a common set of outcomes for these courses. The complete set of outcomes for any given course will consist of these common outcomes plus a set of outcomes that are appropriate to the particular technical domain that a given course belongs to. The common capstone design course outcomes are:

- Master synthesizing and applying prior knowledge to designing and implementing solutions to open-ended computational problems while considering multiple realistic constraints.
- Master deadline driven software design and development in a team setting for an open-ended problem.
- Be competent in evaluating design alternatives.
- Be competent with issues of teamwork, project scheduling, individual and group time management.
- Be competent with presenting work to an audience of peers.
- Be competent with techniques for effective oral and written communication for a range of purposes.

We consider each of the four listed courses and explain how it meets Criterion 5 requirements for the major design experience.

³There is a fifth course, CSE 5913, Computer Animation, that was intended to be another capstone design course. However, because of faculty retirement, we have not been able to offer it since 2012 when Ohio State switched to the semester calendar. Hence we do not discuss it here.

CSE 5911: Capstone Design: Software Applications: The prerequisites for this course are the junior project course, CSE 2501/Phil 1338, and CSE 3231, Software Engineering Techniques. The junior project course provides students with a serious experience in software design and implementation, working in teams, and in producing documentation. CSE 3231 provides additional knowledge of software development practices, methods for implementation and maintenance of software, as well as the importance of reliability of software and ways of achieving it. CSE 2501/Phil 1338 introduces students to the ethical issues in computing and provides practice in developing communication skills. All of this knowledge is called upon in CSE 5911.

The main objective of this course is to prepare students for the software engineering profession. Upon completion of the course, students are expected to have applied their software engineering knowledge to aspects of:

- Software design: driven by requirements; scalability, security, usability, and performance considerations; generating and evaluating design alternatives.
- Development process: Configuration management, project management, team structure, roles and responsibilities.
- Business issues.
- Presenting work to an audience of peers.

Industry-standard tools and techniques are used extensively in the projects.

Students are organized into teams of 4 to 5 students and work jointly on all phases of the project. The projects have been varied, and are mostly provided by local IT organizations. The external organizations have assigned one or more of their personnel to work with the students – mostly in the provision of requirements, but also as mentors. Industry representatives are invited to the mid-term and final presentations made by the teams, as well as to the final poster session to provide appropriate feedback.

CSE 5912: Capstone Design: Game Design and Development: The game industry is a multi-billion dollar industry, with many complex and challenging computational and user-interaction problems. Many students are interested in working in this field. Many others just enjoy working on projects which provide a challenging set of design and programming problems. This capstone design course provides the opportunities for students to work on a challenging and fast paced project.

The prerequisites for this course are the junior project course, CSE 2501/Phil 1338, and CSE 3541, Computer Game and Animation Techniques. The course requires students to apply the knowledge and skills gained in these courses to develop fully functional computer games in a team-based design and implementation project. The junior project course not only develops key technical skills needed in working on large software projects but also soft skills such as team-working and communication. CSE 2501/Phil 1338 develops oral and written communication skills and equips students with an understanding of social, professional and ethical issues. CSE 3541 provides the essential foundation in computer graphics including in the use of standard tools that are used widely in industry. CSE 5912 specializes all of this to the problem of video game production and introduces additional industry-standard toolkits for graphics, for sound, for game physics, as well as additional open source toolkits for character animation, AI and input controllers.

Students have developed a number of games in different genres over the past several years. Examples include a marble maze, a car simulator, ninja battles, stealth games and RPG games. Students are organized into teams, typically 4 to 5 students per team. The course is organized to push these teams towards a complete

game. An Agile development approach is employed with new iterations of the game due every two to three weeks. For the first iteration, a skeletal menu system is developed for starting the game, ending the game, selecting options and playing the game. A splash screen is created to allow the students to highlight the game and themselves. This allows the teams to get organized, develop and refine their ideas for a game while still making progress towards completion. For the second iteration, the students are asked to focus on core components (e.g., resource management, key interfaces, event handling or message passing, etc.) of the game development and basic user interaction. The graphics should be minimal at this stage using boxes and spheres. During this stage the students start to take over the objectives for the following iterations. In total there are five iterations or drops of the game during the course.

Each team is required to make a series of oral presentations spread out over the term; the presentations are devoted respectively to a preliminary proposal for the game, and successive iterations of the game. Students are asked to not only present results, but discuss technical challenges that they are most concerned about that might impact successful completion, and the scope of work for the next iteration. Individual team members may specialize on different aspects of the game. One student typically coordinates the inclusion of sound and sound effects in the game, another may handle all of the physics and another handle any artificial intelligence. Some students may migrate to more of a leadership role, a quality assurance/testing role or a scrum master; etc.

In addition to the Agile method, students use suitable version control systems and develop a web site to highlight their work and keep track of their progress. The demands on the student's time and effort are considerable. However by the end of the course, students have gained a comprehensive experience in design and implementation of video games.

CSE 5914: Capstone Design: Knowledge-Based Systems:⁴ In recent years, the use of knowledge based systems and consumer/client facing artificial intelligence have become more common in industry. Products such as Apple's *Siri*, Microsoft's *Cortana*, and IBM's *Watson* have demonstrated concrete applications of machine learning, cognitive computing, and natural language processing. In this course, student play the role of a software startup making use of the *IBM Watson Cloud Services* to design, develop, and present a cognitive-powered application. Some examples of applications developed by students include:

- A personal trainer application, which guides the user through exercise routines and helps plan workout regimens;
- An interactive kitchen assistant, which helps you choose recipes and assists in their preparation;
- A movie recommendation engine, which identifies films similar to those you have liked in the past and seamlessly combines this with your request;
- An voice-controlled quadcopter drone, which interactively answers questions about its own capabilities and responds to detailed voice commands;
- A cognitive job-matcher, which links resumes to relevant job postings;

⁴As noted earlier in the self-study, this course has been revised recently in view of recent developments in the field. Previously, the main project in this course was based on *expert systems*. But, over the last several years, *machine learning*-based approaches have become the focus of attention. Because of this and based on feedback from our students, the faculty involved with the course revised the project in the course to be one that builds an interesting application that exploits key machine-learning facilities offered by tools such as IBM's *Watson*. The revised course has now been taught several times including, on several occasions, by adjunct faculty from the *Watson* group at the local IBM center, and has proven very effective as a capstone design course.

- A hostage-negotiator training simulator, in which the client interacts verbally with a simulated hostage-taker.

This course requires students to make use of a variety of software tools and methods. Because of the widely divergent areas of expertise required (UI, cloud computing, machine learning training/maintenance, natural language processing, to name a few), teamwork and communication are essential for success in the class. The class is organized into a set of 3-week *time boxes*, which consist of discrete units of work that are planned and implemented by the teams themselves in an agile framework. At the end of each time box, the teams present to their peers and a simulated client a complete, working product, which is iteratively improved and expanded over the course of the semester. Students also gain experience with a variety of technical topics in parallel study groups, which have historically included topics like Docker, Ansible, build tools like Maven and Gradle, UI Testing with products like Selenium, protocol tools like Thrift and Protocol Buffers, and other topics that are relevant to software development. Teams also present their final results at the poster session at the end of the semester where their projects often attract a lot of attention from visitors to the session.

CSE 5915: Capstone Design: Information Systems: CSE 5915 is a capstone design course focusing on information systems projects. The course involves project design, planning and implementation of the project as a team, and presentation of the project results. It is appropriate for BS-CSE majors planning careers in large IT companies including insurance and banking companies.

The course specifically deals with database design projects. The design activity involves designing the database itself, designing some appropriate indexing and query processing techniques for the particular application, and the design of the interface between the user, database engine and back-end server. Besides the problem solving associated with the design of the project itself and its implementation, three major features of the course, as in the case of all capstone design courses, are documentation, presentation, and teamwork. Documentation tasks required for each project include an initial project proposal, weekly group reports, final individual reports, final group reports, and the development and maintenance of a group website. Project teams typically consist of 4 to 6 students. The students typically organize their own teams and select the project they wish to work on. Where needed, the instructor assigns the student to a group based on the student's background and interests. As part of the course, each student is required to make at least one oral presentation. The instructor and class members provide feedback and ideas to the groups following weekly group presentations. Midterm and final demonstrations provide a forum for each group to showcase the design and results of their projects.

The course helps students to improve their skills in individual and group time management, project scheduling, professionalism, communication, and teamwork. Success of the projects is highly dependent on the effectiveness of the teamwork. Students work within teams and develop interpersonal and time management skills while participating in the project design, implementation, documentation, and presentation. Many of the projects in the course are interdisciplinary in nature, and effective utilization of each team member's talents is critical for delivering a good project. Some example projects are:

- Genome Databases: Storing, indexing, and retrieval of large scale biosequence databases;
- Web-based medical information systems: A database system and a user-friendly interface for an online community of doctors and patients;
- News articles website: Indexing and dynamically updating large number of news articles using techniques such as latent semantic indexing.

Groups are required to meet at least twice a week, but typically they meet more frequently.

The course begins with lectures describing the requirements of projects in general and technical details about specific potential projects. After projects are selected, groups provide presentations to the class, which promotes discussion and feedback, and generates ideas about potential improvements. Assignments for the students over the term include a project proposal, weekly progress reports, weekly group presentations, midterm and final demonstrations, individual and group final reports, and the poster presentation at the common capstone poster session.

Summary: The capstone design courses are all well-received by the students. Students have reported that the courses have helped them significantly in their job interviews. Industry sponsors have also generally been pleased with what the students have delivered.

Thus, each of these courses meets the Criterion 5 requirements for the major design experience: it is a culminating activity; it builds on knowledge and skills acquired in earlier course work; and incorporates appropriate standards and constraints in the design/implementation.

8: Cooperative education

The program does not allow cooperative education to satisfy curricular requirements.

9: Materials for review during site visit

Course syllabi, textbooks, and a range of samples of student work for each required course, each capstone design course, and all of the popular electives will be available for review during the site visit.

B. Course Syllabi

Appendix A, starting on page 65, includes the syllabi for all courses used to satisfy the math, science, and discipline-specific requirements.

Criterion 6. Faculty

A. Faculty Qualifications

The tenure-track and clinical-track faculty members of the CSE Department have a broad range of technical interests and expertise. Particular strength in the department exists in the areas of artificial intelligence, computer graphics, networking, security, high-end computing systems, and software engineering, etc. All of the tenure-track faculty and clinical-track faculty have the Ph.D. in computer science or a closely related subject. They typically are quite active professionally.

The department's full-time lecturers and senior lecturers have graduate education in computer science, and in some cases the Ph.D. in computer science. They interact regularly with tenure-track faculty on their instructional assignments, and in some cases also participate in research activities. They also are supported in professional activities including attendance at professional meetings.

Part-time lecturers and senior lecturers also have professional experience equivalent to graduate education in computer science, and most have graduate degrees in computer science. They are practicing computing professionals in the Central Ohio community, and bring a practical side to the delivery of the curriculum. This enriches the students' experience, and students often comment positively about this in the exit surveys.

Table 6-1, Faculty Qualifications, appears on the next three pages. Faculty resumes appear in Appendix B.

B. Faculty Workload

Table 6-2 appears on the next four pages. The order of entries in the table is as follows: tenure-track faculty, followed by clinical-track faculty, followed by full-time lecturers and senior lecturers, followed by part-time (adjunct) lecturers and senior lecturers.

Tenure-track faculty are primarily expected to focus on research including graduate student, especially PhD, advising and in professional activities such as participating in professional conferences; hence their teaching responsibilities are correspondingly lower. In addition, some of the senior tenure-track faculty have major administrative responsibilities (such as serving as chair of major committees) and receive credit for that work as well. Clinical-track faculty are expected to engage to a somewhat lesser extent in research; they are expected to engage to an extent in advising graduate students at the MS level; and in engaging with local industry or participating in other service activities. Full-time lecturers and senior lecturers are expected to focus primarily on teaching of undergraduate courses and engage, to some extent, in professional activities; a handful of them also take an active interest in deliberations concerning the undergraduate programs as well as curricular issues.

Table 6-2: Faculty Workload Summary
BS-CSE Program

Faculty Member	FT or PT(%)	Term (of 2016-17): Classes Taught (num- sections x cr-hrs)	Program Activity Distribution			% of Time Devoted to Program
			Teaching	Research	Other	
Tenure-track:						
Agrawal, Gagan	FT	Au: 5449(2); Sp: 6431(3)	21%	54%	25%	100%
Arora, Anish	PT (51% FTE)	Sp: 5473(3)	13%	78%	10%	100%
Belkin, Mikhail	FT (SRA SP 2017)	Au: 5523(3)	13%	78%	10%	100%
Blanas, Spyridon	FT	Au: 5242(3); Sp: 4194(1.5)	19%	71%	10%	100%
Bond, Michael	FT	Au: 3341(2x3)	25%	65%	10%	100%
Choi, Bryan	FT (40% CSE - 60% Law)	Sp: 5359(2)	8%	22%	10%	40%
Crawfis, Roger	FT	Au: 5912(4); Sp: 5912(4)	33%	57%	10%	100%
Davis, James	FT	Au: 5524(3); Sp: 5052(3)	25%	55%	20%	100%
Dey, Tamal	FT	Au: 2331(3); Sp: 5559(2)	21%	59%	20%	100%
Fosler-Lussier, Eric	FT	Sp: 5522(2x3)	25%	65%	10%	100%
Lai, Ten-Hwang	FT	Au: 6331(3); Sp: 5351(3), 6331(3)	38%	53%	10%	100%
Machiraju, Raghu	FT (50% CSE - 50% OAA)		0%	40%	10%	50%
Memoli, R. Facundo	FT (20% CSE - 80% Math)		0%	10%	10%	20%
Nandi, Arnab	FT	Au: 3241(3)	13%	78%	10%	100%
Panda, DK	FT	Sp: 6422(3)	13%	78%	10%	100%
Parthasarathy, Srini	FT	Sp: 5249(2)	8%	82%	10%	100%
Peng, Chunyi	FT	Sp: 3461(2x3)	25%	65%	10%	100%
Qin, Feng	FT	Au: 5194(3), 5433(3), 6431(3)	38%	53%	10%	100%
Ritter, Alan	FT	Sp: 5523(3)	13%	78%	10%	100%
Rountev, Atanas	FT	Au: 5343(3), 5341(3); Sp: 6341(3)	38%	43%	20%	100%
Sadayappan, P	FT	Sp: 5441(3), 6441(3)	25%	65%	10%	100%
Shen, Han-Wei	FT	Au: 5542(3); Sp: 5542(3), 5544(3)	38%	53%	10%	100%
Shroff, Ness	FT (50% CSE - 50% ECE)	Au: 6461(3)	13%	27%	10%	50%
Sidiropoulos, Anastasios	FT	Au: 6331(3)	13%	78%	10%	100%
Sinha, Prasun	FT	Au: 5462(3)	13%	78%	10%	100%
Sivilotti, Paul	FT	Au: 2221(4); Sp: 3901(4)	33%	47%	20%	100%
Soundarajan, Neelam	FT	Au: 3341(3); Sp: 6341(3)	25%	50%	25%	100%
Srinivasan, Kannan	FT	Au: 3461(2x3)	25%	65%	10%	100%
Stewart, Chris	FT	Au: 6421(3); Sp: 4194(1.5)	19%	71%	10%	100%
Sun, Huan	FT	Au: 5539(2)	8%	82%	10%	100%
Supowit, Ken	FT	Au: 2331(2x3); Sp: 2331(3), 6321(3)	50%	40%	10%	100%
Teodorescu, M. Radu	FT (sabbatical)		0%	90%	10%	100%
Wang, DeLiang	FT	Au: 5526(3)	13%	78%	10%	100%

Wang, Huamin	FT	Sp: 3541(3)	13%	78%	10%	100%
Wang, Yang	FT (SRA SP 2017)	Au: 2431(3); Sp: 2431(3)	25%	65%	10%	100%
Wang, Yusu	FT	Au: 2331(3)	13%	78%	10%	100%
Wenger, Rephael	FT	Su: 2331(3)	13%	58%	30%	100%
Xu, Wei	FT	Au: 5539(2); Sp: 5525(3)	21%	69%	10%	100%
Xuan, Dong	PT (75% FTE)	Sp: 4471(2x3), 5194(3)	38%	53%	10%	100%
Zhang, Xiaodong	FT		0%	50%	50%	100%
Zhang, Yinqian	FT (80% CSE - 20% ECE)	Au: 2431(2x2)	17%	53%	10%	80%
Clinical-track:						
Morris, Jeremy	FT	Au: 3521(2x3)	25%	65%	10%	100%
Ramnath, Rajiv	FT (on NSF assignment)		0%	90%	10%	100%
Full-time Lecturers/Sr. Lecturers:						
Babic, Gojko	FT	Su: 2431(3), 3461(3); Au: 3461(3), 2431(2x3); Sp: 2431(3x3), 3430(4)	75%	0%	25%	100%
Bair, Bettina	FT	Su: 3241(3); Au: 2221(3x4); Sp 3241(2x3), 2221(2x4)	75%	0%	25%	100%
Boggus, Matthew	FT	Su: 2221(4), 3902(4); Au: 3541(2x3), 3902(4); Sp: 3541(3), 3902(2x4)	75%	0%	25%	100%
Bucci, Paolo	FT	Su: 2231(4); Au: 2221(3x4); Sp: 2221(4), 2231(2x4)	75%	0%	25%	100%
Champion, Adam	FT	Au: 5236(2x3), 3461(3); Sp: 5236(2x3), 3461(2x3)	75%	0%	25%	100%
Cline, Alan	FT	Au: 3231(3), 2501(2x4); Sp: 5911(2x4), 3231(2x3)	75%	0%	25%	100%
Close, Doreen	FT	Su: 2321(3), 3321(3); Au: 3321(2x3), 2321(2x3); Sp: 3321(2x3), 2321(2x3)	75%	0%	25%	100%
Fritz, Michael	FT	Su: 2123(3), 2321(3); Au: 2221(4), 2321(3x3); Sp: 2321(4x3)	75%	0%	25%	100%
Green, G. Michael	FT	Su: 2421(4), 2501(2); Au: 2421(3x4); Sp: 2431(3), 2421(2x4)	75%	0%	25%	100%
Heym, Wayne	FT	Au: 2231(2x4); Sp: 2221(2x4), 3341(3)	75%	0%	25%	100%
Jones, Jeff	FT	Au: 5441(2x3), 2321(2x3); Sp: 232 (3), 2331(3x3)	75%	0%	25%	100%
Kiel, Christine	FT	Au: 2221(4), 2231(2x4); Sp: 2231(4), 2221(3x4)	75%	0%	25%	100%

Mallon, Michelle*	FT	Su: 1110(2), 2501(1.5); Au: 2112(3), 1110D(4), 1113(1.5); Sp: 1110D(4), 1113(1.5), 2501(2x4)	75%	0%	25%	100%
Rice, Lori*	FT	Au: 2501(2x2), 2111(4); Sp: 2111(4)	61%	0%	39%	100%
Shareef, Naeem	FT	Su: 3901(4), 3521(3); Au: 3521(3), 3901(2x4); Sp: 3521(3x3), 3901(4)	75%	0%	25%	100%
Wolf, Anna	FT	Au: 2231(3x4); Sp: 2231(3x4)	75%	0%	25%	100%
Zaccai, Diego	FT	Au: 2231(2x4), 2221(4); Sp: 2221(2x4), 2331(2x3)	75%	0%	25%	100%
Part-time Lecturers/Sr. Lecturers:						
Baxter, Aaron	PT (33%)	Au: 2421(4); Sp: 2421(4)	100%	0%	0%	100%
Bihari, Thomas	PT (13%)	Au: 3232(3)	100%	0%	0%	100%
Boxwell, Stephen	PT (50%)	Au: 5914(4); Sp: 5914(2x4)	100%	0%	0%	100%
Chaabouni, Moez	PT (33%)	Au: 5915(4); Sp: 5915(4)	100%	0%	0%	100%
Domas, Christopher	PT (17%)	Au: 2421(4)	100%	0%	0%	100%
Domas, Stephanie	PT (8%)	Sp: 2501(2)	100%	0%	0%	100%
Eden, Jeff	PT (13%)	Sp: 3241(3)	100%	0%	0%	100%
Fuhry, David	PT (38%)	Au: 3241(2x3), 5243(3)	100%	0%	0%	100%
Giles, Charles	PT (33%)	Au: 3901(4); Sp: 3901(4)	100%	0%	0%	100%
Gomori, Steve	PT (29%)	Au: 2133(4.5); Sp: 2133(3)	100%	0%	0%	100%
Hamm, Jihun	FT (25%)	Au: 5522(3); Sp: 5523(3)	25%	75%	0%	100%
Hossain, Shaikh Mohammed Zahid	PT (13%)	Au: 3231(3)	100%	0%	0%	100%
Ilin, Roman	PT (25%)	Au: 2321(3); Sp: 2321(3)	100%	0%	0%	100%
Jaber, Kal	PT (13%)	Sp: 3232(3)	100%	0%	0%	100%
Jayanti, Suri	PT (33%)	Au: 5911(4); Sp: 5911(4)	100%	0%	0%	100%
Jones, Janis	PT (33%)	Sp: 2421(2x4)	100%	0%	0%	100%
Joseph, Robert	FT (33%)	Au: 3901(4); Sp: 3901(4)	33%	0%	0%	33%
Joshi, Swaroop	PT (55%)	Sp: 2221(3x4)	100%	0%	0%	100%
Krishnasamy, Perumal	FT (38%)	Au: 3241(3); Sp: 3241(2x3)	38%	0%	0%	38%
Kumar, Praveen	PT (25%)	Au: 5234(3); Sp: 3232(3)	100%	0%	0%	100%
Madrid, Leon	PT (88%)	Au: 3421(3), 4251(1.5), 4252(1.5), 4471(2x3); Sp: 3241(3), 4251(1.5), 4252(1.5), 5235(3)	100%	0%	0%	100%
Manda, V. Krishna	PT (17%)	Au: 3901(4)	100%	0%	0%	100%
Martin, William Thomas	PT (17%)	Au: 2501(2); Sp: 2501(2)	100%	0%	0%	100%
Mills, Scott	PT (42%)	Au: 3902(5); Sp: 3902(5)	100%	0%	0%	100%
Narasimhan, Bhuvarahamur	PT (33%)	Au: 5911(4); Sp: 5911(4)	100%	0%	0%	100%
Ramasamy, Perumal	PT (33%)	Au: 5911(4); Sp: 5911(4)	100%	0%	0%	100%

Rivera, Angel	PT (13%)	Sp: 3461(3)	100%	0%	0%	100%
Romig, Steve	FT (13%)	Au: 5472(3)	13%	0%	0%	13%
Van Hulse, Jason	PT (25%)	Au: 5243(3); Sp: 5243(3)	100%	0%	0%	100%
Wagner, Richard	PT (13%)	Au: 3241(3)	100%	0%	0%	100%
Wiksell, Parker	PT (25%)	Au: 3241(3); Sp: 3241(3)	100%	0%	0%	100%
Ziniel, Justin	PT (25%)	Au: 5243(3); Sp: 5243(3)	100%	0%	0%	100%
*Mallon and Rice teach primarily service courses taken by non-majors and a few sections of CSE 2501.						

C. Faculty Size

The demand for the CSE program has seen rather big swings with the last several years seeing rapid increases. As mentioned earlier in the self-study (see page 6), this has put substantial pressure on enrollments in both required and elective courses and we have been working to address this in various ways. First, we have recruited a number of tenure-track faculty, specializing in areas that are likely to be important in the coming years. Second, we continue to look for and hire part-time faculty from among local computing professionals to teach specific courses including some of the capstone design courses where their industry experiences and insight can be of great value. Third, we continue to look for qualified computing professionals with excellent teaching skills who are interested in teaching full-time, to hire them as non-tenure-track faculty. While these efforts have helped, the demand is so great that in spite of these efforts, enrollment pressures in our courses has continued to increase. Hence, a couple of years ago, we instituted a GPA-based enrollment management process to restrict the number of students who are admitted to the major program. This means that a pre-major will be admitted to the major only if, after completing the specified pre-requisite courses, he/she has a specified minimum cumulative-point-hour-ratio (CPHR); currently, this minimum is 3.2 (on a 4.0 scale). This effectively means that well over 50% of otherwise qualified pre-majors, i.e., ones who have satisfactorily completed all the prerequisite courses, will nevertheless not be admitted to the major program; and will have to pursue alternate majors. Clearly, this is not a desirable situation since *computer science & engineering* was these students' first choice. We hope that our efforts at improving our ability to serve a greater number of students pays off in the near future and that we will be able to admit more of these students to the major program.

D. Professional Development

The university supports a faculty professional leave (sabbatical) activity after every seven years of service. Many faculty take advantage of this opportunity. The department has recommended all requests for professional leave in the last five years. The Department Chair also routinely supports, from the department's budget, travel by all full-time faculty (including Lecturers and Senior Lecturers) to professional meetings, including workshops that promote effective teaching.

Each newly hired faculty is offered a generous startup package to cover their first one to three years of expenses for research students, summer salary, travel costs, and others. The startup funds remains in their accounts even after they get their own grants.

E. Authority and Responsibility of Faculty

Two faculty committees have primary responsibility for all instructional programs in the department, the Undergraduate Studies Committee (UGSC) and the Curriculum Committee (CC). These two committees are made up of a cross-section of faculty members, the professional undergraduate advisor, and student representatives. All faculty are welcome to attend the meetings of the two committees. The chair of each committee is also a member of the other committee, enabling the two committees to work closely with each other. UGSC is responsible for the development and implementation of the processes for assessment, evaluation and improvement of the BS-CSE program including its PEOs and SOs. It is also responsible for documenting these activities. Proposals for major changes in the program are discussed by UGSC before being recommended to the faculty as a whole for its approval. CC is responsible for all courses. Proposals for changes in existing courses as well as for new courses are discussed by CC before being recommended to the faculty for its approval.

At the level of the college, there are two committees that are responsible for all programs in the college. The College Committee on Academic Affairs (CCAA) consists of faculty representatives from the various programs in the college. CCAA is responsible for all academic programs in the college. All new course proposals, proposals for (substantive) changes in existing courses, and all proposals for changes in a program's requirement have to be approved by CCAA before they go into effect. An important subcommittee of CCAA is the Academic Standards and Probation (ASAP) Committee which is responsible for monitoring student performance, and probation and dismissal decisions. Each program in the college has a faculty representative on the ASAP; staff advisors are also part of the ASAP subcommittee. The second committee is the Outcomes Assessment Committee which consists of faculty representatives from the various programs in the college. The committee's main purpose is to serve as a vehicle for programs to exchange experiences and ideas directed towards continuous program improvement.

Criterion 7. Facilities

A. Offices, Classrooms and Laboratories

1. All full-time faculty have private or, in the case of some full-time lecturers, semi-private offices with appropriate office equipment. Part-time faculty typically share offices. All faculty members' work areas are equipped with high-end desktop computing facilities including high-speed internet service. Wireless access is available in all faculty offices. Most administrative staff also have private offices with suitable office equipment, including standard desktop computers and including high-speed internet service. Advisors in the Advising Office are also provided a Microsoft Surface tablet. These devices allow the advisors to be effective in various settings, such as freshman orientation, recruitment sessions, etc., involving large number of students or prospective students and parents. The devices also allow the advisors to be effective when making presentations in the Survey class (Engineering 1100) that all freshmen take during their first semester; etc. Graduate teaching associates have desks in larger shared offices and are provided standard desktop computing facilities.
2. Nearly all OSU classrooms are equipped with a desktop computer with LCD display connected to the internet, attached to a projector and a drop-down screen for display to the class. Instructors may also connect their own laptops/tablets to the projectors.
3. Laboratory facilities: The only laboratory facilities are computing facilities which are described next.

B. Computing Resources

The CSE Department's computing facilities are separate from the general university computing labs, and provide access to UNIX and Windows systems in all faculty and staff offices and in all laboratories used by students in the program. Windows 10 and Red Hat Enterprise Linux 6 and 7 are the operating systems currently deployed. The Department maintains computing facilities in 4 buildings for the program that include roughly 130+ seats for open lab use. Most computing labs for general use by students in the program are open weekdays from 8 am to 10 pm, closed on Saturdays, and open on Sundays from noon to 10 pm. One of the labs is accessible to students in the program 24/7 via their *BuckID* (OSU's student id card). There is another (newly renovated) 42-seat *closed* laboratory that is used for the introductory computer science sequence (and for other courses on occasion). Remote access to the centralized (Windows and Linux) servers is available to all students in the program.

CSE provides a unique instructional experience to the future leaders in our field. Modern development tools such as Eclipse, Microsoft Visual Studio 2015 and Xcode are available in all operating system environments. A special graphics lab provides high-end equipment for graphics related course work.

Virtualization is employed to provide self-contained enterprise-like environments for capstone courses through our Instructional Enterprise Support project. Virtualization is used in many courses that require students to have administrative level access that would otherwise not be possible in the more restrictive instructional computing setting. Virtualization has afforded CSE much success in giving courses what they really need to be truly successful and will play an increasing role in our general services strategy to provide robust and flexible solutions to the Department.

The CSE ethernet network employs redundant 40 Gb links within the data center to connect users to high-powered servers for both computer power and file management. Printing facilities exist in each lab (except for the closed lab, whose print facility is a short distance down the hall). Appropriate software resides on

the servers and is accessible by all student and faculty accounts from any lab seat or office.

The department controls two classrooms that have internet access and permanent attached digital projectors, including the closed laboratory classroom used by the introductory sequence. Other classrooms assigned to our courses have generally been upgraded by the University to contain podium computers and projection equipment as standard. The department maintains laptops and laptop projectors that may be reserved by faculty and graduate teaching associates for short term use.

The university's *Office of Distance Education and eLearning* (ODEE) is responsible for providing access to general computing facilities for all students at the university. Various computing labs and "collaboration spaces" are maintained by ODEE throughout the campus. See:

<https://odee.osu.edu/public-computing>

C. Guidance

The main open lab is staffed with student "consultants" who offer help with systems and programming questions. CSE also has a Help Desk staffed with student employees, mostly from CSE/CIS majors. The Help Desk is available to answer more complicated systems questions and resolve any hardware or software problems. Detailed information is available about the computing resources and guidance is available on-line to faculty, students and staff at:

<https://cse.osu.edu/computing-services>

D. Maintenance and Upgrading of Facilities

Until two or three years ago, the CSE Dept. had its own computing staff that was responsible for maintaining our facilities. About three years ago, the College of Engineering decided that it would be better to consolidate the computing resources in the different departments in the college in order to minimize duplication and maximize sharing of resources. At the same time, there was concern that "removing local control" from CSE, given the unique computing needs of our students and faculty, may create its own problems. In order to address these conflicting considerations, the newly created *Engineering Technology Services* (ETS) is centered in the college and reports to the college leadership. However, ETS has 9 employees embedded in the CSE Department to maintain the facilities used in the program by CSE students, faculty, and staff. This allows the computing staff to be more responsive to the needs of the program and can plan upgrades and maintenance activities to minimize disruption and accommodating our needs. The CSE Department's *Computer Committee* is responsible for computing policies and plans. The director of the department's computing staff, student representatives, and a number of faculty are part of the committee and help inform the policies/plans as they are developed. The structure of ETS and precise details of allocation of resources for maintaining and upgrading the computing infrastructure in the CSE department are still evolving; the goal is to maintain the quality of the computing resources available to CSE students and faculty while also working toward consolidation with the computing resources of the other departments in the college.

Equipment upgrades generally occur on a 4 to 5 year cycle for desktop and lab equipment. With server virtualization the upgrade cycle is not as critical since additional resources can be allocated to servers on the fly. The VM infrastructure servers themselves are replaced once they can no longer be warrantied. The entire server hardware infrastructure is currently in the process of being upgraded with the exception of some of the VM host servers.

E. Library Services

The CSE program is served mainly by the *18th Avenue Library* (a.k.a. the Science and Engineering Library). The library is accessible 24/7 to students, faculty, and staff (BuckID) access between 11:30 pm and 7:30 am) with the exception of major holidays (such as Independence Day). Materials may be checked out between 8 am and 11:30pm. Reference librarians are available between 9 am and 5 pm Monday through Friday for assistance with finding books, electronic resources, and other information needs or questions.

The library acquires a variety of printed materials, including textbooks, conference proceedings, journals, and reference materials each year in the area of computer science and engineering. The current collection in CSE is extensive. In addition, students, faculty, and staff may request printed monographic items through OhioLINK, the state of Ohio's interloan library system.

The University Libraries has access to a variety of online resources in the area of CSE. All users have access to full-text resources, such as IEEE Xplore, ACM Digital Library, and Safari Tech Books Online. In addition, full-text access to a large number of journals in computer science is available through OhioLINK's Electronic Journal Center. The list of online journals is available here: <http://go.osu.edu/ListOfOnlineCSJournals>

Other databases, such as the EBSCOhost databases and Lexis Nexis, are also available. Several research databases that abstract or index information in computer science, including MathSciNet, NTIS, Applied Science and Technology Index, Compendex and Compendex Historical, INSPEC and INSPEC Archive, and ISI Citation Databases (included Science Citation Index Expanded) are also available. Faculty, students, and staff may suggest titles that they believe should be included in the library's collection.

F. Overall Comments on Facilities

CSE's computing staff has been extremely effective in maintaining the facilities used by faculty, staff, and students. As long as the budget situation remains stable, the program will continue to provide excellent facilities to students, faculty, and staff.

Criterion 8. Institutional Support

A. Leadership

Professor Xiaodong Zhang is the Chair of the CSE Department. He has been serving as chair since January 2006. He is expected to step down at the end of Summer 2018. An internal search for a new chair is currently on-going and is expected to identify, as the next chair, one of the current full-professors in the department; the search is expected to be complete by the start of or early in Fall 2017. The individual, once identified, will be appointed as “chair-designate” and will work closely with Professor Zhang so that by the time he/she takes over in late 2018 will be ready to “hit the ground running”.

The department has a decentralized faculty governance structure. Faculty committees conduct discussions and make recommendations on important issues to the faculty and to the chair, including faculty recruiting, graduate studies, graduate admissions, computing services, curriculum, and all aspects of the undergraduate programs. An *executive committee*, composed of the chairs of the major faculty committees, provides the chair advice on various matters affecting the department and that may not fall within the purview of any particular committee. The chair also organizes occasional staff meetings to discuss administrative issues with appropriate staff members on budget administration, grant administration, graduate admission and support, human resource services, support for faculty recruiting, and various other aspects where they may have special insight.

The department chair has ultimate responsibility for all aspects of the CSE Department, overseeing the budget, and managing the staff and faculty. He is assisted in this task by an *associate chair*, currently Professor Raphael Wenger. The associate chair is responsible for day-to-day matters including, especially, staffing all courses (undergraduate, graduate, and service courses) and for faculty teaching assignments.

B. Program Budget and Financial Support

The University budget model for allocating annual funding to each department is defined mainly by two factors: the total number of credit hours taught by a department, and the total amount of annual faculty research expenditure in the department. Since the CSE Department has maintained a strong levels of both student enrollment and research activities, the budget allocation to the department has been adequate in spite of cuts at the state level. For example, during each of the last several years, the department has been authorized to hire a number of tenure-track and clinical-track faculty in a number of different focus areas; at the same time, like many other CS departments, we have not always been successful in filling all these positions. Under the budget model, we are also able to hire full-time lecturers and senior lecturers in order to meet the needs of a burgeoning undergraduate student enrollment. Several of the senior lecturers are recent CS PhDs who have a strong interest in pursuing academic careers with a teaching focus; others are professionals with several years of industry experience who have decided to shift gears and focus their careers on university-teaching.

The department has a number of funds mostly endowed by former students and other friends of the department. The income from these funds are used to provide annual scholarships to both undergraduate and graduate students based on merit evaluation, and to support faculty and staff members in career development activities, such as attending conferences on research and education.

Courses at all levels, from service courses through pre-major courses, required and elective courses for majors, and graduate courses, are carefully planned in terms of size, structure, and teaching staff (instructors,

TAs and graders). The computing staff works closely with the course coordinators to ensure that any special computing needs of the course are met. All courses taught by faculty have assigned graduate or undergraduate graders who, typically, grade homeworks, lab projects, and the like. Grading of both midterm and final examinations, as well as assigning of final course grades, is the responsibility of the course instructor.

In some cases, advanced graduate students are assigned to teach sections of pre-major and some of the beginning major courses under the supervision of the course coordinator. In the case of GTAs (graduate teaching associates) assigned to teach a major course, they typically go through advance training by a faculty member, often the course coordinator, with considerable experience in teaching the course; this involves sitting through all the lectures, in a semester prior to the one in which the GTA is expected to independently teach the course, of a section of the same course taught by the faculty member and grading that section of the course. Each year, excellent teaching by GTAs is recognized with a certificate and cash awards.

One important university-wide resource that is dedicated to excellence in teaching and that is available to both GTAs and faculty instructors is the *University Center for the Advancement of Teaching* (UCAT) (<http://ucat.osu.edu/>). UCAT's primary goal is to help "Ohio State's teachers approach their work in a scholarly and reflective way, engaging with the research on effective pedagogies, thus promoting continuous improvement of student learning." UCAT not only offers workshops on various aspects of teaching, it also offers individual consultations for interested faculty; these consultations may be followed-up by midterm interviews with students (without the instructor being present) to gather feedback from them; classroom observation where one of the UCAT professionals attends one or more of the instructor's lectures and comes up with specific suggestions on how the instructor might improve his approach to teaching or particular course materials, etc.

The CSE associate chair is a member of the Undergraduate Studies Committee as well as the Curriculum Committee. This ensures that the associate chair is well aware of the overall needs of the program as well as of individual courses including the demand for particular elective courses; and can take these factors into account when planning course offerings. The associate chair also works closely with the Advising Office to ensure that he is aware of any specific concerns or needs that the advisors may identify to help specific individual students or all students in the program as a whole to succeed. This organizational structure, combined with more or less stable resources that have so far been adequate, help BS-CSE majors to succeed in the program and to achieve the program's student outcomes.

C. Staffing

The department currently has 8 full-time administrative staff members in charge of such activities as HR, grant administration, budget, public relations and communications, etc. These staff members help the faculty, the chair, and the associate chair ensure smooth functioning of the department and help address any administrative issues as they arise. Also, as noted under Criterion 7, subsection D, the college's *Engineering Technology Services* unit has 9 technical staff who are embedded in the CSE Department to maintain the facilities used in the program by CSE students, faculty, and staff. In addition to the 8 administrative staff members, the department has an undergraduate Advising Office staffed with three full-time professional advisors and one graduate student assistant; some of the important roles that the staff in the undergraduate Advising Office play in the program is described under Criterion 1, page 4. The strong academic environment, supportive office environment and competitive salary and benefits allows us to recruit and retain highly-qualified and capable staff members who, in turn, provide excellent service to students and faculty.

D. Faculty Hiring and Retention

A key component for hiring of tenure-track and clinical-track faculty is the faculty search committee consisting of faculty representatives in all research areas, and a graduate student representative. The chair is also a member of the search committee. The application files are open to all tenure-track faculty. The reviews of faculty candidates, selections for campus interviews, and final selections are discussed in the faculty search committee, and meetings are open to all faculty.

The associate chair has the primary responsibility for hiring lecturers and senior lecturers. He works closely with all other faculty who may have leads on possible suitable candidates and try to recruit them. As noted earlier, one pool of candidates is our own PhD students who have demonstrated good performance as graduate teaching associates.

Faculty retention is seriously considered in the department. In the periodic merit evaluations, highly productive faculty in both research and high quality teaching are appropriately rewarded with salary increases and “best teacher awards.” We also nominate, for various prestigious awards in the college and the university, faculty who exhibit exemplary performance. Over the years, we have been very successful in retaining both tenure-track and non-tenure-track faculty.

E. Support of Faculty Professional Development

Newly hired tenure-track and clinical-track faculty members are offered generous startup packages to cover their first one to three years of expenses for research students, summer salary, travel costs, etc. The department supports regular sabbatical leaves for its faculty. The department also provides travel funds to faculty, including lecturers and senior lecturers, who do not have external funds, to attend at least one professional conference each year.

Program Criteria

The program satisfies the EAC Program Criteria applicable to programs that include the word “computer” in the title and the CAC Program Criteria applicable to computer science programs, as detailed under the Curriculum criterion, see page 45.

Appendix A – Course Syllabi

Syllabi for all CSE courses, as well as mathematics, science, and engineering courses that are required in the program, appear in the pages that follow. The syllabus for each course is in the format specified in the self-study template and includes the items of information listed in the template.

In the syllabi of individual CSE courses, course outcomes are stated in terms of intended student learning outcomes; i.e., each objective is implicitly prefaced by “The student is expected to . . .”. We use the following terminology to describe familiarity level (most to least) with respect to various kinds of material and procedures. A student who receives an “A” in a course should have met substantially all the outcomes as stated, and a student who merely passes the course should have met all or most of the objectives at least at the next lower familiarity level.

- Master means the student will be able to exhibit knowledge of the material and/or skill with the procedure in a new context or novel situation, even when not instructed to do so.
- Be competent with means that the student will be able to exhibit knowledge of the material and/or skill with the procedure in a routine situation such as those covered in the course, even when not instructed to do so.
- Be familiar with means the student will be able to answer questions about the material and/or to use the procedure in a routine situation such as those covered in the course, when instructed to do so.
- Be exposed to means the student will have heard the term and/or seen the procedure, but may not be able to discuss or use it effectively without further instruction.

The syllabus of each course contains a table summarizing the relation between the course and various Student Outcomes of the program. This table contains the same information as Table 2 on page 22 but for just this course. And the notation used is the same as in that table:

- *** means the substance of the Criterion 3 or program outcome is a primary theme of the course; a significant fraction of course time (7 hours or more, often woven through the fabric of the course) is directly related to this criterion or objective.
- ** means the substance of the Criterion 3 or program outcome is a secondary theme of the course; a smaller fraction of course time (3–6 hours) is directly related to this criterion or objective.
- * means the substance of the Criterion 3 or program outcome is not a theme of the course, but it is still treated in the course a non-trivial way; a smaller fraction of course time (perhaps 1-2 hours) is directly related to this criterion or objective.

Course number and name:

CSE2221 Software I: Software Components

Credits and contact hours: 4; 2.0 hr Lec, 2.0 hr Lab

Course coordinator: Paolo Bucci

Text book:

On-line reference materials

Brief description:

Intellectual foundations of software engineering; design-by-contract principles; mathematical modeling of software functionality; component-based software from client perspective; layered data representation.

Prerequisites, co-requisites: CSE 1211 or 1212 or 1221 or 1222 or 1223 or 201 or 202 or 203 or 204 or 205 or EnGraph 167 or Engr 1221 or 1281.01H or CSE Placement Level A; co-req: Math 1151 or 1161

Required (R), elective (E), selected elective (SE): R

Main course outcomes:

Be familiar with the reasons it is important that software be “correct”, i.e., why “good enough” is not good enough when it comes to software quality;

Be familiar with the reasons for designing software to minimize the impact of change, and why it is difficult to achieve this;

Be familiar with using design-by-contract principles to write software that uses existing software components based on their interface contracts;

Be familiar with using interface contracts that are described using simple predicate calculus assertions with mathematical integer, string, finite set, and tuple models;

Be familiar with extending existing software components by layering new operations on top of existing operations;

Be familiar with layering new software components’ data representations on top of existing software components;

Be familiar with using simple recursion;

Be familiar with using simple techniques to test application software, layered implementations of extensions, and layered data representations, including developing and carrying out simple specification-based test plans;

Be familiar with using simple techniques to debug application software, layered implementations of extensions, and layered data representations;

Be exposed to using basic algorithm analysis techniques and notations to analyze and express execution times of operations whose implementations involve straight-line code and simple loops;

Be competent with writing Java programs in a procedural style using the basic control structures, primitive value types, character strings, and input/output;

Be familiar with writing Java programs using core language features including interfaces, classes, inheritance, and assertions;

Be familiar with writing Java programs that use software components similar to (but simplified from) those in the Java collections framework;

Be familiar with using an understanding of the difference between value types and reference types to trace the execution of simple Java code in situations involving both flavors of types, including their use as parameters to method calls;

Be familiar with testing using JUnit;

Be familiar with illustrating key dependencies between software components using UML class diagrams (or similar);

Be familiar with using the most important features of a modern IDE, e.g., Eclipse.

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
***	*	***		**		*		*		***	**	*	***

Brief list of topics:

Introduction to Java; value types; control structures; basic input/output; introduction to Eclipse

Software components; packages; interfaces; design-by-contract; classes; reference types; methods, calls, and parameter passing; equals and toString methods; Text component; Natural component; introduction to UML class diagrams (or similar)

Layered implementations of new Text and Natural methods; introduction to recursion; introduction to specification-based testing and JUnit

Generics; Sequence component; Queue component; Stack component; List component; layered implementations of new Sequence, Queue, Stack, and List methods; more recursion

Set component; Map component; iterators

Layered data representation concepts; representation invariants and abstraction functions; Natural representation using a Stack; Sequence/Queue/Stack representation using a List

Course number and name:

CSE 2231 Software II: Software Development and Design

Credits and contact hours: 4; 2.0 hr Lec, 2.0 hr Lab

Course coordinator: Paolo Bucci

Text book:

On-line reference materials

Brief description:

Data representation using hashing, search trees, and linked data structures; algorithms for sorting; using trees for language processing; component interface design; best practices in Java.

Prerequisites, co-requisites: CSE 2221; co-req: CSE 2321

Required (R), elective (E), selected elective (SE): R

Main course outcomes:

Be competent with using design-by-contract principles and related best practices, including separation of abstract state from concrete representation;

Be competent with using interface contracts, representation invariants, and abstraction functions that are described using simple predicate calculus assertions with mathematical integer, string, finite set, and tuple models;

Be competent with extending existing software components by layering new operations on top of existing operations;

Be competent with layering new software components' data representations on top of existing software components;

Be familiar with simple linked data representations, including why and when it is (and is not) appropriate to use them rather than layered data representations;

Be competent with using simple recursion;

Be competent with using simple techniques to test application software, layered implementations of extensions, and layered or linked data representations, including developing and carrying out simple specification-based test plans;

Be competent with using simple techniques to debug application software, layered implementations of extensions, and typical data representations;

Be familiar with using basic algorithm analysis techniques and notations to analyze and express execution times of operations whose implementations involve straight-line code, simple loops, and simple recursion (e.g., in manipulating binary trees);

Be competent with writing Java programs using core language features including interfaces, classes, inheritance, and assertions;

Be competent with writing Java programs that use software components similar to (but simplified from) those in the Java collections framework;

Be familiar with using many industry-standard "best practices" for Java design and development;

Be familiar with working as part of a team on a software project with multiple milestones;

Be exposed to using a version control system, e.g., CVS or SVN.

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
***	*	***	**	**		*		*		***	**	*	***

Brief list of topics:

Set and Map representations using an array of Queues with hashing

BinaryTree component; Set representation using a BinaryTree with binary search tree algorithms

Linked representations of Stack/Queue/List components and variations; singly-linked and doubly-linked lists

Tree component; language processing using trees; elaboration of small programming language compiler team project (with related programming lab assignments continuing beyond this module); introduction to version control

Component interface design principles and practices

Advanced Java language constructs and uses; best practices in Java.

Course number and name:

CSE 2321 Foundations I: Discrete Structures

Credits and contact hours: 3; 3.0 hr Lec

Course coordinator: Ken Supowit

Text book:

Discrete Mathematics and its Applications, Rosen

Brief description:

Propositional and first-order logic; basic proof techniques; graphs, trees; analysis of algorithms; asymptotic analysis; recurrence relations.

Prerequisites, co-requisites: CSE 2122 or 2123 or 2221; Math 1151 or 1161; co-req (for students with credit for 2221): 2231

Required (R), elective (E), selected elective (SE): R

Main course outcomes:

- Be competent with using propositional logic.
- Be familiar with first-order predicate logic.
- Be familiar with proving by contradiction, by ordinary induction and by strong induction.
- Be familiar with using asymptotic notation.
- Be familiar with analyzing running time of simple iterative algorithms.
- Be familiar with graph theory.
- Be exposed to analyzing running time of recursive algorithms.
- Be exposed to sorting and searching.
- Be exposed to designing graph algorithms.

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
***		**		*				*		**	**	**	

Brief list of topics:

- Mathematical reasoning.
- Analysis of simple algorithms.
- Sorting and searching.
- Graph theory.
- Graph algorithms.

Course number and name:

CSE 2331 Foundations II: Data Structures and Algorithms

Credits and contact hours: 3; 3.0 hr Lec

Course coordinator: Wenger

Text book:

Introduction to Algorithms, Cormen, Leiserson, Rivest and Stein

Brief description:

Design/analysis of algorithms and data structures; divide-and-conquer; sorting and selection, search trees, hashing, graph algorithms, string matching; probabilistic analysis; randomized algorithms; NP-completeness.

Prerequisites, co-requisites: CSE 2231 or 321; CSE 2321 or Math 566; Stat 3460, 3470 or 427; co-req: Math 3345

Required (R), elective (E), selected elective (SE): R

Main course outcomes:

- Be competent with using asymptotic notation.
- Be familiar with designing graph algorithms.
- Be familiar with designing and analyzing divide-and-conquer algorithms.
- Be familiar with the use of balanced trees.
- Be familiar with hashing.
- Be familiar with heaps.
- Be familiar with designing backtracking algorithms.
- Be familiar with string matching.
- Be exposed to selection algorithms.
- Be exposed to probabilistic algorithms.
- Be exposed to formal languages and finite automata.
- Be exposed to NP-completeness.

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
***	*	**		**				**		**	**	**	*

Brief list of topics:

- Design and analysis of recursive algorithms.
- Balanced trees and heaps.
- Hashing.
- Graph algorithms.
- Backtracking algorithms.
- Sorting and selection.

Course number and name:

CSE 2421 Systems I: Introduction to Low-Level Programming and Computer Organization

Credits and contact hours: 4; 3.0 hr Lec, 1.0 hr Lab

Course coordinator: Gagan Agrawal

Text book:

Computer Systems: A Programmer’s Perspective; Bryant and O’Hallaron
Pointers with C; Kenneth Reek

Brief description:

Introduction to computer architecture at machine and assembly language level; pointers and addressing; C programming at machine level; computer organization.

Prerequisites, co-requisites: CSE 2122 or 2123 or 2231 or 321; CSE 2321 or Math 2366 or Math 366

Required (R), elective (E), selected elective (SE): R

Main course outcomes:

- To master programming with pointers in C;
- To be competent with application development and debugging in Unix environments;
- To be competent in programming with dynamic data structures in C, and in using C string and I/O features, bit operations, and function pointers;
- To be familiar with overall organization and design of computer systems;
- To be competent with representation and manipulation of information in computer systems;
- To be familiar with machine encoding of instructions, and be competent with a particular real or hypothetical instruction set;
- To be familiar with programming in assembly language;
- To be familiar with Linking (static linking, relocatable object files, symbols and symbol tables, symbol resolution, relocation, loading executable object files).

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
**	**	***		**						***	***	***	**

Brief list of topics:

- Transitioning from Java to C, Basic C syntax, working in Unix Environments ;
- C pointers and memory allocation/deallocation. Programming dynamic data structures with C (linked lists, arrays, including multi-dimensional arrays accessed through pointers, trees), string manipulation, pointer casting, null/void pointers.
- Other misc C features: I/O operations, bit operations, function pointers, command line argument passing
- Debugging in Unix with gdb/xgdb, Use of Makefile, Other Unix features
- Introduction to Computer Systems Organization
- Representation and manipulation of information (information storage, integer representation, integer arithmetic, floating point)
- Machine level representation of programs (program encoding, data formats, accessing information,

arithmetic and logical operations, control, procedures, array allocation and access, alignment)

Programming with an assembly language: simple use of registers and arithmetic operations, conditionals and loops, accessing arrays in assembly, procedure calls in assembly.

Linking (static linking, relocatable object files, symbols and symbol tables, symbol resolution, relocation, loading executable object files).

Course number and name:

CSE 2431 Systems II: Introduction to Operating Systems

Credits and contact hours: 3; 3.0 hr Lec**Course coordinator:** Doreen Close**Text book:**

Operating System Concepts; Silberschatz, Galvin, and Gagne
 Computer Systems: A Programmer's Perspective; Bryant and O'Hallaron

Brief description:

Introduction to operating system concepts: process, CPU scheduling, memory management, file system and storage, and multi-threaded programming.

Prerequisites, co-requisites: CSE 2421 or (CSE 360 and 459.21) or (2451 and ECE 2560)**Required (R), elective (E), selected elective (SE):** R**Main course outcomes:**

- Be competent with process concepts and CPU scheduling.
- Be competent with memory hierarchy and memory management.
- Be familiar with process control blocks, system calls, context switching, interrupts, and exception control flows.
- Be familiar with process synchronization, inter-process communication, and threads.
- Be familiar with multi-threaded programming.
- Be familiar with file systems and disk scheduling algorithms.

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
**	**	**		***				*		***	**	***	**

Brief list of topics:

- Introduction to operating systems, overview of related computer architecture concepts (CPU modes of operation, exceptions/interrupts, clock).
- Process concepts, process control block, memory and CPU protection, process hierarchy, shell, process (Unix-like) related system calls, interactions between systems calls, context switching and underlying interrupt, timer mechanisms.
- Process interactions, exception control flow (classes of exceptions, exception handling, private address space, user and kernel modes, process control, loading and running programs, Unix fork and exec system calls, signals).
- Process synchronization (e.g., critical section problem, synchronization problems), deadlock and inter-process communication, threads.
- Process (CPU) scheduling (various CPU scheduling algorithms).
- Multi-thread programming.
- Memory hierarchy
- Memory management (contiguous allocation, paging, segmentation, virtual memory).

File systems (file system hierarchy, i-node, files, directories, file system management and optimization).
Disk allocation and disk arm scheduling.

Course number and name:

CSE 2501 Social, Ethical, and Professional Issues in Computing

Credits and contact hours: 1; 1.5 hr Lec

Course coordinator: Mike Green

Text book:

Ethics for the Information Age; Michael J. Quinn

Brief description:

Social, ethical, and professional issues facing computing professionals; ethical principles; discussion of case studies.

Prerequisites, co-requisites: CSE 2231 or 222; CSE 2321 or Math 366

Required (R), elective (E), selected elective (SE): R

Main course outcomes:

- Be competent in the identification of social and ethical issues that arise in the development and application of computing technology in modern society;
- Be competent in the appreciation for alternate points of view and broader perspectives in the analysis of social and ethical concerns arising in the context of computing technology;
- Be familiar with the immediate and long-term implications to society in the creation and use of computing technology;
- Be familiar with analyzing the potential benefits and risks of computing technology to society, both locally and globally;
- Be familiar with the impact of computing technology on the economy at large as well as long-term trends;
- Be familiar with the codes of ethics of one or more professional societies related to computing technologies (e.g., ACM, IEEE, CISSP);
- Be familiar with effective methods of written and oral communication;
- Be exposed to the distinction between a profession and a trade, and how this distinction relates to ethics and responsibility;
- Be exposed to some legal issues that computing professionals may encounter as part of their practice

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
					***	**	***	*	**				

Brief list of topics:

- Professional ethics
- Effective communication
- Privacy / Civil liberties
- Security / Civil liberties
- Intellectual property
- Censorship
- Computer risks

Computer crime
Global perspectives

Course number and name:

CSE 3231 Software Engineering Techniques

Credits and contact hours: 3; 3.0 hr Lec

Course coordinator: Al Cline

Text book:

Software Engineering, Sommerville;
Software Engineering, A Practitioner’s Approach, Pressman
Developing Object-Oriented Software, An Experience-Based Approach, IBM

Brief description:

Software engineering issues, techniques, methodologies and technologies; software lifecycle activities: requirements analysis, architecture, design, testing, deployment, maintenance; project management; enterprise software systems; frameworks.

Prerequisites, co-requisites: CSE 3901 or 3902 or 3903 or 560

Required (R), elective (E), selected elective (SE): SE

Main course outcomes:

- Be competent with structured and agile software engineering frameworks; specifically structured and agile software engineering methodologies for requirements identification, analysis, architecture, design, testing, deployment and project management;
- Be familiar with the characterization of enterprise software systems.;
- Be familiar with frameworks for analyzing the business context of enterprise IT systems, the concept of Business-IT alignment and related issues, and Enterprise Architecture.;
- Be exposed to the trends impacting enterprise systems;
- Be exposed to the need for frameworks for software engineering

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
*		**	*	**	*	*	*	*	*	**	**	**	**

Brief list of topics:

- Characteristics of enterprise softw. sys.: scale, heterogeneity, distribution, federation by nature, lack of complete knowledge; organizational challenges; external drivers.
- Understanding the business and the relationship between the business and information technology - business strategy, business-IT alignment and enterprise architecture.
- Software engineering process - broadly characterized as structured or agile processes. Scenario-driven, Incremental and iterative development. Introduction to work-products and work-product-oriented development. Agile principles.
- Requirements gathering. Structured and agile requirements work-products.
- Analysis - domain, problem and solution analysis. Exposure to UML. Structured and agile analysis work-products. CRC-card based analysis.
- Architecting softw. intensive sys: Designing, evaluating architectures; non-functional requirements & quality attributes in arch. Quality-driven design. Structured & agile architecture work-products.

Software project management: Structured and Agile project planning and management, linear and parametric software estimation, Risk planning. Software configuration management. Agile boot camp - LEGO-based workshop on Agile development.

Software design: Responsibility-driven design concepts, application of responsibility-driven design in design patterns and enterprise technology frameworks, designing applications using enterprise technology frameworks.

Testing: Testing methodologies for enterprise systems. Testing in agile methodologies.

Deployment, Maintenance and Management: IT Infrastructure Library (ITIL) practices for infrastructure management.

Case studies in software engineering

Course number and name:

CSE 3232 Software Requirements Analysis

Credits and contact hours: 3; 3.0 hr Lec

Course coordinator: Bettina Bair

Text book:

An Introduction to Object-Oriented Analysis, Brown

Brief description:

Information systems analysis; object-oriented analysis models and tools; use cases, system modeling using UML; requirements specification development; term project.

Prerequisites, co-requisites: CSE 3901 or 3902 or 3903 or 560; CSE 3241 or 670; CSE 2321 or Math 366

Required (R), elective (E), selected elective (SE): E

Main course outcomes:

- Master applying an object-oriented methodology to the analysis of a real-world problem.
- Be competent with writing use cases to model functional requirements.
- Be competent with using UML use case, class, sequence and collaboration diagrams to model data and behavior requirements.
- Be competent with organizational dynamics as it applies to projects.
- Be competent with the system lifecycle approach and its phases.
- Be familiar with software engineering issues such as correctness, reliability, productivity.
- Be familiar with the distinction between analysis and design activities and skills.
- Be familiar with working with a team to produce requirements specification document.
- Be familiar with the purpose, structure and contents of a requirements specification document.
- Be familiar with non-functional requirements such as security, integrity, response time and reliability.
- Be familiar with using a UML tool.

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
		**	**	*	**	**	*	*	**	***	***	*	**

Brief list of topics:

- Software engineering, software development life cycle, traditional vs object-oriented analysis
- Teamwork and organizational dynamics
- Data flow diagramming (as context model)
- UML (use case diagram, sequence diagram, collaboration diagram, state chart diagram, class diagram)
- Requirements elicitation (face-to-face meetings and presentations to real-world client)

Course number and name:

CSE 3241 Introduction to Database Systems

Credits and contact hours: 3; 3.0 hr Lec**Course coordinator:** Arnab Nandi**Text book:**

Fundamentals of Database Systems, Ramez Elmasri and Shamkant Navathe

Brief description:

Database systems use; logical design; entity-relationship model; normalization; query languages and SQL; relational algebra and calculus; object relational databases; XML; active databases; database design project.

Prerequisites, co-requisites: CSE 2231 or 321; CSE 2321 or Math 366**Required (R), elective (E), selected elective (SE):** SE**Main course outcomes:**

Master using relational databases.

Master writing queries in relational data languages including SQL and relational algebra.

Master using mechanisms for data independence, including data models, languages and views.

Be competent with logical database design.

Be competent with conceptual database design.

Be familiar with object relational database technology.

Be exposed to XML and active databases.

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

Introduction; Entity-Relationship (ER) Model

The Structure of the Relational Data Model

Relational Algebra and Relational Calculus

Functional Dependencies and Normalization

ER-to-Relational Data Model

SQL

Graphical User Interfaces

Embedded SQL

Object Relational Databases

XML

Active Databases

Course number and name:

CSE 3244 Data Management in the Cloud

Credits and contact hours: 3; 3.0 hr Lec**Course coordinator:** Srini Parthasarathy**Text book:**

Fundamentals of Database Systems, Ramez Elmasri and Shamkant Navathe
 Data-Intensive Text Processing with MapReduce, Jimmy Lin and Chris Dyer

Brief description:

Systematic organization of data on cloud computing architectures; basic indexing techniques, including B-tree and hash-based indexing; fundamentals of query optimization, including access path selection and cardinality estimation; full and partial replication; data partitioning and distributed task scheduling.

Prerequisites, co-requisites: CSE 3241; 2421**Required (R), elective (E), selected elective (SE):** SE**Main course outcomes:**

Master using over fundamental concepts in indexing and optimization techniques, including B-trees, hash-based indexing and cardinality estimation
 Master using mechanisms of distributed data management, including full and partial replication strategies, data partitioning, fault tolerance models and consistency tradeoffs
 Be competent with data warehousing techniques, including on-line analytical processing (OLAP)
 Be competent with distributed algorithms and task scheduling in cloud environments
 Be exposed to current cloud-based data management technologies

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

Review of relevant 3241 material
 Indexing and optimization
 Data warehousing and OLAP
 Cloud computing principles
 Replication and partitioning strategies
 Algorithms and platforms for cloud

Course number and name:

CSE 3321 Automata and Formal Languages

Credits and contact hours: 3; 3.0 hr Lec

Course coordinator: Mike Fritz

Text book:

Introduction to Languages and the Theory of Computation, J. C. Martin

Brief description:

Machine-based and grammatical models of computation; finite automata and regular languages; push-down automata and context-free languages; Turing machines; non-determinism; Church’s Thesis; halting problem.

Prerequisites, co-requisites: CSE 2231 or 321; CSE 2331 or Math 566; CSE 2421 or 360; Math 3345

Required (R), elective (E), selected elective (SE): SE

Main course outcomes:

- Be competent with using regular expressions and finite state machines.
- Be competent with using context-free languages, context-free grammars, and push-down automata.
- Be competent with proving by contradiction, by ordinary induction and by strong induction.
- Be familiar with non-determinism.
- Be familiar with Turing machines.
- Be exposed to reductions.
- Be exposed to decidability and recursive enumerability.
- Be exposed to Church’s Thesis.
- Be exposed to theory of parsing.

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

- Formal languages.
- Regular languages and finite automata.
- Grammars.
- Context-free languages and pushdown automata.
- Recursively enumerable languages and Turing machines.

Course number and name:

CSE 3341 Principles of Programming Languages

Credits and contact hours: 3; 3.0 hr Lec**Course coordinator:** Neelam Soundarajan**Text book:**

Programming language pragmatics, Scott

Brief description:

Formal languages and grammars; recursive descent parsing; data types, expressions, control structures, parameter passing; compilers and interpreters; memory management; functional programming principles.

Prerequisites, co-requisites: CSE 2231; CSE 2331 or 680; CSE 2421; CSE 3901 or 3902 or 560**Required (R), elective (E), selected elective (SE):** SE**Main course outcomes:**

Master using syntax-directed parsing, printing, execution, and compilation for simple imperative language constructs.

Master distinguishing between compile-time vs. run-time activities.

Be competent with using syntax-related concepts including regular expressions and context-free grammars to describe the structure of languages.

Be competent with analyzing programming language design issues related to data types, expressions and control structures, parameter passing.

Be competent with principles of object-oriented languages.

Be competent with implementing object-oriented languages.

Be familiar with memory management techniques for imperative languages, including object-oriented languages.

Be familiar with using functional programming languages.

Be exposed to analyzing variable bindings and scope rules.

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

Overview of types of languages; language design and evaluation criteria; implementation methods (compilers and interpreters)

Grammars (regular expressions, CFGs), abstract & concrete parse trees; recursive descent parsing;

Recursive descent interpretation, compilation;

Principles of OO languages (data abstraction, encapsulation, single and multiple inheritance, polymorphism (single and multiple dispatch), etc.)

Implementation of imperative languages including OO languages (stack, heap management; activation records etc; runtime dispatch in OO languages)

Functional programming principles (Scheme), including some discussion of implementation techniques
More advanced ideas (ML types/inferencing, dynamically-typed languages, ...)

Course number and name:

CSE 3421 Introduction to Computer Architecture

Credits and contact hours: 3; 3.0 hr Lec

Course coordinator: Chris Stewart

Text book:

Computer Organization & Design: The Hardware/Software Interface, Patterson, Hennessy

Brief description:

Organization of hardware and software in modern computer systems, including instruction set design, processor control, ALU design, pipelining, multicores and accelerators, and memory subsystem design.

Prerequisites, co-requisites: CSE 2231 or 321; CSE 2421 or 360 or ECE 2560 or ECE 265; ECE 2000 or 2060 or 261

Required (R), elective (E), selected elective (SE): SE

Main course outcomes:

- Be competent with performance tradeoffs in computer architecture, especially as they relate to processor and memory design.
- Be competent with the architectural components of a computer, especially the memory hierarchy and processor.
- Be familiar with the design principles underlying modern instruction sets.
- Be familiar with the RISC/MIPS programming
- Be exposed to the structure of a processor cache
- Be exposed to multicores, multiprocessors, clusters/datacenters, and IO subsystems
- Be exposed to the architectures underlying modern computer systems

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

- State of the art in computer architecture, Moore’s law, and the power wall;
- Quantifying performance and power tradeoffs;
- Design of instruction set architectures
- Digital logic and circuit design
- Architecture and design of memory, such as SRAM and DRAM
- Design of integer arithmetic logic unit (ALU)
- Floating point representation and arithmetic
- Processor design: non-pipelined and pipelined
- Advanced topics in memory hierarchy, such as cache lines, associativity, and cache coherence
- Multicores, multiprocessors, interconnects, I/O subsystems, and clusters/data centers
- Realization of architecture concepts in real systems

Course number and name:

CSE 3461 Computer Networking and Internet Technologies

Credits and contact hours: 3; 3.0 hr Lec

Course coordinator: Prasun Sinha

Text book:

Computer Networking: A Top-Down Approach, James Kurose and Keith Ross

Brief description:

Computer networks, communication protocols, Internet TCP/IP and applications, wireless communications and network security.

Prerequisites, co-requisites: CSE 2421; co-req: CSE 2431

Required (R), elective (E), selected elective (SE): SE

Main course outcomes:

- Be competent with the basics of data communications and network architecture.
- Be competent with network layer control and protocols.
- Be competent with link layer control and protocols.
- Be competent with using the TCP/IP protocol suite.
- Be familiar with using high speed LANs.
- Be familiar with various internetworking technologies.
- Be exposed to designing advanced communication protocols.

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

- Introduction to Internet
- Internet application, TCP and IP layers
- Internet data link and physical layers
- Wireless networks
- Network security

Course number and name:

CSE 3521 Survey of Artificial Intelligence I: Basic Techniques

Credits and contact hours: 3; 3.0 hr Lec

Course coordinator: Jim Davis

Text book:

Artificial Intelligence, A Modern Approach (3rd edition)

Brief description:

Survey of basic concepts and techniques in artificial intelligence, including problem solving, knowledge representation, and machine learning.

Prerequisites, co-requisites: CSE 2331 or (CSE 222 and Math 366)

Required (R), elective (E), selected elective (SE): SE

Main course outcomes:

- Master basic search techniques for problem-solving, including systematic blind search, heuristically-guided search, and optimal search.
- Be competent with game tree search methods and the requirements for expert-level game play.
- Be familiar with using logic and proof as a basis for knowledge representation and automated reasoning.
- Be familiar with multiple knowledge-representation formalisms.
- Be exposed to problems in common sense reasoning and language understanding.
- Be exposed to integrated AI architectures as a platform for building AI systems.
- Be exposed to machine learning techniques and the kinds of problem they solve.
- Be exposed to state-of-the-art AI applications related to robotics, machine vision, speech recognition, and computer games.

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

- Basic representation and problem solving methods.
- Search techniques and game playing.
- Knowledge representation using logic, automated proof techniques.
- Machine learning, probabilistic inference.
- Planning and common sense reasoning.
- Perception and communication.
- Applications.
- AI & Games.

Course number and name:

CSE 3541 Computer Game and Animation Techniques

Credits and contact hours: 3; 3.0 hr Lec

Course coordinator: Matt Boggus

Text book:

Computer Animation: Algorithms & Techniques, Parent

Brief description:

Fundamental algorithms and mathematics in production of computer animation and video games, emphasizing control and rendering of animated characters.

Prerequisites, co-requisites: CSE 3901 or 3902 or 3903 or 560

Required (R), elective (E), selected elective (SE): SE

Main course outcomes:

- Be competent with basic interpolation techniques, speed control along a path, and automatic banking into curves along a path.
- Be competent with forward and inverse kinematics or articulated linkages
- Be competent with physics-based animation.
- Be competent with behavioral animation.
- Be competent with the generation and processing of sound in games and animation.
- Be competent with the use of AI techniques in games.
- Be competent with software architectures for computer games.
- Be competent with the concept of a rendering pipeline and graphics state.
- Be competent with hierarchical scene graphs and hierarchical animation.
- Be familiar with computational issues associated with computer animation.
- Be familiar with control devices for computer games and framework support for event notification.
- Be exposed to computer animation production technology.
- Be exposed to motion capture technology and its use in computer animation.
- Be exposed to the history of animation and computer animation.

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

- Overview, history, and foundation of computer games and computer animation
- Matrices and transformations
- Path-based animation; linear, cubic interpolation; splines, path following; acceleration, speed control; ease-in/ease-out; orientation rep., interpolation; quaternions, path following; Frenet Frame, banking, interpolation-based animation
- Hierarchical modeling and animation: inverse kinematics, other IK techniques
- Review of numerical integration
- Constrained motion: ground clamping, collision detection, constrained physics

Review of physics: gravity, friction, rigid body, spring-mass systems, particle systems, collision response

Human figure animation: anatomy, biomechanics

Mocap, including visit to mocap lab; motion databases

Behavioral animation: flocking, prey-predator model

Crowd modeling: cellular and continuous models

Flexible body animation: non-uniform scaling, spring-mass-damper systems, blend shapes

Efficient and effective basic human motion modeling: reaching, grasping, walking/running, expressions, speech

Sound: physically based, sound effects

Rendering overview: models, textures, lights and cameras

Overview of AI in computer games

Scene management using octrees and cells and portals

Course number and name:

CSE 3901 Project: Design, Development, and Documentation of Web Applications

Credits and contact hours: 4; 3.0 hr Lec, 1.0 hr Lab

Course coordinator: Paul Sivilotti

Text book:

Head First Servlets & JSP, Sierra and others

Brief description:

Intensive group project involving design, development, and documentation of a web application; client-side and server-side scripting; communication skills emphasized; builds programming maturity.

Prerequisites, co-requisites: CSE 2231 CSE 321; CSE 2321 or Math 366; CSE 2421 or (CSE 360 and 459.21 or 459.22); and GE Writing Level 2

Required (R), elective (E), selected elective (SE): SE

Main course outcomes:

- Be competent in the development of dynamic web applications using Java-based technologies.
- Be competent in the development and formatting of static web content.
- Be competent with writing, organizational, and presentation skills.
- Be competent with analyzing the intended audience for a written document and writing an audience profile.
- Be familiar with making engineering decisions involving tradeoffs.
- Be familiar with the use of SQL to access database content.
- Be familiar with defining the purpose (persuade, inform, etc.) of a written document and select the appropriate rhetorical devices.
- Be familiar with writing several pieces of documentation that have different purposes and to use appropriate organization to tie them together.
- Be familiar with group project organization techniques including conducting group meetings, recording minutes, and tracking project progress.
- Be familiar with using one structured approach to large software design to carry out a large group project.
- Be exposed to the use of application frameworks for the deployment of web applications.
- Be exposed to some basic security vulnerabilities sometimes found in web applications.
- Be exposed to methods for internationalizing web applications.

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

- Static web and networking (HTTP)
- Document content and formatting (HTML, XHTML, XML, CSS)
- Client-side scripting with JavaScript

Databases (MySQL, JDBC)
Model-view-controller design pattern
Server-side scripting with servlets and Java Server Pages
Sessions and state (JavaBeans)
Authentication and security (SSL, SQL injection attacks, Cross-site scripting attacks)
Deployment frameworks
Internationalization and localization
Performance considerations
Technical writing
Improving responsiveness with asynchronous requests (Ajax)
Introduction to web services

Course number and name:

CSE 3902 Project: Design, Development, and Documentation of Interactive Systems

Credits and contact hours: 4; 3.0 hr Lec, 1.0 hr Lab

Course coordinator: Roger Crawfis

Text book:

on-line materials provided

Brief description:

Intensive group project involving design, development, and documentation of an interactive software system, a 2D interactive game; communication skills emphasized; builds programming maturity.

Prerequisites, co-requisites: CSE 2231 CSE 321; CSE 2321 or Math 366; CSE 2421 or (CSE 360 and 459.21 or 459.22); and GE Writing Level 2

Required (R), elective (E), selected elective (SE): SE

Main course outcomes:

- Be competent with 2D graphics objects and rendering.
- Be competent with event based programming.
- Be familiar with elements of game engines such as AI, animation, memory management, and user control.
- Be familiar with game content creation and editing tools.
- Be competent with writing, organizational, and presentation skills.
- Be competent with analyzing the intended audience for a written document and writing an audience profile.
- Be familiar with making engineering decisions involving tradeoffs (e.g., space-time tradeoffs in choosing a table implementation).
- Be familiar with defining the purpose (persuade, inform, etc.) of a written document and select the appropriate rhetorical devices.
- Be familiar with writing several pieces of documentation that have different purposes and to use appropriate organization to tie them together.
- Be familiar with group project organization techniques including conducting group meetings, recording minutes, and tracking project progress.
- Be familiar with using one structured approach to large software design to carry out a large group project.

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

- Computer graphics and games overview
- Event based programming
- 2D rendering pipeline
- Image processing

Introduction to 3D graphics
Student project team meetings
Student project team design reviews, presentations, etc.

Course number and name:

CSE 3903 Project: Design, Development, and Documentation of System Software

Credits and contact hours: 4; 3.0 hr Lec, 1.0 hr Lab

Course coordinator: Paul Sivilotti

Text book:

System Software – An Introduction to Systems Programming, Leland Beck
The Practice of Programming, Brian Kernighan and Rob Pike
A Writer's Reference, Diana Hacker

Brief description:

Intensive group project involving design, development, and documentation of system software including an assembler and a linking loader; communication skills emphasized; builds programming maturity.

Prerequisites, co-requisites: CSE 2231 CSE 321; CSE 2321 or Math 366; CSE 2421 or (CSE 360 and 459.21 or 459.22); and GE Writing Level 2

Required (R), elective (E), selected elective (SE): SE

Main course outcomes:

Be competent with using and implementing each component of the the assemble-link-load-relocate-execute process
Be competent with using bit manipulation of integers and ascii characters to be able to emulate a simple computer that handles both integer and character I/O
Be competent with writing, organizational, and presentation skills
Be competent with analyzing the intended audience for a written document and writing an audience profile
Be familiar with making engineering decisions involving tradeoffs
Be familiar with writing a relocating linking loader
Be familiar with subroutine linkage at the assembly level and with using different addressing modes
Be familiar with emulating in software, the fetch-decode-execute cycle of a CPU
Be familiar with using macros, including recursive and nested macros
Be familiar with software testing strategies including black-box versus white-box, unit testing, integration testing, top-down versus bottom-up testing, and construction and implementation of a test plan
Be familiar with defining the purpose (persuade, inform, etc.) of a written document and select the appropriate rhetorical devices.
Be familiar with writing several pieces of documentation that have different purposes and to use appropriate organization to tie them together.
Be familiar with group project organization techniques including conducting group meetings, recording minutes, and tracking project progress.
Be familiar with using one structured approach to large software design to carry out a large group project.
Be exposed to issues in systems programming as opposed to applications programming
Be exposed to memory management issues including caching and virtual memory
Be exposed to one-pass macro processing techniques

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

- Architecture
- Software engineering
- Technical writing
- System software
- Assemblers: algorithm, pseudo operations, expressions
- Searching and sorting
- Tools: makefiles, CVS, lex and yacc
- Linking and loading
- Macro processors
- Compilers: tokenizing, parsing, code generation

Course number and name:

CSE 4251 The UNIX Programming Environment

Credits and contact hours: 1; 1.0 hr Lec

Course coordinator: Prasun Sinha

Text book:

UNIX in a Nutshell, A Desktop Quick Reference, Arnold Robbins
UNIX Shells by Example, Ellie Quigley

Brief description:

Introduction to the UNIX programming environment including: shell programming (csh); regular expressions; makefiles; grep, sed, and awk programming languages.

Prerequisites, co-requisites: CSE 2231 or 321

Required (R), elective (E), selected elective (SE): E

Main course outcomes:

- Be familiar with csh programming.
- Be familiar with UNIX regular expressions.
- Be familiar with using basic sed commands.
- Be familiar with using awk commands to filter through data files.

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

- C Shell: filename metacharacters, i/o redirection, command history, building complex command, job/process control, directory control
- C Shell programming: script introduction, script examples, debugging scripts
- Regular expressions in Unix (grep)
- make, sed, awk

Course number and name:

CSE 4252 Programming in C++

Credits and contact hours: 1; 1.0 hr Lec**Course coordinator:** Neelam Soundarajan**Text book:**

The C++ Programming Language, Stroustrup

Brief description:

Syntax and pragmatics of C++ programming; C++ types, arrays, classes, pointers; objects and classes; compile-time vs. run-time picture; inheritance; template classes.

Prerequisites, co-requisites: CSE 2231**Required (R), elective (E), selected elective (SE):** E**Main course outcomes:**

Be competent with using C++ classes, member functions, constructors, destructors, etc.

Be competent with using templates and the C++ standard template library (STL).

Be competent with using inheritance including using virtual functions.

Be familiar with using arrays and pointers to work with collections of objects and with allocating and releasing memory.

Be familiar with using .h and .cpp files to organize large programs.

Be familiar with the relation between the runtime picture and the source-level picture of moderately complex programs; and using this to build reliable programs.

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

Introduction; Compiling and running C++ programs (including use of .h and .cpp files);

Overview of simple types in C++; arrays, classes, address types (pointers and references);

Distinction between objects and classes; compile-time picture vs. runtime; member functions are invoked on objects; exception: static members (both data and functions);

Stack vs. heap objects; automatic vs. explicit creation; constructors and destructors; new and delete; “this” pointer; complex structures such as trees;

Inheritance; public vs. private vs. protected; overriding; virtual methods, pure virtual methods, abstract classes; virtual vs. non-virtual methods; runtime dispatch and how it works;

Exceptions, namespaces;

Templates; examples using STL

Course number and name:

CSE 4253 Programming in C#

Credits and contact hours: 1; 1.0 hr Lec

Course coordinator: Roger Crawfis

Text book:

C# in a Nutshell, Joseph Albahari and Ben Albahari

Brief description:

C# programming for students well-versed in programming with another object-oriented language.

Prerequisites, co-requisites: CSE 2231

Required (R), elective (E), selected elective (SE): E

Main course outcomes:

- Master C# programming language constructs and built-in types
- Master using C# delegates and events
- Be competent in using language interfaces, in particular, those defined in the .NET framework
- Be competent in using inheritance in C#
- Be competent with using .NET collections (sets, lists, dictionaries)
- Be exposed to the Common Language Runtime (CLR), garbage collection, and assemblies
- Be familiar with GUI programming on Windows
- Be exposed to C# documentation and community web sites.

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

- Overview of the course, the .NET platform and C#
- C# language basics
- Hands-on workshop on Visual Studio
- Review of Object-oriented design, programming to interfaces, C# interfaces, C# inheritance and C# class definitions.
- C# Generics and generic collection classes in .Net
- Enumerations and Iterators
- Windows Forms and basic GUI development
- Delegates and Events
- Extension methods
- Equality, comparisons and hashing in .NET
- Anonymous types
- Lambda Expressions
- Language integrated queries (LINQ) and functional programming with C#

Course number and name:

CSE 4254 Programming in Lisp

Credits and contact hours: 1; 1.0 hr Lec

Course coordinator: Neelam Soundarajan

Text book:

ANSI Common Lisp, Graham

Brief description:

Lisp programming for students well-versed in programming with another language.

Prerequisites, co-requisites: CSE 2231

Required (R), elective (E), selected elective (SE): E

Main course outcomes:

- Be competent with basic components of Common Lisp, such as s-expressions, data structures, and program flow.
- Be familiar with the Lisp family of programming languages, with particular emphasis on ANSI Common Lisp.
- Be familiar with the Lisp top-level and debugger.
- Be exposed to the functional programming paradigm.

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

- Data structures
- Program control and structure
- Functions
- I/O and symbols
- Numbers and macros
- Advanced topics, style, tricks, and review.

Course number and name:

CSE 4255 Programming in Perl

Credits and contact hours: 1; 1.0 hr lec

Course coordinator: Nasko Rountev

Text book:

Learning Perl, 3rd Edition, Randal L. Schwartz and Tom Phoenix

Brief description:

Syntax and pragmatics of Perl programming; Perl mechanisms for text and file processing, scripting, client-server programming, etc.; powerful ways to combine these mechanisms.

Prerequisites, co-requisites: CSE 2231, 2331, 2421

Required (R), elective (E), selected elective (SE): E

Main course outcomes:

- Be competent with Perl's data types;
- Be competent with text and file manipulations using Perl;
- Be competent with combining Perl's mechanisms and techniques to solve complex, practical problems.
- Be familiar with using DBI to access a database;
- Be familiar with basic CGI scripts written in Perl;

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

- Introduction to Perl, basic skeleton, scalar variables;
- Arrays, lists, subroutines;
- Hashes, basic I/O;
- Regular expressions;
- Control structures;
- File and directory manipulations;
- Process orchestration;
- String manipulations and sorting;
- Perl DBI; CGI scripting;
- Other common Perl modules;
- Combining Perl's mechanisms and techniques to solve complex problems;
- Object-oriented Perl.

Course number and name:

CSE 4471 Information Security

Credits and contact hours: 3; 3.0 hr Lec

Course coordinator: Dong Xuan

Text book:

Principles of Information Security, M. E. Whitman and H. J. Mattord

Brief description:

Introduction to security of digital information; threats and attacks; regulations; risk management; attack detection and response; cryptography; forensics; technical training and certifications.

Prerequisites, co-requisites: CSE 2231, 2321

Required (R), elective (E), selected elective (SE): E

Main course outcomes:

- Be competent with information security governance, and related legal and regulatory issues
- Be competent with understanding external and internal information security threats to an organization
- Be competent with information security awareness and a clear understanding of its importance
- Be competent with how threats to an organization are discovered, analyzed, and dealt with
- Be familiar with a high-level understanding of how information security functions in an organization.
- Be familiar with the structure of policies, standards and guidelines

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

- Information security, roles within an organization
- Legal, regulatory issues
- Threats, vulnerabilities, exploits
- Governance, policy, standards, guidelines
- Risk management
- Firewalls, Intrusion Detection, Incident Response, Forensics, Honeypots, VPN, Vulnerability Scanning
- Cryptography
- Access Control
- Physical Security, Personnel, Training, Education, Awareness, Certification...
- Presentations by the students
- Overview, wrap-up

Course number and name:

CSE 5234 Distributed Enterprise Computing

Credits and contact hours: 3; 3.0 hr Lec**Course coordinator:** Rajiv Ramnath**Text book:**

Effective Enterprise Java, Ted Neward

Service Oriented Java Business Integration: Enterprise Service Bus integration solutions for Java developers, B. A. Christudas

Brief description:

Current application and middleware frameworks for distributed enterprise computing; XML; Enterprise Java; SOAP and REST web services; AJAX and JSON; enterprise service bus; Hadoop; mobile computing.

Prerequisites, co-requisites: CSE 2431**Required (R), elective (E), selected elective (SE):** E**Main course outcomes:**

Be competent with the technologies of enterprise computing that are most important in the software industry

Be competent with the advantages of architectures, specifically three tier architectures over two tier architectures

Be competent with how to build scalable distributed systems

Be competent with standards in describing data

Be familiar with how to apply enterprise computing to scientific problems

Be familiar with the importance of distributed computing through hands on experience

Be familiar with the issues involved in enterprise mission critical applications

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

Introduction to Distributed Enterprise Systems

Overview of the technologies used for distributed enterprise systems

XML

Javascript, AJAX and JSON

Object-relational mapping (ORM)

Enterprise Java

Designing enterprise applications

SOAP and REST Web Services

Enterprise integration via the Enterprise Service Bus

Cloud computing toolkits

Mobile and edge computing

High-volume computing on mainframe computers

Course number and name:

CSE 5235 Applied Enterprise Architectures and Services

Credits and contact hours: 3; 3.0 hr Lec

Course coordinator: Rajiv Ramnath

Text book:

Various on-line and on-reserve readings from the literature

Brief description:

Modeling/analysis of complex enterprise architectures; enterprise patterns (workflow, broker, warehousing); methods for service performance (lean, ontologies, data mining, etc.); emerging topics in semantic cyber-infrastructures, social computation.

Prerequisites, co-requisites: CSE 5911 or 5912 or 5913 or 5914

Required (R), elective (E), selected elective (SE): E

Main course outcomes:

Master enterprise architecture modeling concepts such as external context, service goals, workflows, roles, service and operating level performance, complex components, service provisioning, metrics, and performance measurement.

Be competent with conceptual enterprise modeling, goals and trade-offs, and gap analysis to identify service changes and needed performance improvement.

Be competent with developing specifications for service improvement leading to design.

Be competent with related governance and technology standards (Federal Enterprise Architectures, ISO20000, W3C, and OMG).

Be familiar with the applications of broker, data warehousing, and workflow architecture patterns and their performance improvement through industry cases.

Be familiar with tools and methods for service improvement like data mining tools, social network services, ontologies/OWL/RDF.

Be familiar with the industry practice of applying architecture knowledge for developing strategic options using IT solutions.

Be familiar with techniques to develop a business case for the stakeholders by articulating priorities and their ability to meet service goals.

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

Syllabus and course administration, process of research, identifying references, and ethics
 Introduction to vocabulary 2013 HCI, business processes, supply chains, enterprise architectures and systems, and symbiotic computing; declarative modeling and analysis methods using case studies
 Use of performance linkages between services in-the-large and in-the-small, for service level and policy formulation, and evaluation; service life-cycle
 Patterns and principles for co-engineering Adaptive Complex Systems to achieve behaviors like Lean,

chargeback and capacity alignment, accountability, competitiveness, and innovation

Role of emerging technologies (sensors, mobile, service-oriented architectures) in achieving performance objectives; enterprise architecture patterns (warehousing, mining of operational data, symbiotic computing, social computing, standards)

Portfolio development and program management; project specific presentations of research and best practices; guest lecturers from industry representing IT operations management and middleware technologies

Edge-to-enterprise case studies covering trends such as social networking services and their impact on enterprise architectures

Team project methodology, team meetings, and project-relevant research presentations.

Course number and name:

CSE 5236 Mobile Application Development

Credits and contact hours: 3; 3.0 hr Lec**Course coordinator:** Rajiv Ramnath**Text book:**

Mobile Applications: Architecture, Design, and Development; Valentino Lee; Heather Schneider; Robbie Schell
 Mobile Design and Development, Brian Fling
 Programming the Mobile Web, Maximiliano Firtman

Brief description:

Mobile application development frameworks; Architecture, design and engineering issues, techniques, methodologies for mobile application development.

Prerequisites, co-requisites: CSE 3901 or 3902 or 3903**Required (R), elective (E), selected elective (SE):** E**Main course outcomes:**

- Be competent with the characterization and architecture of mobile applications.
- Be competent with understanding enterprise scale requirements of mobile applications
- Be competent with designing and developing mobile applications using at least 2 mobile application development frameworks
- Be competent with comparatively evaluating the capabilities of at least 2 mobile application development frameworks.
- Be exposed to technology and business trends impacting mobile applications

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

- Characteristics of mobile applications
- History of mobile application frameworks
- Overview of mobile application development languages - Objective C and Java
- Application models of mobile application frameworks
- User-interface design for mobile applications
- Managing application data
- Integrating with cloud services
- Creating enriched user interfaces. Multi-touch and gesture-based applications
- Integrating networking, the OS and hardware into mobile-applications
- Addressing enterprise requirements in mobile applications - performance, scalability, modifiability, availability and security
- Testing methodologies for mobile applications
- Publishing, deployment, maintenance and management
- Case studies in mobile applications

Course number and name:

CSE 5242 Advanced Database Management Systems

Credits and contact hours: 3; 3.0 hr Lec

Course coordinator: Spyros Blanas

Text book:

Database System Implementation, H Garcia-Molina, J Ullman, and J Widom

Concurrency Control and Recovery in Database Systems, P Bernstein, V Hadzilacos, and Nathan Goodman

Foundations of Multidimensional and Metric Data Structures, H Samet

Brief description:

Transaction management; query processing and optimization; organization of database systems, advanced indexing, multi-dimensional data, similarity-based analysis, performance evaluation, new database applications.

Prerequisites, co-requisites: CSE 3241, 2421

Required (R), elective (E), selected elective (SE): E

Main course outcomes:

Master transaction processing, concurrency control and crash recovery

Master query processing and optimization

Master advanced indexing and data organization for DBMS

Be competent with similarity-based querying

Be familiar with new data management applications

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

Transaction Management: Concurrency Control and Serializability; Recoverability and Strictness; Two-phase locking; Two-phase commit

Query Processing and Optimization: (a) Relational algebra transformations (b) Query size and I/O cost estimation (c) I/O cost for basic data management algorithms

Advanced Indexing and Query Processing, Multi-dimensional Index Structures

Data Warehouse Design and Implementation

New Topics and Applications, e.g., (a) Information Retrieval (b) Bioinformatics (c) Incomplete and Uncertain Databases (d) Non-relational Databases, (e) Data Stream Management

Scalable Data Storage, Parallel and Distributed Databases, Database Performance, Buffer and Storage Management

Course number and name:

CSE 5243 Introduction to Data Mining

Credits and contact hours: 3; 3.0 hr Lec**Course coordinator:** Srini Parthasarathy**Text book:**Introduction to Data Mining, Tan, Steinbach and Kumar
Data mining: Concepts and techniques, Han, Kamber.**Brief description:**

Knowledge discovery, data mining, data preprocessing, data transformations; clustering, classification, frequent pattern mining, anomaly detection, graph and network analysis; applications.

Prerequisites, co-requisites: CSE 2331, 3241**Required (R), elective (E), selected elective (SE):** E**Main course outcomes:**Be competent with anomaly detection algorithms and graph/network analysis algorithms
Master the knowledge discovery process
Be competent with simple data preprocessing and data transformation techniques
Master key classification and clustering algorithms
Master major frequent pattern mining algorithms**Contribution to program outcomes:**

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:Introduction to the Knowledge Discovery Process and Background
Elements of Data Preprocessing and Data Transformations
Data Clustering
Data Classification
Frequent Pattern Mining
Analyzing Graphs and Networks
Anomaly Detection
Applications (Bioinformatics, Social Networks)

Course number and name:

CSE 5245 Introduction to Network Science

Credits and contact hours: 3; 3.0 hr Lec

Course coordinator: Srini Parthasarathy

Text book:

Networks, An Introduction, Mark Newman

Networks, Crowds, and Markets; D. Easley and J. Kleinberg

Brief description:

Introduction to Network Science; Global and Local Network Measures; PageRank; Community Discovery Algorithms; Network Models; Understanding the role of network analysis in Web and Social network applications

Prerequisites, co-requisites: CSE 2331

Required (R), elective (E), selected elective (SE): E

Main course outcomes:

Be familiar with network science as a discipline

Master major macro- and micro- metrics used to describe various networks.

Master key community discovery algorithms

Be familiar with generative models for networks and various network analysis tools.

Master the role of network science in WWW and social network applications.

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

Motivation and Introduction to Basic Concepts

Fundamentals of Network Theory: Representation, Measures and Metrics

Graph Algorithms, Page Rank and Community Discovery

Network Models

The Web and Social Network Analysis: Putting It All Together

Course number and name:

CSE 5343 Compiler Design and Implementation

Credits and contact hours: 3; 3.0 hr Lec**Course coordinator:** Nasko Rountev**Text book:**

Compilers: Principles, Techniques, and Tools, Alfred V. Aho, Monica S. Lam, Ravi Sethi, and Jeffrey D. Ullman

Brief description:

Lexical and syntax analyses using compiler generation tools; type checking; intermediate code; control-flow analysis; dataflow analysis; code optimizations; code generation; compiler project.

Prerequisites, co-requisites: CSE 3901 or 3902 or 3903; and CSE 3341**Required (R), elective (E), selected elective (SE):** E**Main course outcomes:**

Master using tools for generation of lexical analyzers and parsers;
 Master generating intermediate code;
 Be competent with control-flow and dataflow analysis;
 Be competent with simple code optimizations;
 Be familiar with techniques for top-down and bottom-up parsing;
 Be familiar with type checking;
 Be familiar with generation of machine code;
 Be familiar with optimizations for parallelism and locality;
 Be exposed to techniques for lexical analysis;
 Be exposed to register allocation;
 Be exposed to instruction scheduling.

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

Compiler structure
 Lexical analysis
 Parsing
 Type checking
 Intermediate code
 Control-flow analysis
 Dataflow analysis
 Code optimizations
 Generation of machine code
 Parallelism and locality
 Instruction scheduling
 Register allocation

Course number and name:

CSE 5361 Numerical Methods

Credits and contact hours: 3; 3.0 hr Lec**Course coordinator:** Misha Belkin**Text book:**

Numerical Mathematics and Computing, Cheney and Kincaid

Brief description:

Numerical methods for scientific computation: computer arithmetic, rounding errors, machine precision, machine representation, root-finding, interpolation, integration, linear systems, splines, smoothing, curve-fitting, linear programming.

Prerequisites, co-requisites: CSE 2231 and Math 2568**Required (R), elective (E), selected elective (SE):** E**Main course outcomes:**

Master using the bisection method, Newton's method, and the secant method in single variable root finding.

Master central difference formula and Richardson extrapolation for numerical differentiation.

Master trapezoid rule, recursive trapezoid formula and Romberg algorithm for numerical integration.

Master Gaussian elimination with scaled partial pivoting.

Be competent with using IEEE single precision floating point arithmetic standard.

Be competent with loss of significant digits in numerical calculations.

Be competent with polynomial interpolation and Lagrange and Newton form.

Be competent with numerical computation of second derivative.

Be familiar with Simpson's and adaptive Simpson's algorithm.

Be exposed to calculating errors in polynomial interpolation.

Be exposed to Gaussian quadrature formulas.

Be exposed to solving linear systems using matrix factorization.

Be exposed to iterative solutions of linear systems.

Be exposed to method of least squares.

Be exposed to Monte Carlo simulation.

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

Taylor series

Computer arithmetic, rounding errors, machine precision, machine representation

Root finding

Polynomial interpolation

Numerical differentiation and integration

Systems of linear equations; Gaussian elimination and iterative methods

Monte Carlo Integration
Smoothing of data and least squares method
Splines
Linear Programming

Course number and name:

CSE 5433 Operating Systems Laboratory

Credits and contact hours: 3; 1.0 hr Lec, 2.0 hr Lab

Course coordinator: Feng Qin

Text book:

Linux Kernel Development, Robert Love

Brief description:

Introduction to the internals of operating systems; designing and implementing components within commercial operating systems: system calls, CPU scheduling, context switching, process management, memory management, file systems.

Prerequisites, co-requisites: CSE 2431

Required (R), elective (E), selected elective (SE): E

Main course outcomes:

- Master compilation and configuration of building an OS.
- Master internals of OS system call implementation.
- Be competent with CPU scheduling and process management.
- Be competent with memory management systems.
- Be competent with internals of file systems.

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

- Linux basics (Overview of Linux, Building Linux, and kernel source tree)
- Internals of system calls
- Linux CPU scheduling and process management
- Linux interrupt handling
- Linux memory management
- Linux file systems

Course number and name:

CSE 5441 Introduction to Parallel Computing

Credits and contact hours: 3; 3.0 hr Lec**Course coordinator:** P. Sadayappan**Text book:**

Class notes

Brief description:

Parallel programming models; sequential and parallel performance issues; high-performance computer architecture; design, analysis, implementation and performance evaluation of parallel algorithms.

Prerequisites, co-requisites: CSE 2231, 2331, 2421; Math 2568**Required (R), elective (E), selected elective (SE):** E**Main course outcomes:**

- Be competent with the fundamental factors affecting the performance of sequential programs
- Be competent with program transformations to enhance data locality and improve performance.
- Be familiar with the prevalent parallel programming models.
- Be familiar with design, implementation and analysis performance analysis of parallel programs.

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

- Fundamental performance issues
- Cache and its impact on performance
- Loop Transformations for performance enhancement
- Data dependence analysis
- Overview of parallel architectures and programming models
- Shared-memory parallel programming
- Message passing
- Programming GPUs
- Programming for high performance with short-vector SIMD instruction sets

Course number and name:

CSE 5462 Network Programming

Credits and contact hours: 3; 2.0 hr Lec, 1.0 hr Lab

Course coordinator: Prasun Sinha

Text book:

Unix Network Programming, Vol. 1: The Sockets Networking API, Stevens, Fenner, and Rudoff

Brief description:

IP-based socket programming in C/C++, TinyOS programming in NesC.

Prerequisites, co-requisites: CSE 3461

Required (R), elective (E), selected elective (SE): E

Main course outcomes:

Master socket programming in C or C++

Master TinyOS programming in NesC

Be competent with application development and debugging in Unix environments

Be competent with application development and debugging in TinyOS environment

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

Review of C pointers and memory allocation/deallocation

Review of the Unix environment

NesC

Communication using UDP sockets

Communication using TCP sockets

Course number and name:

CSE 5463 Introduction to Wireless Networking

Credits and contact hours: 3; 3.0 hr Lec

Course coordinator: Prasun Sinha

Text book:

Class notes, other resources.

Brief description:

Fundamental concepts in cellular design, Wireless-LANs, MANETs, and sensor networks will be explored. Specific topics will include propagation, fading, cellular-design, power-management, routing, scheduling, and control.

Prerequisites, co-requisites: CSE 3461 or 677

Required (R), elective (E), selected elective (SE): E

Main course outcomes:

- Exposed to basics of propagation and fading
- Be familiar with notions of SINR and cell design, as well as notions of handoffs and channel allocation.
- Be familiar with different forms of multi-access systems (FDMA, CDMA, TDMA, OFDMA, etc.)
- Be familiar with power management and current implementations in cellular systems
- Be familiar with routing and current implementations in both cellular
- Be familiar with cellular scheduling as well as be exposed to scheduling in multi-hop networks
- Be familiar with various wireless systems such as cellular, Wireless LAN, sensor, mobile ad hoc, sensor, etc.
- Be exposed to some major issues facing the design of future wireless systems.

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

- Historical Milestones and Current Wireless Networks
- Understanding the Wireless Communication Channel
- Multiple Access Techniques (FDMA, TDMA, CDMA)
- Concept of Cellular Communications, Handoff, and Location Management
- Power Control
- Opportunistic Scheduling for cellular networks and extensions to multi-hop networks.
- Proactive and Reactive Routing
- Congestion control
- System case studies (802.11, Bluetooth, etc.)
- Energy management in sensor networks
- Project presentations

Course number and name:

CSE 5472 Information Security Projects

Credits and contact hours: 3; 2.0 hr Lec, 1.0 hr Lab

Course coordinator: Dong Xuan

Text book:

On-line materials

Brief description:

Team-based projects: solve information security problems (mobile/static host/network hardening, intrusion detection and vulnerability scanning, forensics); results communicated through report writing and presentation.

Prerequisites, co-requisites: CSE 3901 or 3902 or 3903; CSE 3461 or 4471

Required (R), elective (E), selected elective (SE): E

Main course outcomes:

Be competent with the use of VMWare to create flexible, complex virtual computer networks.

Be competent with techniques for hardening various operating systems (Linux and Windows) and services running on these systems (web, database, others).

Be familiar with issues involved in the configuration and use of firewalls, intrusion detection/prevention, and vulnerability scanning/exploit tools.

Be familiar with common software vulnerabilities and techniques for finding and fixing them.

Be familiar with host security standards and laws such as HIPAA, PCI, Ohio House Bill 104, OWASP, NSA, CSI and so on.

Be familiar with general goals of and issues pertaining to computer forensic analysis and incident response.

Be exposed to a wide variety of computer security tools, especially forensics and investigation tools and scanning tools.

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

Host hardening: configuration, patching, logging & monitoring, host-based intrusion detection, etc.

Network Security: vulnerability scanning and enumeration, web application scanning, VPN, sniffing, network-based intrusion detection, etc.

Computer Investigations: incident response, forensics, malware analysis, etc

Miscellaneous topics relating to information security

VMware, project objectives

Project presentations

Course number and name:

CSE 5473 Network Security

Credits and contact hours: 3; 3.0 hr Lec

Course coordinator: Anish Arora

Text book:

Cryptography and Network Security: Principles and Practice, Stallings

Applied Cryptography, Campbell

Network Security: Private Communication in a Public World, Charlie Kaufman, Radia Perlman and Mike Speciner

Brief description:

Security threats and services, elements of cryptography, protocols for security services, network and internet security, advanced security issues and technologies.

Prerequisites, co-requisites: CSE 3461 or 677

Required (R), elective (E), selected elective (SE): E

Main course outcomes:

Be competent with protocols for security services.

Be competent with network security threats and countermeasures.

Be familiar with fundamentals of cryptography.

Be familiar with network security designs using available secure solutions (such as PGP, SSL, IPSec, and firewalls).

Be familiar with advanced security issues and technologies (such as DDoS attack detection and containment, anonymous communications, and security properties testing, verification and design).

Be exposed to original research in network security.

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

Security threats and services

Elements of cryptography: (1) Classic ciphers, modern ciphers, stream ciphers and block ciphers; (2)

Secret key (symmetric): DES/AES and public key (asymmetric): RSA

Protocols for security services: (1) Key distribution and management, (2) Data integrity and message authentication codes, (3) User authentication; (4) Non-repudiation and digital signatures

Network and internet security: (1) Transport-level security, (2) Wireless network security, (3) Email security, (4) IP security

Advanced security issues and technologies such as firewalls, intrusion detection, active worm defense, DDoS attacks and defense, anonymous communications, security in routing (OSPF and BGP), sensor network

Course number and name:

CSE 5522 Survey of Artificial Intelligence II: Advanced Techniques

Credits and contact hours: 3; 3.0 hr Lec

Course coordinator: Fosler-Lussier

Text book:

Artificial Intelligence: A Modern Approach, Russell and Norvig

Brief description:

Survey of advanced concepts, techniques, and applications of artificial intelligence, including knowledge representation, learning, natural language understanding, and vision.

Prerequisites, co-requisites: CSE 3521

Required (R), elective (E), selected elective (SE): E

Main course outcomes:

- Master advanced AI concepts, theories, and terminology.
- Master computational techniques in typical AI subareas.
- Master knowledge representation and reasoning methods in AI.
- Be exposed to current research topics in AI.

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

- Introduction, probability theory
- Bayesian networks and probabilistic representations
- Exact and approximate probabilistic inference
- Machine learning
- Computer vision
- Computational audition
- Automatic speech recognition
- Natural language processing
- Information retrieval
- Diagrammatic reasoning and abductive inference

Course number and name:

CSE 5523 Machine Learning and Statistical Pattern Recognition

Credits and contact hours: 3; 3.0 hr Lec**Course coordinator:** Belkin**Text book:**

Pattern Recognition by Theodoridis and Koutroumbas

Brief description:

Introduction to basic concepts of machine learning and statistical pattern recognition; techniques for classification, clustering and data representation and their theoretical analysis.

Prerequisites, co-requisites: CSE 3521 or 5243; CSE 5522 or Stat 3460 or Stat 3470; Math 2568**Required (R), elective (E), selected elective (SE):** E**Main course outcomes:**

Master basic techniques of machine learning, including linear methods, prototype-based methods, and kernel methods.

Master the statistical framework of machine learning and basic concepts, such as Bayes optimal classifier.

Be competent with theoretical analysis of complexity and other properties of statistical learning techniques.

Be familiar with the broad spectrum of methods for classification, regression and clustering, including boosting, spectral clustering, and other methods.

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

Basics of statistical pattern recognition. Probability and statistical inference. Bayes decision theory

Overview of techniques for regression and classification, parametric and non-parametric methods including prototype-based methods, linear and kernel methods

Analysis of statistical algorithms. Empirical risk minimization and VC-theory. Generalization bounds

Clustering. k-means algorithm. Gaussian mixture models and the EM algorithm. Spectral clustering

Dimensionality reduction. Principal Components Analysis and Multidimensional Scaling

Advanced topics in machine learning

Discussion of applications, e.g. speech, language, and vision.

Course number and name:

CSE 5524 Computer Vision for Human-Computer Interaction

Credits and contact hours: 3; 3.0 hr Lec

Course coordinator: Davis

Text book:

Computer Vision, Shapiro and Stockman

Brief description:

Computer vision algorithms for use in human-computer interactive systems; image formation, image features, segmentation, shape analysis, object tracking, motion calculation, and applications.

Prerequisites, co-requisites: CSE 2331 or senior or grad standing

Required (R), elective (E), selected elective (SE): E

Main course outcomes:

- Master fundamental computer vision algorithms.
- Be competent with computer vision application design and evaluation.
- Be familiar with Matlab programming environment.
- Be exposed to original research and applications in computer vision.

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

- Introductory computer vision
- Image formation
- Noise removal
- Edge detection
- Pyramids
- Region segmentation
- 2-D shape
- Template matching
- Motion
- Tracking
- 3-D
- Event analysis
- Features
- Stereo
- Clustering
- Applications
- Motion capture
- Current research

Course number and name:

CSE 5525 Foundations of Speech and Language Processing

Credits and contact hours: 3; 3.0 hr Lec

Course coordinator: Fosler-Lussier

Text book:

Speech and Language Processing, Jurafsky and Martin
Speech Synthesis and Recognition, Holmes and Holmes
Spoken Language Processing: A guide to theory, algorithms, and system development Huang, Acero, and Hon

Brief description:

Fundamentals of natural language processing, automatic speech recognition and speech synthesis; lab projects concentrating on building systems to process written and/or spoken language.

Prerequisites, co-requisites: CSE 3521; CSE 5522 or Stat 3460 or Stat 3470

Required (R), elective (E), selected elective (SE): E

Main course outcomes:

- Master the fundamentals of symbolic methods in language processing tasks, such as natural language parsing.
- Be competent with fundamental concepts for natural language processing and automatic speech recognition, such as "hidden Markov models".
- Be competent with fundamental concepts in text-to-speech synthesis, such as concatenative synthesis and text analysis.
- Be familiar with a finite state framework integrating all of speech processing.
- Be familiar with a toolkit for text classification, part-of-speech tagging and sentiment mining.
- Be familiar with methods of constructing speech recognition and synthesis systems.
- Be exposed to current speech and language processing research.
- Be exposed to toolkits for speech recognition and speech synthesis.

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

- Course introduction, part-of-speech tagging
- HMMs, expectation maximization and search
- Parsing
- Word senses
- Language modeling
- Text classification and opinion mining
- Human hearing, acoustics, and phonetics
- Finite state transducers and automatic speech recognition toolkits
- Dynamic time warping and acoustic modeling

Text analysis and speech synthesis
Language processing in context (systems)
Quizzes and in-class assignments
Project presentations

Course number and name:

CSE 5526 Introduction to Neural Networks

Credits and contact hours: 3; 3.0 hr Lec

Course coordinator: D Wang

Text book:

Neural networks and learning machines, Haykin

Brief description:

Survey of fundamental methods and techniques of neural networks; single- and multi-layer perceptrons; radial-basis function networks; support vector machines; recurrent networks; supervised and unsupervised learning.

Prerequisites, co-requisites: CSE 3521; Math 2568

Required (R), elective (E), selected elective (SE): E

Main course outcomes:

Master basic neural network methods

Be competent with solving problems using neural network techniques

Be familiar with enough background about neural networks to take other specialty courses on neural networks

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

Introduction and McCulloch-Pitts networks

Perceptrons

Regression and least mean square algorithm

Multilayer perceptrons

Radial-basis function networks

Support vector machines

Recurrent networks

Unsupervised learning and self-organization

Applications

Current research

Exam and discussion

Course number and name:

CSE 5542 Real-Time Rendering

Credits and contact hours: 3; 3.0 hr Lec

Course coordinator: Shen

Text book:

Real-Time Rendering Akenine-Moller and Haines

Brief description:

Comprehensive list of topics in real-time rendering using OpenGL and GLSL, including coordinate systems, transformations, viewing, illumination, texture mapping, and shader-based algorithms.

Prerequisites, co-requisites: CSE 3901 or 3902; Math 2568

Required (R), elective (E), selected elective (SE): E

Main course outcomes:

- Master graphics programming and the theory of real time rendering.
- Be familiar with various techniques for creating 3D realism.
- Be exposed to the state of the art in graphics hardware API.
- Be competent with developing real time graphics applications

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

- Overview of graphics APIs (OpenGL and GLSL)
- Overview of graphics hardware - geometry processing, fragment processing, pixel processing; graphics pipeline
- Coordinate systems in rendering pipeline - local space, world space, eye space, clip space, window space
- Modeling transformation - rotation, scaling, translation; hierarchical transformation; transformation between different spaces
- 3D viewing - viewing transformation, projection transformation
- Basic lighting algorithms - Phong illumination model and Gouraud shading
- Introduction to OpenGL Shading Language
- OpenGL shader overview - vertex shaders, geometry shaders, fragment shaders
- OpenGL vertex shaders
- OpenGL geometry shaders
- OpenGL fragment shaders
- OpenGL raster operations - scissor test, stencil test, depth test, blending
- OpenGL buffer objects - vertex buffer objects, frame buffer objects, pixel buffer objects
- Real time shadow algorithms - planar shadows, shadow volumes, shadow maps
- OpenGL texture mapping
- Bump mapping

Environment mapping

Advanced texture mapping and anti-aliasing

Advanced shading and lighting algorithms - real time global illumination

Non-photorealistic rendering

Real time volumetric rendering

Course number and name:

CSE 5543 Geometric Modeling

Credits and contact hours: 3; 3.0 hr Lec

Course coordinator: Dey

Text book:

Geometric Modeling by Mortenson
Course Notes

Brief description:

Common algorithmic and mathematical techniques for modeling geometric objects in computer graphics and CAD applications; sample based modeling, mesh generation, and hierarchical representations.

Prerequisites, co-requisites: Math 2568

Required (R), elective (E), selected elective (SE): E

Main course outcomes:

- Master modeling curves and surfaces (B-splines and Bezier)
- Master techniques for object creation, manipulation with extrusions, revolutions, lofting
- Master techniques to generate meshes from point cloud data and CAD data
- Be familiar with hierarchical representations
- Be exposed to parameterization techniques

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

- Curve modeling (B-splines and Bezier)
- Subdivision curves
- Surface geometry and topology
- Surface modeling (B-splines and Bezier)
- Subdivision surfaces
- B-rep, CSG, Boolean operations
- Curve and surface reconstruction
- Surface and volume simplification
- Mesh generation
- Parameterization
- Midterm examination, review, discussions

Course number and name:

CSE 5544 Introduction to Data Visualization

Credits and contact hours: 3; 3.0 hr Lec

Course coordinator: Machiraju

Text book:

Visual Thinking for Design by Ware
Visualizing Data by Fry

Brief description:

Principles and methods for visualizing data from measurements and calculations in physical and life sciences, and transactional and social disciplines; information visualization; scientific visualization.

Prerequisites, co-requisites: CSE 5361 or Stat 3301 or 3541 or 5541

Required (R), elective (E), selected elective (SE): E

Main course outcomes:

- Be competent with design principles of creating viable visualizations
- Be competent with visualization algorithms and data structures
- Be competent with creation of interactive visualizations
- Be competent with the collection and processing of diverse collections of data
- Be competent with including perceptual considerations into visualization systems
- Be familiar with with practical applications of visualization
- Be familiar with visualization needs of domains from science, medicine, and commerce
- Be familiar with the critiques of visualization systems
- Be familiar with gaining insights into visualization problems and phenomenon

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

- Introduction and historical remarks
- Abstract visualization concepts and the visualization pipeline
- Data acquisition and representation
- Principles of visual design
- Basic mapping concepts
- Focus+context, and navigation+zoom
- Perception and color theory
- Case study: trends application
- Visualization of matrices, graphs and trees
- Visualization of high-dimensional data and dimensionality reduction techniques
- Case study: bioinformatics
- Visualization of scalar fields (color maps, isosurface extraction, volume rendering)
- Case study: medical and biological imaging

Visualization of vector fields (particle tracing, texture-based methods, vector field topology)
Case study: flow visualizations
Evaluation and Interaction models
Visualization of Large data
Visualization of spatio-temporal data
Final Presentations

Course number and name:

CSE 5545 Advanced Computer Graphics

Credits and contact hours: 3; 3.0 hr Lec**Course coordinator:** Machiraju**Text book:**

Physically Based Rendering by Pharr and Humphreys

Brief description:

Advanced topics in computer graphics; image synthesis, lighting and rendering, sampling and material properties, volume rendering.

Prerequisites, co-requisites: CSE 3541**Required (R), elective (E), selected elective (SE):** E**Main course outcomes:**

- Be competent with software realizations of physically based ray tracing
- Be competent with underlying physics of optical transport
- Be competent with algorithms of light propagation including volume rendering
- Be competent with signal processing and texture mapping
- Be familiar with methods for efficient realization

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

- Introduction to Realistic Rendering and Literate Programming
- Geometry, Transformations, Shapes
- Acceleration Structures
- Color and Radiometry
- Sampling and Reconstruction
- Reflection Models, Texture
- Volume Rendering and Scattering
- Monte Carlo Methods
- Unbiased Light Transport
- Biased/Importance-Sampled Light Transport, Photon Mapping, Metropolis Light Transport, Irradiance Caching
- Project Presentations

Course number and name:

CSE 5911 Capstone Design: Software Applications

Credits and contact hours: 4; 1.0 hr Lec, 3.0 hr Lab

Course coordinator: Ramasamy

Text book:

Software Engineering, A Practitioner’s Approach, Pressman
Developing Object-Oriented Software, An Experience-Based Approach, IBM

Brief description:

Capstone design project: application of software engineering techniques, methodologies and technologies in software lifecycle activities using enterprise software frameworks; teamwork, written and oral communication.

Prerequisites, co-requisites: CSE 2501 or Phil 1338; CSE 3901 or 3902; CSE 3231

Required (R), elective (E), selected elective (SE): SE

Main course outcomes:

- Master synthesizing and applying prior knowledge to designing and implementing solutions to open-ended computational problems while considering multiple realistic constraints.
- Master deadline driven software design and development in a team setting for an open-ended problem.
- Be competent in evaluating design alternatives.
- Be competent with issues of teamwork, project scheduling, individual and group time management.
- Be competent with presenting work to an audience of peers.
- Be competent with techniques for effective oral and written communication for a range of purposes.
- Master principles of structured and agile software eng. frameworks, specifically methodologies for requirements identification, analysis, architecture, design, deployment, testing, and project management.
- Be competent with application of structured & agile software eng. frameworks, specifically methodologies for requirements identification, analysis, architecture, design, deployment, testing, and project management.
- Be familiar with frameworks for analyzing the business context of enterprise IT systems, the concept of Business-IT alignment and related issues, and Enterprise Architecture frameworks for analyzing and achieving Business-IT alignment.
- Be competent with the application of at least one industry-standard technology framework.
- Be competent with professional and formal presentations and communications to a varied set of stakeholders - customers, peers and superiors.

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

- Course overview and project guidelines
- Project selection and team formation

Software engineering methodology selection, High-level project plan consisting of high-level requirements, analysis, architecture, risk plan and acceptance plan. Development and target environment set up

Student presentations and demos of current progress

In-class team project design and development time

Midterm presentation

Final presentation

Poster presentation

Course number and name:

CSE 5912 Capstone Design: Game Design and Development

Credits and contact hours: 4; 1.0 hr Lec, 3.0 hr Lab

Course coordinator: Roger Crawfis

Text book:

Brief description:

Capstone design project; conceptual and technical design and implementation of interactive game, integrating custom code and toolkits; teamwork, written and oral communication skills.

Prerequisites, co-requisites: CSE 2501 or Phil 1338; CSE 3901 or 3902; CSE 3541

Required (R), elective (E), selected elective (SE): SE

Main course outcomes:

- Master synthesizing and applying prior knowledge to designing and implementing solutions to open-ended computational problems while considering multiple realistic constraints.
- Be competent in evaluating design alternatives.
- Be competent with software design and development practices and standards.
- Be familiar with researching and evaluating computing tools and practices for solving given problems.
- Be competent with deadline driven projects in a team setting.
- Be competent with issues of project management, such as teamwork, project scheduling, individual and group time management.
- Be competent with presenting work to a group of peers.
- Be familiar with presenting work to a range of audiences.
- Be competent with techniques for effective written communication for a range of purposes (user guides, design documentation, storyboards etc.)
- Be familiar with analyzing professional issues, including ethical, legal and security issues, related to computing projects.
- Master the development of a complete and functional computer game including elements of computer graphics, artificial intelligence, spatial sound, input controllers and GUI's.

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

- Course overview and project guidelines
- Game idea generation and game team formation
- Software engineering for games, basic game structure, source code control, project management and agile software development concepts
- Student presentations and demos of current progress on game design and development
- Student presentations of team research on current trends, technologies and toolkits used in game programming such as three-dimensional sound, physics, scripting, networking, input controllers, etc.

Game business and current trends
In-class team game project design and development time
Final presentations/demos
Poster presentation

Course number and name:

CSE 5913 Capstone Design: Computer Animation

Credits and contact hours: 4; 1.0 hr Lec, 3.0 hr Lab

Course coordinator: Huamin Wang

Text book:

MEL Scripting for MAYA Animators by Wilkins and Kazmier

Brief description:

Capstone design project: conceptual and technical design and implementation of computer animation incorporating animation elements; teamwork, written and oral communication skills.

Prerequisites, co-requisites: CSE 2501 or Phil 1338; CSE 3901 or 3902 or 560; CSE 3541 or 581

Required (R), elective (E), selected elective (SE): SE

Main course outcomes:

- Master synthesizing and applying prior knowledge to designing and implementing solutions to open-ended computational problems while considering multiple realistic constraints.
- Be competent in evaluating design alternatives.
- Be competent with software design and development practices and standards
- Be familiar with researching and evaluating computing tools and practices for solving given problems.
- Be competent with deadline driven projects in a team setting.
- Be competent with issues of project management, such as teamwork, project scheduling, individual and group time management.
- Be competent with presenting work to a group of peers.
- Be familiar with presenting work to a range of audiences.
- Be competent with techniques for effective written communication for a range of purposes (user guides, design documentation, storyboards etc.).
- Be familiar with analyzing professional issues, including ethical, legal and security issues, related to computing projects.

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

- Class software familiarization
- Technical group reports
- Animation group progress reports
- Post-processing: sound, compositing, editing
- Final presentations/demos
- Poster presentation

Course number and name:

CSE 5914 Capstone Design: Knowledge-Based Systems

Credits and contact hours: 4; 1.0 hr Lec, 3.0 hr Lab

Course coordinator: Fosler-Lussier

Text book:

Brief description:

Capstone design project; conceptual and technical design; theory and practice of knowledge-based systems; teamwork, written and oral communication skills.

Prerequisites, co-requisites: CSE 2501 or Phil 1338; CSE 3901 or 3902; CSE 3521

Required (R), elective (E), selected elective (SE): SE

Main course outcomes:

- Master task-level analysis and problem solving methods for information search problems.
- Be competent with methods for representing and reasoning with uncertain knowledge.
- Be familiar with the methods used natural language tools.
- Master synthesizing and applying prior knowledge to designing and implementing solutions to open-ended computational problems while considering multiple realistic constraints.
- Be competent in evaluating design alternatives.
- Be competent with software design and development practices and standards.
- Be familiar with researching and evaluating computing tools and practices for solving given problems.
- Be competent with deadline driven projects in a team setting.
- Be competent with issues of project management, such as teamwork, project scheduling, individual and group time management.
- Be competent with presenting work to a group of peers.
- Be familiar with presenting work to a range of audiences.
- Be competent with techniques for effective written communication for a range of purposes (user guides, design documentation, storyboards etc.).
- Be familiar with analyzing professional issues, including ethical, legal and security issues, related to computing projects.
- Master task-level analysis and problem solving methods for classification problems.

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

- Introduction and overview
- Natural language processing tools
- Configuration and design
- Reasoning with uncertain knowledge
- Cloud-based question answering architectures

Current trends: Information search systems in industry
Design meetings, team work
Final presentations/demos
Poster presentation

Course number and name:

CSE 5915 Capstone Design: Information Systems

Credits and contact hours: 4; 1.0 hr Lec, 3.0 hr Lab

Course coordinator: Parthasarathy

Text book:

Fundamentals of Database Systems, Third Edition, Ramez Elmasri and Shamkant B. Navathe
Principles of Multimedia Database Systems, V.S. Subrahmanian
Practical Analysis & Design for Client/Server & GUI Systems, D. A. Ruble

Brief description:

Capstone design project; information system principles: database design methods and tools, indexing, searching, application development, testing, evaluation; teamwork, written and oral communication skills.

Prerequisites, co-requisites: CSE 2501 or Phil 1338; CSE 3901 or 3902; CSE 3241

Required (R), elective (E), selected elective (SE): SE

Main course outcomes:

- Master synthesizing and applying prior knowledge to designing and implementing solutions to open-ended computational problems while considering multiple realistic constraints.
- Master design and implementation of an information systems project.
- Master using database design methods and tools.
- Be competent in evaluating design alternatives.
- Be competent with software design and development practices and standards.
- Be competent with deadline driven projects in a team setting.
- Be competent with issues of project management, such as teamwork, project scheduling, individual and group time management.
- Be competent with presenting work to a range of audiences and peers.
- Be competent with techniques for effective written communication for a range of purposes.
- Be familiar with researching and evaluating computing tools and practices for solving given problems.
- Be familiar with analyzing professional issues, including ethical, legal and security issues, related to computing projects.

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

- Description of information systems projects
- Multimedia (image, audio, video, text) and scientific data management
- Web-based Information Systems
- Requirement analysis, initial design, project proposals
- Project design progress
- User-interfaces, initial demonstrations

Project implementations, testing
Final presentations/demos
Poster presentation

Course number and name:

Philosophy 1338: Ethics in the Professions: Introduction to Computing Ethics with Student Presentations

Credits and contact hours: 4; 3.0 hr Lec 2 hr Rec

Course coordinator: Bryan Weaver

Text book:

The Fundamentals of Ethics, Russ Shafer-Landau

Brief description:

An introduction to ethical theory with a special focus on ethical issues that arise in the computing profession. It includes student presentations and feedback to improve discussion skills.

Prerequisites, co-requisites: Not open to students with credit for 1300, 1332, or 1337

Required (R), elective (E), selected elective (SE): SE

Main course outcomes:

Be familiar ethical theories and distinctions necessary for talking productively about moral problems.
Be familiar with using these tools to analyze/evaluate some moral problems that arise in the context of contemporary computing including creation and consumption (intellectual property, piracy, copyrights and patents, fair use, DRM, and free/open-source software); rights and responsibilities (privacy, governmental surveillance, data mining, online anonymity, doxxing, hacktivism, and cyber-bullying); anticipation and accountability (unanticipated consequences of technology, 3D printing, military drones, autonomous vehicles, AI).

Be familiar with writing short papers that analyze aspects of recent technological developments and evaluate the associated moral/ethical issues.

Be familiar with making short presentations that that analyze aspects of recent technological developments and evaluate the associated moral/ethical issues.

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

Course number and name:

ECE 2020 Introduction to Analog Systems and Circuits

Credits and contact hours: 3.0 2.5 hr Lec, 1.0 hr Rec, 1.5 hr Lab

Course coordinator: McPherson

Text book:

Circuits, by Ulaby and Maharbiz

Brief description:

Circuit theory and applications of passive components and Op amps. Introduction to analog systems using differential equations and Laplace transforms.

Prerequisites, co-requisites: CSE 2221, Engr 1182, Math 1172; Phys 1250

Required (R), elective (E), selected elective (SE): R

Main course outcomes:

- Master circuit concepts such as voltage, current, charge, resistors, inductors, capacitors, etc.
- Master how to analyze, design and implement circuits using Ohm’s Law, Kirchhoff’s laws and superposition
- Be competent in Phasor Domain sinusoidal techniques
- Be competent in analyzing, designing and implementing steady state and transient behavior of RC, RL, RLC circuits
- Be competent in Laplace Transform techniques
- Be competent in analyzing, designing and implementing simple active filters based on ideal Op amps
- Be familiar with how to use modern computer tools for analog simulation
- Be competent in how to use laboratory instruments and laboratory methodology
- Be competent with methodology for critical troubleshooting skills

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
***	***	*	**	***						***			

Brief list of topics:

- Fundamentals of electric circuits: Charge, Voltage, Kirchhoff’s Laws, power and sign conventions, Ohm’s law, practical circuit elements
- Circuit Analysis Techniques: Node Voltage / Mesh analysis, superposition, Thevenin and Norton equivalents
- Ideal op amp, feedback, active filters, cascaded active filters
- RC and RL first-order circuits, natural and total response, RC Op amp circuits
- Initial and Final Conditions, Series and Parallel RLC, General solution of second-order circuits
- Laplace transforms, properties, pole zero diagrams and inverse Laplace transform
- System transfer function scaling, impulse response, step response, sinusoidal response, s-Domain circuit analysis
- Sinusoidal signals, Phasor domain analysis, impedance transformations
- RC, RL, RLC frequency response vs transient response

Bode Plots, Passive and Active Filters

Periodic Waveforms, Average and Complex Power, Maximum power Transfer

Multisim circuit analysis

Introduction to Lab Equipment, troubleshooting skills

Course number and name:

ECE 2060 Introduction to Digital Logic

Credits and contact hours: 3.0 2.5 hr Lec, 1.0 hr Rec, 1.5 hr Lab

Course coordinator: McPherson

Text book:

Fundamentals of Logic Design, by Roth, Jr. and Kinney

Brief description:

Introduction to the theory and practice of combinational and clocked sequential networks.

Prerequisites, co-requisites: CSE 2221; Math 1172; Phys 1250; Engr 1182

Required (R), elective (E), selected elective (SE): R

Main course outcomes:

- Master the number representations used in today’s digital systems and their arithmetic properties and conversion techniques
- Master analyzing, synthesizing, and designing networks of combinatorial, digital logic elements
- Be competent to analyze, design and synthesize digital clocked sequential circuits
- Be familiar with modern computer tools for digital design, verification and simulation
- Be familiar with how to implement their design schematics to hardware using modern FPGAs
- Be competent in working in teams for lab experiments
- Be familiar with digital circuit design methods
- Be competent in reporting standards
- Be competent in using laboratory instruments and laboratory methodology
- Exposure to methodology for critical troubleshooting skills

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
***	***	*	**	***						***			

Brief list of topics:

- Number systems and conversion
- Boolean algebra
- Karnaugh maps
- Multi-level gate circuits
- Multiplexers, decoders and PLDs
- Latches and flip-flops
- Registers and counters
- Timing (delays, timing diagrams)
- Analysis of clocked sequential circuits (general models for sequential circuits, timing charts, state tables, graphs)
- Design of clocked sequential circuits
- Finite state machines, flow diagrams, mapping to flip-flop circuits with logic gates
- Introduction to lab Equipment: Signal Generator and Oscilloscope, how to measure digital signals

using the oscilloscope and the motivation for using digital signals

Introduction to Quartus and the DE2 Board: HDL files, basic RTL components for simulation. Quartus's on-chip debugging tools, Signal Tap II and the In-System Memory Content Editor

Using the CODEC: Students are shown how to use the DE2's audio CODEC chip to perform conversions between analog and digital signals

Introduction to the Synthesizer: build a synthesizer, Students also learn how to use Matlab to create memory contents for ROM look-up tables. Finally students are introduced to bit shifting as a means of scaling signed and unsigned numbers

Electronic Keyboard: Students build a circuit that takes signals from PS2 keyboard and converts them into musical tones by applying the concepts and skills they have learned in the previous 5 labs

Demo Player Feature for an Electronic Keyboard: Students add an auto play feature to the electronic keyboard that automatically plays a short tune. Emphasizes the use of sequential components, testing of large Quartus project.

Course number and name:

ENGR 1181.01 Fundamentals of Engineering 1

Credits and contact hours: 2.0 3.0 hr Lec, 2.0 hr Lab

Course coordinator: Abrams

Text book:

Writing as an Engineer (Selected Chaps.) by Beer and McMurrey

Tools and Tactics of Design (Selected Chaps.) by Dominick, Demel, Lawbaugh, Freuler, Kinzel, Fromm

MATLAB, An Introduction with Applications by Gilat

Brief description:

Engineering problem solving utilizing computational tools such as Excel and Matlab; hands-on experimentation; modeling; ethics; teamwork; written, oral and visual communications.

Prerequisites, co-requisites: Math 1150 or higher

Required (R), elective (E), selected elective (SE): R

Main course outcomes:

Students will develop professional skills for success in engineering, including teamwork; written, oral, and visual communications; and ethics.

Students will understand basic elements for engineering problem solving utilizing tools such as Excel and Matlab.

Students will have an introductory knowledge of a wide range of fundamental engineering tasks and principles gained through homework and hands-on laboratory exercises.

Students will be motivated towards opportunities within engineering careers and gain an appreciation of the range of engineering disciplines available to them.

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
***	**	*	**	***	*	**	*			***			

Brief list of topics:

Course introduction and overview

Teamwork fundamentals and agreements

Problem solving fundamentals – Problem types, systems descriptions, SI units, significant digits, understanding analysis vs design

Using spreadsheets for problem solving – Excel spreadsheet structure; equations, operators, array elements; models and systems; mathematical models; plots and charts

Ethics for engineers

Using MATLAB for problem solving – MATLAB tool/environment; command mode; script files, arrays, and strings; problem solving structure for MATLAB, algorithms, statements and functions; input, output, plotting; systems and mathematical models

Series of laboratory exercises will draw from a wide range of engineering domains - Fundamental engineering concepts; hands-on measurement and instrumentation; collection and analysis of data; reporting of results; modeling.

Course number and name:

ENGR 1182.01 Fundamentals of Engineering 2

Credits and contact hours: 2.0 3.0 hr Lec, 2.0 hr Lab

Course coordinator: Abrams

Text book:

An Introduction to Autodesk Inventor and AutoCAD (Selected Chaps.), by Shih
Technical Graphics (Selected Chaps., Custom Pub.) by Meyers, Croft, Miller, Demel, Enders
Tools and Tactics of Design (Selected Chaps.) by Dominick, Demel, Lawbaugh, Freuler, Kinzel,
Fromm
Writing as an Engineering (Selected Chaps.)

Brief description:

Introduction to 3D visualization and CAD; engineering design-build process; teamwork; written, oral and visual communications; project management.

Prerequisites, co-requisites: Engr 1181; concur: Math 1151

Required (R), elective (E), selected elective (SE):

Main course outcomes:

Students will understand and gain experience with the elements of engineering design
Students will be able to visualize and present objects and systems in three-dimensions
Student will have a basic proficiency with a modern CAD tool (Autodesk Inventor)
Students will develop professional skills for success in engineering, including teamwork and written, oral, and visual communications
Students will have an introductory level knowledge of project management (e.g. scheduling, budgeting, reporting)
Students will complete a term-length, design-build project which serves as a cornerstone experience. Project is to reinforce use of numerical problem solving, engineering documentation, graphics and visualization and teamwork skills.

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
**	**	***	**	**		**				***			

Brief list of topics:

Introduction to Course and Overview
Engineering Design Process Fundamentals
Project Management
Visualization of 3-D Objects (Sketching, Pictorials, & Orthographics)
Construction of 3-D Objects with CAD
Standard Views and Presentations of Objects
Assembly and Presentation of Systems
Conventions and Standards (Dimensioning, Tolerance, Sections)
Design/Build Project Preparation Exercises
Design/Build Project(Project to make use of both Problem Solving and CAD knowledge)

Course number and name:

English 1110.01, First-Year English Composition

Credits and contact hours: 3 3 Lec

Course coordinator: Singleton

Text book:

The Writers Companion: A Guide to First-Year Writing with Excerpts from Writing Analytically by Ferebee, Singleton, and Bierschenk

Brief description:

Practice in the fundamentals of expository writing, as illustrated in the student’s own writing & in the essays of professional writers

Prerequisites, co-requisites:

Required (R), elective (E), selected elective (SE): R

Main course outcomes:

Communicate using the conventions of academic discourse.

Read critically and analytically

Develop capacity for undertaking academic research and analysis through an original research project and presentation of the results of work completed to an audience of peers.

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>

Brief list of topics:

- Preview the Analytical Research Paper (ARP)
- Considering the writing process
- Exploring course theme
- Finding primary sources for the ARP
- Intro to sourcing and citing images
- What is Intellectual Property?
- What is rhetoric?
- Modeling analysis of primary sources
- Analyzing complex texts using the Analytical Toolkit
- Rhetorical Analysis
- Peer review
- Annotated Bibliography and Secondary Source Integration (SSI)
- Exploring research strategies
- Working with secondary sources
- MLA citation style
- Evaluating secondary sources
- Integrating secondary sources
- Thematic exploration

Linking evidence and claims: Secondary Sources

From evidence to interpretation

Complex interpretations

How to word and evolve thesis statements

Similarities between academic and public writing

Using images to make meaning

Structure and Organization: The Analytical Research Paper

Course number and name:

Math 1151, Calculus I

Credits and contact hours: 5; 3 hr lec, 2 hr rec**Course coordinator:** Lakos**Text book:**

Calculus for Scientists and Engineers: Early Transcendentals, by Briggs, Cochran and Gillett

Brief description:

Differential and integral calculus of one real variable.

Prerequisites, co-requisites:**Required (R), elective (E), selected elective (SE):** R**Main course outcomes:**

To master the essentials of Differential Calculus and its applications, and to develop the computational and problem solving skills for that purpose

To understand the basic techniques of Calculus, including the notions of limit and continuity, the definition of the derivative of a function, how to compute the derivative of a function, how to compute the derivative of any elementary function (polynomial, exponential, logarithmic, trigonometric, or any combination of such), how to determine maxima and minima, and how these techniques apply to real life situations

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

Review of Functions
 Representing Functions
 Inverse Exponential, and Logarithmic Functions
 Trigonometric Functions and Their Inverses
 The Idea of Limits
 Definitions of Limits
 Techniques of Computing Limits
 Infinite Limits
 Limits at Infinity
 Continuity
 Introducing the Derivative
 Working with Derivatives
 Rules of Differentiation
 The Product and Quotient Rules
 Derivatives of Trigonometric Functions
 Derivative as Rates of Change
 The Chain Rule

Implicit Differentiation
Derivatives of Logarithmic and Exponential Functions
Derivatives of Inverse Trigonometric Functions
Related Rates
Maxima and Minima
What Derivatives Tell Us
Graphing Functions
Optimization Problems
Linear Approximations and Differentials
Mean Value Theorem
L'Hospital's Rule
Antiderivatives
Approximating Areas under Curves
Definite Integrals
Fundamental Theorem of Calculus
Working with Integrals
Substitution Rule
Velocity and Net Change

Course number and name:

Math 1172, Engineering Mathematics A

Credits and contact hours: 5; 3.0 hr Lec, 2.0 hr Rec**Course coordinator:** Talamo**Text book:**

Calculus for Scientists and Engineers: Early Transcendentals, by Briggs, Cochran, Gillett

Brief description:

Techniques of integrations, Taylor series, differential calculus of several variables

Prerequisites, co-requisites: Grade of C- or above in Math 1151**Required (R), elective (E), selected elective (SE):** R**Main course outcomes:**

To understand the basic techniques and applications of Integral Calculus, including applications of integration, integration techniques, sequences and series, Taylor series and their applications, working with parametric equations and polar coordinates, developing the coordinate description of vectors, working with functions of several variables

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

Regions between Curves
 Volume by Slicing
 Volume by Shells
 Lengths of Curves
 Physical Applications
 Basic Approaches to Integration
 Integration by Parts
 Trigonometric Integrals
 Trig Substitution
 Partial Fractions
 Improper Integrals
 Overview of Sequences and Series
 Sequences
 Series (and Idea of Convergence)
 Divergence Test (and Properties of Convergent Series only)
 Ratio Test (only)
 Approx functions with Polynomials
 Properties of Power Series
 Taylor Series
 Parametric Equations

Polar Equations
Calculus in Polar Coordinates
Conic Sections (Conic Sections in Polar optional)
Vectors in the Plane and 3-Space
Dot Products, Cross Products
Lines and Curves in Space
Calculus of Vector-Value Functions
Motion in Space
Lengths of Curves
Planes and Surfaces
Graphs and Level Curves
Limits and Continuity
Partial Derivatives
The Chain rule
Directional Derivatives, Gradient

Course number and name:

Math 2568, Linear Algebra

Credits and contact hours: 3; 3.0 Lec**Course coordinator:** Onofrei**Text book:**

Introduction to Linear Algebra, 5th Edition, by Johnson, Riess, and Arnold

Brief description:

Matrix algebra, vector spaces and linear maps, bases and dimension, eigenvalues and eigenvectors, applications.

Prerequisites, co-requisites: C- or above in Math 1172**Required (R), elective (E), selected elective (SE):** R**Main course outcomes:**

To understand the concepts and applications of matrix algebra, vector spaces, linear transformations, eigenvectors and eigenvalues

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

Introduction to Matrices and Systems of linear equations
 Echelon Form and Gaussian-Jordan Elimination
 Consistent Systems of linear Equations
 Matrix Operations
 Algebraic Properties of Matrix operations
 Linear Independence and Nonsingular Matrices
 Matrix Inverses and Their Properties
 Vectors in The Plane (Review only because it was done in 1152)
 Vectors in Space (Review only because it was done in 1152)
 The Dot Product and The Cross
 Introduction
 Vector Space Properties of \mathbb{R}^n
 Examples of Subspaces
 Bases for Subspaces
 Dimension
 Vector Spaces
 Subspaces
 Linear Independence, Bases, and Coordinates
 Orthogonal Bases for Subspaces
 Linear Transformation from \mathbb{R}^n to \mathbb{R}^m
 The Eigenvalue Problem for 2x2 Matrices

Determinants and the Eigenvalue Problem
Eigenvalues and Characteristic Polynomial
Eigenvectors and Eigenspaces
Complex Eigenvalues and Eigenvectors
Similarity Transformations and Diagonalization

Course number and name:

Math 3345, Foundations of Higher Mathematics

Credits and contact hours: 3; 3.0 Lec**Course coordinator:** Husen**Text book:**

The Fundamentals of Higher Mathematics, Lecture notes by Falkner

Brief description:

Introduction to logic, proof techniques, set theory, number theory, real numbers

Prerequisites, co-requisites: Major or minor in BS-CSE, BS-CIS, or Math**Required (R), elective (E), selected elective (SE):** R**Main course outcomes:**

To understand the foundational concepts of logic, methods of proof, set theory, function theory, cardinality

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

Propositional calculus; quantifiers
 Simple example of mathematical proofs
 Mathematical induction
 Sets and functions; surjections, injections, bijections
 Infinite sets: countable and uncountable

Course number and name:

Physics 1250, Mechanics, Thermal Physics, Waves

Credits and contact hours: 5; 3.0 Lec, 1 rec, 2 Labs

Course coordinator: Ziegler

Text book:

Physics for Scientists and Engineers with Modern Physics, 9th Edition, by Serway and Jewett

Brief description:

Calculus-based introduction to classical physics: Newton's laws, fluids, thermodynamics, waves; for students in physical sciences, mathematics, and engineering.

Prerequisites, co-requisites: Concur: Math 1151

Required (R), elective (E), selected elective (SE):

Main course outcomes:

Student preconceptions and alternate conceptions of physical law are addressed head on.
 Students learn the scientific theories that have developed from the 1600s to the present day. They learn different modes of approaching the same phenomena, such as force and energy methods in mechanics.
 Students understand that this course introduces the basic physical laws that underlie all engineering applications

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

Acceleration
 Vectors
 Projectile Motion
 Forces
 Forces Free Body Diagrams
 Forces and Coupled Motion
 Forces Friction
 Friction and Motion
 Circular Motion
 Circular Motion and Gravity
 Work and Energy
 Energy Potential Energy
 Conservation of Energy
 Energy and Power
 Momentum
 Collisions
 Center of Mass of Systems

Rotational Kinematics
Rotation of Torque
Net Torque and Motion
Rotational Energy and Motion
Angular Momentum
Conservation of Angular Momentum
Static Equilibrium
Oscillations
Oscillations Damping and Forcing
Fluids Statics
Fluids Dynamics
Temperature and Heat
Thermodynamics; Ideal Gas
Thermodynamics Processes in the PV Plane
Ideal Gas: Molecular Model; Entropy
Thermodynamics Engines
Changes in Entropy
Relativity of Time and Space
Relativity and Velocity
Relation of Inertial Frames
Momentum and Energy

Course number and name:

Statistics 3470, Introduction to probability and Statistics for Engineers

Credits and contact hours: 3; 3.0 Lec

Course coordinator: Ozturk

Text book:

Probability and Statistics for Engineering and the Sciences, by Devore

Brief description:

Introduction to probability, Bayes theorem, discrete and continuous random variables, expected values, probability distributions,

Prerequisites, co-requisites: Math 1172

Required (R), elective (E), selected elective (SE):

Main course outcomes:

The course provides an introduction to probability and statistics targeted toward students in several engineering disciplines.

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
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Brief list of topics:

- Sampling, numerical and graphical summary measures
- Axioms and properties of probability
- Counting Techniques
- Conditional Probability
- Bayes theorem and independence
- Discrete random variable (RVs)
- Probability distributions
- Expected values of (functions of) RVs, variance
- Binomial distribution
- Poisson distribution
- Continuous RVs, density & distribution functions
- Percentiles & expected values
- Normal (Gaussian) distributions
- Exponential and gamma distributions
- Jointly distributed RVs, conditional distns, conditional expectation
- Expected values, covariance and correlation
- Sampling distribution of a statistic
- Distribution of the sample mean & central limit theorem
- Populations & parameters, samples & statistics
- Point estimation, methods of moments
- Method of maximum likelihood

Confidence intervals (CIs)
Large-sample CIs for means
Large-sample CIs for proportions
CIs for means of normal populations
Hypotheses and testing procedures
Tests for population means
Tests for population proportions
p-values
Chi-squared goodness-of-fit test
Simple linear regression model, least squares estimation
Residuals, sum of squares for error
Inference about regression parameters
Inference about fitted and predicted values
Diagnostic plots and transformations
Multiple regression, F-tests, R^2 , ANOVA

Course number and name:

ENGR 2367 American Attitudes About Technology

Credits and contact hours: 3; 3.0 Lec

Course coordinator:

Text book:

Various online text and videos resources and attachments will be used.
MLA Formatting and Style Guide

Brief description:

Discussion, analysis, and intensive writing in a technical and professional context based on study of American attitudes about technology.

Prerequisites, co-requisites: Engl 1110

Required (R), elective (E), selected elective (SE):

Main course outcomes:

Students will demonstrate knowledge of the inter-relations of technology and American society: in class discussions, in writing, and in multi-modal presentations.

Students will demonstrate ability to design and write to a specific audience and for a range of document lengths and purposes.

Students will evaluate and translate selected documents into oral and multi-modal presentations for professional and public audiences.

Contribution to program outcomes:

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>
			*		*	***	**	*	**	*			

Brief list of topics:

Working toward mastery of expository, technical, and professional written communication.

Practice and performance of oral and multi-modal presentations for professional and public audiences.

Exploration of technologies in relation to diversity in the United States.

Ethics and social responsibility as it pertains to technology's relations with a diverse American society.

Appendix B – Faculty Vitae

The vitae of all full-time and part-time faculty in the ABET format appear in the following pages.

Name: Gagan Agrawal

Education:

B.S. Computer Science, May 1991, I.I.T. Kanpur, India

M.S. Computer Science, May 1994, University of Maryland, College Park

Ph.D. Computer Science, August 1996, University of Maryland, College Park

Academic experience:

October 2007 - Present – Professor, Department of Computer Science and Engineering, Ohio State University (full-time)

September 2001 - September 2007 – Associate Professor, Department of Computer Science and Engineering, Ohio State University (full time)

September 1996 to August 2001: Assistant Professor, Department of Computer and Information Sciences, University of Delaware (full time)

Non-academic experience: Consultant for Intelligent Automation, 2012-2013, Part-time

Certifications or professional registrations: None

Current membership in professional organizations: ACM, IEEE Computer Society

Honors and awards: Best paper award at a number of conferences

Lumley Award for Research, College of Engineering, 2006 and 2011

Service activities: Grad Studies Committee Chair, CSE, 2003 onwards

Convener, Executive Committee, CSE, 2014-15 and 2015-16

Program Committee Vice-Chair, HiPC 2017

Program Committee Members for Various Conferences

Recent publications and presentations:

Rajkumar Kettimuthu, Gayane Vardoyan, Gagan Agrawal, P. Sadayappan, Ian T. Foster, An elegant sufficiency: load-aware differentiated scheduling of data transfers. SC 2015: 46:1-46:12

Yi Wang, Gagan Agrawal, Tekin Bicer, Wei Jiang, Smart: a MapReduce-like framework for in-situ scientific analytics. SC 2015.

Linchuan Chen, Peng Jiang, Gagan Agrawal, Exploiting recent SIMD architectural advances for irregular applications. CGO 2016: 47-58

Mehmet Can Kurt, Bin Ren, Sriram Krishnamoorthy, Gagan Agrawal, User-assisted storage reuse determination for dynamic task graphs. PPOPP 2016: 54:1-54:2

Rajkumar Kettimuthu, Gagan Agrawal, P. Sadayappan, Ian T. Foster, Differentiated Scheduling of Response-Critical and Best-Effort Wide-Area Data Transfers, IPDPS 2016.

Recent professional development activities:

Attended various professional conferences

Name: Anish Arora

Education:

Ph.D., Computer Sciences, UT Austin, 1992
M.S., Computer Sciences, UT Austin, 1988
B.Tech., Computer Science & Engineering, IIT Delhi, 1986

Academic experience:

CSE, OSU, Professor, 2002- (Assistant: 1992-98, Associate: 1998-2002), Full-Time
Translational Data Analytics, OSU, Faculty-in-Residence, Part-Time
Institute of Sensing Systems, OSU, Co-founder, 2007–14, Part-Time

Non-academic experience: The Samraksh Company, CTO, 2006– , Part-Time

The Indian Institute of Science, Visiting Professor, Bangalore, 2009, Full-Time
Microsoft Research, Visiting Professor, Redmond, 199-2001, Full-Time
EPFL, Visiting Professor, Lausanne, Summer 1999, Full-Time
MCC, Distributed Computing Group, Member, Austin, 1989 – 1992, Part-Time

Certifications or professional registrations: None

Current membership in professional organizations: Fellow, IEEE

Member, ACM

Honors and awards: Best Student Paper award for PhyCloak, NSDI 2016

Best Paper Runner-Up award for Low Power Counting paper, IPSN 2013
Best Paper award for Achievable Throughput paper, MASS 2012
OSU CoE Lumley Research Award (2003, 2008)
IEEE Fellow (2008)

Service activities: Program Committee Co-Chair, MASS 2017

Program Committee Area Chair, ICNP 2014
General Chair, MSN 2014
General Chair, SSS 2013
Program Committee Co-Chair, netHealth 2013
Steering Committee Member, SSS, 1999-
OSU Representative on State of Ohio CyberRange Testbed Committee
OSU Representative on City of Columbus Smart and Connected Columbus Committees (various)

Recent publications and presentations:

“PhyCloak: Obfuscating sensing from communication signals”, Y. Qiao, O. Zhang, W. Zhou, K. Srinivasan, and A. Arora, USENIX Annual Technical Conference (USENIX ATC), 2016.
“Specification-based design of self-stabilization”, M. Demirbas and A. Arora, IEEE Transactions on Parallel and Distributed Systems 27 (1), 263-270, 2016
“A regression-based radar-mote system for people counting”, J. He and Anish Arora, Proceedings of IEEE International Conference on Pervasive Computing and Communications (PerCom), Budapest, 2014.
“Low power counting via collaborative wireless communications”, W. Zeng, A. Arora, K. Srinivasan, Proceedings of the 12th International Conference on Information Processing, 2013.

“Achievable throughput in duty-cycled wireless networks”, J Li, W Zeng, A Arora, Proceedings of the IEEE 9th International Conference on Mobile Adhoc and Sensor Systems (MASS), 2012.

Recent professional development activities:

Outreach to Smart and Connected Columbus project, 2016-

Transition of Wireless Sensor Networks to World Wildlife Fund, 2014-

Engagement with Technologies for Forest Legality and Forest Protection, 2015

Name: Gojko Babic

Education:

Doctorate: Ph.D. Computer Science, Ohio State University, Columbus, Ohio, 1978

Masters: M.S. Computer Science, Florida Institute of Technology, Melbourne, Florida, 1975

Bachelors: B.S.E.E., University of Sarajevo, Sarajevo, Yugoslavia, 1972

Academic experience:

September 1993 - current, Senior Lecturer at Department of Computer and Information Science, Ohio State University, Columbus, Ohio; (full time)

March 1984 - May 1993, Associate Professor at Electrical Engineering Faculty, University of Sarajevo (joint appointment with IRIS-Computer)

Non-academic experience: March 1984 - May 1993, Director of Computer Networking Department at IRIS-Computer, a division of Energoinvest Corporation, Sarajevo (joint appointment with Electrical Engineering Faculty)

Certifications or professional registrations: none

Current membership in professional organizations: none

Honors and awards: none

Service activities: none

Recent publications and presentations:

a. G. Babic, R. Jain and A. Durresi: "ATM Performance Testing and QOS Management," The ATM Handbook, Editors: F. Golshani and F. Groom, International Engineering Consortium, pp. 127-143, 2000

b. R. Jain and G. Babic: "Performance Testing Effort at the ATM Forum: An Overview," IEEE Communication Magazine, August 1997, Vol. 35, No. 8, pages 110-116

c. About 15 contributions to ATM Forum Working Groups AF-TEST and AF-TM in the period 1996-1998.

Recent professional development activities:

a. IEEE 2016 GLOBECOM, Global Communication Conference, Exhibition & Industry Forum, 4-8 December 2016, Washington, DC

b. 2nd International Conference on Connected Vehicles and Expo (ICCVE 2013), 2-6 December 2013, Las Vegas, Nevada

c. International Conference on Service-Oriented Computing and Applications (SOCA 2011), 12-14 December, 2011, Irvine, California

Name: Bettina Bair

Education:

Business Administration, Bachelor of Science, University of Phoenix, 1987

Business Administration, Master of Business Administration, University of Denver, 1992

Academic experience:

The Ohio State University, Faculty Senior Lecturer , Oct 2005 -present , Full time

The Ohio State University, Faculty Lecturer , Jan 1998-Oct 2005 , Full time

Central Ohio Technical College, Faculty Instructor , Aug 1997-Jul 1998 , part time

Wilmington College, Faculty Instructor , Aug 1997-May 1998 , part time

Metropolitan State College of Denver, Faculty Instructor , Jan 1997-May 1998 , part time

National College, Faculty Instructor, Sep 1996-Mar 1997 , part time

Non-academic experience: U S WEST, Englewood, CO, Project/ Process Manager 4/1988-8/1996

Cranfield-Phoenix Data Systems, Phoenix, AZ, Product Marketing and Sales 4/1987-4/1988

Hughes Aircraft Company, Tucson, AZ, Systems Performance Analyst 4/1984-4/1987

Arizona Criminal Intelligence System Agency, Tucson, AZ, Data Base Analyst 4/1983-4/1984

University of Arizona, Tucson, AZ, System/ Product Manager 9/1979-4/1983

Certifications or professional registrations: none

Current membership in professional organizations: none

Honors and awards: Ohio State University Distinguished Diversity Enhancement Award 2006.

Mary Ann Williams Woman's Leadership Award 2005.

Service activities: Ohio Celebration of Women In Computing Conference, General Chair, 2005 and 2007

(<http://www.cse.ohio-state.edu/ocwic>)

Journal of Educational Resources in Computing (JERIC), Special Issue co-editor, April 2005 (<http://portal.acm.org/brow>

President's Council on Women's Issues at the Ohio State University, 2005- present (pcw.osu.edu)

SIGCSE Committee – Expanding the Women in Computing Community, 2004-present (<http://www.cs.grinnell.edu/sig>
[committees/women-in-computing-charge.html](http://www.cs.grinnell.edu/sigcommittees/women-in-computing-charge.html))

Training and Leadership Council (TLC), Board of Directors, 2004-2005 (<http://www.thetlc.org>)

The Women In Computer Engineering (TWiCE), Director, 2003-present (<http://twice.cse.ohio-state.edu>)

Association for Computing Machinery Committee on Women (ACM-W) - Working Committee 2003-present (<http://women.acm.org>)

ACM-W Student Chapter Faculty sponsor, 2003-present (<http://acmw.org.ohio-state.edu>)

Department of Computer Science & Engineering Undergraduate Diversity co-Coordinator, 2002-present (<http://www.cse.ohio-state.edu/diversity>)

Recent publications and presentations:

none

Recent professional development activities:

ACM/SIGCSE Conference attendance, March 2016.

Name: Aaron Baxter

Education:

MS, Electrical and Computer Eng., Johns Hopkins, 2013

BS, Electrical and Computer Eng., Ohio State, 2009

Academic experience:

Part-time Lecturer, OSU, August 2016-present

Non-academic experience: Battelle Labs, Cyber Computer Scientist, 2013-present, full-time

Certifications or professional registrations: None

Current membership in professional organizations: None

Honors and awards: None

Service activities: None

Recent publications and presentations:

None

Recent professional development activities:

None

Name: Mikhail Belkin

Education:

Ph.D. in Mathematics, The University of Chicago, 2003.

M.Sc. in Mathematics, The University of Chicago, 1997.

Hon.B.Sc. with High Distinction, The University of Toronto, Hon.B.Sc. with High Distinction, 1995.

Academic experience:

Ohio State University, Associate Professor, Department of Computer Science and Engineering, Sept 2011–present. Department of Statistics (courtesy appointment), Sept 2011– present.

The Institute of Science and Technology (IST Austria), Visiting Professor, Sept 2012–May 2013.

Ohio State University, Assistant Professor, Department of Computer Science and Engineering, Sept 2005–2011.

Department of Statistics (courtesy appointment), Feb 2009–2011.

Non-academic experience: University Community Healthcare, Chicago. Senior Software Engineer, 1998–2000, part time.

Certifications or professional registrations: None

Current membership in professional organizations: ACM

Honors and awards: Lumley Research Award, College of Engineering, Ohio State University, 2011.

NSF Early Career Award: Geometry and High-dimensional Inference.

Service activities: Served on program committees/area chair for ICML 2017 (Area chair) AAAI 2017 (SPC), COLT 2016.

AI and Statistics 2015 (SPC), area chair for NIPS 2014, AAAI 2014, COLT 2013.

Served on graduate admission and recruitment committees in the department.

Recent publications and presentations:

Graphons, mergeons, and so on! Justin Eldridge, Mikhail Belkin, Yusu Wang, Neural Information Processing Systems (NIPS), 2016

Learning a Hidden Basis Through Imperfect Measurements: An Algorithmic Primitive, M.Belkin, L. Rademacher, J. Voss, The 29th Conference on Learning Theory (COLT), 2016.

The Hidden Convexity of Spectral Clustering, James Voss, Mikhail Belkin, Luis Rademacher, Thirtieth AAAI Conference on Artificial Intelligence (AAAI-16), 2016, oral presentation.

Polynomial learning of distribution families, Mikhail Belkin, Kaushik Sinha, SIAM Journal on Computing (SICOMP), 44(4), 889-911, 2015.

Beyond Hartigan Consistency: Merge Distortion Metric for Hierarchical Clustering, Justin Eldridge, Mikhail Belkin, Yusu Wang, The 28th Conference on Learning Theory (COLT), 2015, Mark Fulk award (best student paper).

Inverse Density as an Inverse Problem: The Fredholm Equation Approach, Qichao Que, Mikhail Belkin, Neural Information Processing Systems (NIPS), spotlight presentation, 2013.

Recent professional development activities:

Currently spending the semester as a visiting scientist at the Simons Institute for theoretical computer science in Berkeley.

Name: Thomas E. Bihari

Education:

Ph.D., Computer and Information Science, The Ohio State University, 1987
MS, Computer and Information Science, The Ohio State University, 1983
MS, Mathematics, The Ohio State University, 1982
BS, Mathematics, Kent State University, 1978

Academic experience:

OSU, Senior Lecturer, CSE, part-time, 2009-current

Non-academic experience: Nationwide Insurance, Senior IT Consultant, 2006-current
AMT Systems Engineering, Vice President, Research and Development, 1987-2006

Certifications or professional registrations: Project Management Professional (PMP)
Certified Scrummaster

Current membership in professional organizations: ACM, IEEE-CS, PMI, IIBA

Honors and awards:

Service activities:

Recent publications and presentations:

T. Bihari, et.al, Enabling Scalability, Richer Experiences and ABET-Accreditable Learning Outcomes in Computer Science Capstone Courses Through Inversion of Control, 2011 ASEE/IEEE Frontiers in Education Conference.
T. Lynch, et.al, An Agile Boot Camp: Using a LEGO-Based Active Game to Ground Agile Development Principles, 2011 ASEE/IEEE Frontiers in Education Conference.
T. Bihari, Evaluating COTS Source Code For Use In Certified Embedded Systems, COTS Journal, February 2003.
T. Bihari and P. Gopinath, Using Real-Time Linux in Safety Critical Applications, IEEE Workshop on Real Time Operating Systems and Applications and Second Real Time Linux Workshop, Orlando, FL, November 27-28, 2000.

Recent professional development activities:

Many professional courses, workshops, etc., on management of large IT programs, organizational change management, agile project management, etc., as part of continuing professional education.

Name: Spyros Blanas

Education:

B.S., Computer Engineering, Technical University of Crete, Greece, 2006.
M.Sc., Computer Sciences, University of Wisconsin–Madison, U.S.A., 2009.
Ph.D., Computer Sciences, University of Wisconsin–Madison, U.S.A., 2013.

Academic experience:

The Ohio State University, Assistant Professor, 2014–now, full time.

Non-academic experience: Lawrence Berkeley National Lab, Post-doc, Conducted researcher in scientific data management, Fall 2013, full time.

Microsoft, Research intern, Prototyped the CipherBase system for encrypted query processing, Summer 2012, full time.

Microsoft, Research intern, Conducted research on concurrency control algorithms for in-memory OLTP, Summer 2011, full time.

Microsoft, SDE intern, Developed an early prototype of the “Hekaton” OLTP engine, Summer 2009, full time.

IBM, Research intern, Conducted research on efficient join implementations on MapReduce, Summer 2008, full time.

Certifications or professional registrations: None

Current membership in professional organizations: ACM

Honors and awards: Google Faculty Research Award

Service activities: PC member, SSDBM 2017.

PC member, IEEE ICDE 2017.

PC member, VLDB 2017.

PC member, ACM SIGMOD 2017.

PC member, IEEE ICDE 2016.

PC member, ACM SIGMOD 2016.

PC member, EDBT 2015.

PC member, ACM SIGMOD 2015.

Recent publications and presentations:

F. Liu, L. Yin, S. Blanas. Design and evaluation of an RDMA-aware data shuffling operator for parallel database systems. In EuroSys, 2017.

F. Liu, S. Blanas. Forecasting the cost of processing multi-join queries via hashing for main-memory databases. In Proceedings of the ACM Symposium on Cloud Computing, SoCC 2015.

S. Blanas, K. Wu, S. Byna, B. Dong, A. Shoshani. Parallel Data Analysis Directly on Scientific File Formats. In Proceedings of the ACM SIGMOD International Conference on Management of Data, SIGMOD 2014, pages 385–396.

Y. Yuan, K. Wang, R. Lee, X. Ding, J. Xing, S. Blanas, X. Zhang. BCC: Reducing false aborts in optimistic concurrency control with low cost for in-memory databases. In The Proceedings of the VLDB Endowment, PVLDB, 9(6):504–515, 2016.

S. Blanas and J. M. Patel. Memory footprint matters: Efficient equi-join algorithms for main memory

data processing. In Proceedings of the ACM Symposium on Cloud Computing, SoCC 2013.

A. Arasu, S. Blanas, K. Eguro, R. Kaushik, D. Kossmann, R. Ramamurthy, and R. Venkatesan. Orthogonal security with Cipherbase. In Conference on Innovative Data Systems Research, CIDR, 2013.

Recent professional development activities:

Integrated the open-source bitmap indexing software FastBit with a query processing engine, creating the SDS/Q open-source prototype for scientific data processing.

Co-organized the ADMS/IMDM workshop to promote the use of in-memory database technologies for managing data, New Delhi, India, 2016.

Co-organized the FADS workshop to create a forum where researchers and practitioners can learn and discuss why past research projects or commercial products failed to achieve their full potential.

Name: Matthew J. Boggus

Education:

Ph.D., Computer Science and Engineering, The Ohio State University, 2012.

B.A., Computer Science, Mathematics, Hiram College, 2006.

Academic experience:

The Ohio State University, Department of Computer Science and Engineering, Senior Lecturer, Autumn 2012 - Present, full time.

Oberlin College, Visiting Instructor, Spring 2012 - Summer 2012, full time.

The Ohio State University, Graduate School, Preparing Future Faculty Fellow, Autumn 2010 - Spring 2011, part time.

The Ohio State University, Department of Computer Science and Engineering, Teaching Assistant, Autumn 2007 - Autumn 2011, part time.

Non-academic experience: None

Certifications or professional registrations: None

Current membership in professional organizations: Member, ACM

Honors and awards: Outstanding Teaching Award, Department of Computer Science and Engineering, 2016.

Microsoft Imagine Cup Kinect Course Award, 2013.

Upsilon Pi Epsilon Honor Society, 2010.

Service activities: Member, CSE Undergraduate Studies Committee, 2015-Present.

Volunteer, Columbus Area Boardgaming Society, 2010-Present.

Organizer, CSE Game Design and Development Capstone final demonstrations, Spring 2015-Spring 2016.

Collaborator, Department of Engineering Capstone Design Showcase, 2015-2016.

Organizer, OSU CSE booth at Ohio Game Developer Expo, 2014-2015.

Recent publications and presentations:

Matt Boggus. Modeling, evaluation, editing, and illumination of three dimensional mazes and caves for computer games. Ph.D. Thesis. The Ohio State University. 2012.

Recent professional development activities:

Attended Capstone Design Conference 2016.

Attended GDEX (formerly known as Ohio Game Developers Expo) 2014-2016.

Attended ACM webinars on software engineering, ex: "Agile Methods: The Good, The Hype, and the Ugly".

Attended OSU University Center for the Advancement of Teaching events, ex: "Course Design Institute".

Name: Michael D. Bond

Education:

PhD, Computer Sciences, University of Texas at Austin, 2008
MCS, Computer Science, University of Illinois at Urbana-Champaign, 2003
BS, Computer Science, University of Illinois at Urbana-Champaign, 2002

Academic experience:

Ohio State University, associate professor, 2016-present, full time
Ohio State University, assistant professor, 2011-2016, full time
University of Texas at Austin, postdoctoral fellow, 2009-2010, full time

Non-academic experience: Intel Corporation, research intern, 2005, full time

Certifications or professional registrations: None

Current membership in professional organizations: Member of the Association for Computing Machinery (ACM)

Honors and awards: Lumley Research Award, College of Engineering, Ohio State University, 2016
Distinguished Paper Award, ACM SIGPLAN International Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA), 2015
Distinguished Artifact Award, ACM SIGPLAN International Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA), 2015
Faculty Early Career Development (CAREER) Award, National Science Foundation, 2013
ACM SIGPLAN Outstanding Doctoral Dissertation Award, 2008

Service activities: Co-chair, Artifact Evaluation Committee, ACM SIGPLAN International Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA), 2016 and 2017
Program Committee, ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP), 2016
Chair, Program Committee, ACM SIGPLAN International Symposium on Memory Management (ISMM), 2015
Program Committee, ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI), 2013
Graduate Admissions Committee, Computer Science and Engineering, Ohio State University, 2011-present

Recent publications and presentations:

Legato: End-to-End Bounded Region Serializability Using Commodity Hardware Transactional Memory. Aritra Sengupta, Man Cao, Michael D. Bond, and Milind Kulkarni. IEEE/ACM International Symposium on Code Generation and Optimization (CGO), February 2017
Drinking from Both Glasses: Combining Pessimistic and Optimistic Tracking of Cross-Thread Dependences. Man Cao, Minjia Zhang, Aritra Sengupta, and Michael D. Bond. ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP), March 2016.
Efficient, Software-Only Data Race Exceptions. Swarnendu Biswas, Minjia Zhang, Michael D. Bond, and Brandon Lucia. ACM SIGPLAN International Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA), October 2015.

Hybrid Static–Dynamic Analysis for Statically Bounded Region Serializability. Aritra Sengupta, Swarnendu Biswas, Minjia Zhang, Michael D. Bond, and Milind Kulkarni. ACM International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS), March 2015.

Low-Overhead Software Transactional Memory with Progress Guarantees and Strong Semantics. Minjia Zhang, Jipeng Huang, Man Cao, and Michael D. Bond. ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP), February 2015.

Practical Fine-Grained Information Flow Control Using Laminar. Donald E. Porter, Michael D. Bond, Indrajit Roy, Kathryn S. McKinley, and Emmett Witchel. ACM Transactions on Programming Languages and Systems (TOPLAS), November 2014.

DoubleChecker: Efficient Sound and Precise Atomicity Checking. Swarnendu Biswas, Jipeng Huang, Aritra Sengupta, and Michael D. Bond. ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI), June 2014.

Octet: Capturing and Controlling Cross-Thread Dependences Efficiently. Michael D. Bond, Milind Kulkarni, Man Cao, Minjia Zhang, Meisam Fathi Salmi, Swarnendu Biswas, Aritra Sengupta, and Jipeng Huang. ACM SIGPLAN International Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA), October 2013.

Recent professional development activities:

Invited talk, "Rethinking Strong Memory Consistency," Ghent University (March 2016), University of Rochester (October 2016), Carnegie Mellon University (February 2017)

Invited talk, "Toward Practical Language and Runtime Support for Reliable, Scalable Parallelism," University of Massachusetts at Amherst (May 2015), Massachusetts Institute of Technology (May 2015)

Member of Jikes RVM Team, 2007-present

Name: Stephen Boxwell

Education:

PhD, Computational Linguistics, Ohio State, 2011

BS in Arts, Linguistics, Willing and Mary, 2006

Academic experience:

Senior Lecturer, Part-time, Ohio State, August 2016-present

Non-academic experience: IBM, Senior Software Engineer, 2013-present, full-time

NSA, Cryptanalyst, 2011-2013, full-time

Certifications or professional registrations: None

Current membership in professional organizations: None

Honors and awards: None

Service activities: None

Recent publications and presentations:

S. Boxwell et al., Semantic role labeling for CCG without treebanks, In Proc. of 5th Int. Conf. on Nat. Lang. Proc., 2011

S. Boxwell et al., What a parser can learn from a semantic role labeler and vice-versa, Conf. on empirical methods in NLP (EMNLP), 2010.

Recent professional development activities:

None

Name: Paolo Bucci

Education:

Ph.D., Computer and Information Science, The Ohio State University, Columbus, OH, 1997

M.S., Computer and Information Science, The Ohio State University, Columbus, OH, 1989

Laurea (B.S.), Computer Science, Universit degli Studi, Milan, Italy, 1986

Academic experience:

Senior Lecturer, Computer Science and Engineering, The Ohio State University, Columbus, OH (Oct 2007-present)

Senior Research Associate/Senior Lecturer, Computer Science and Engineering (formerly Computer and Information Science), The Ohio State University, Columbus, OH (Oct 1997-Sep 2007)

Graduate Teaching and Research Assistant, Computer and Information Science, The Ohio State University, Columbus, OH (Sep 1989-Sep 1997)

Non-academic experience: Software Developer, Unicad, Spa, Milan, Italy (Mar 1988-Jul 1988)

Software Developer, Eidos, Spa, Milan, Italy (Feb 1987-Feb 1988)

Research Staff Member, CISE, Milan, Italy (Jun 1986-Jan 1987)

Certifications or professional registrations: None

Current membership in professional organizations: ACM Professional Member

Honors and awards: The Ohio State University, Department of Computer Science and Engineering, Excellence in Teaching Award (April 2013)

The Ohio State University Department of Computer and Information Science, Excellence in Teaching Award (May 2001)

The Ohio State University, University Fellowship (Sep 1988-Aug 1989)

Fulbright Fellowship (Sep 1988-Aug 1993)

Service activities: Undergraduate Studies Committee, Computer Science and Engineering, member
Curriculum Committee, Computer Science and Engineering, member

Recent publications and presentations:

Invited Talk: "Design of the First-Year CS Course Sequence: Themes and Principles", American Society for Engineering Education, November 19, 2013, Columbus, OH

Technical Presentation: "Client View First: An Exodus From Implementation-Biased Teaching (or How to Teach Recursion)", May 20, 2016, RESOLVE 2016 Workshop, Columbus, OH

Recent professional development activities:

Attended SIGCSE 2013 Symposium, March 6-9, 2013, Denver, CO

Attended SIGCSE 2016 Symposium, March 2-5, 2016, Memphis, TN

Attended RESOLVE 2016 Workshop, May 18-20, 2016, Columbus, OH

Name: Moez Chaabouni

Education:

1992-1994 Post Graduate - PhD Track, Computer Science, Wright State University

1990 - MS, Computer Science, Wright State University

1988 - BS, Computer Information Systems, The Ohio State University

Academic experience:

1992-1993 TA Wright State University

1993-1994 Faculty Instructor (FT) Wright State University

1996-Present Lecturer (PT) The Ohio State University

Non-academic experience: 2008-Present: Deputy CIO, City of Columbus

2006-2008: Founder, My CIO

2005-2006: CIO, Hondros College

2002-2005: CIO, Title First Agency

2000-2002: Sr. Consultant, Rational Software

1994-2000: Various, Compuware Corporation

Certifications or professional registrations:

Current membership in professional organizations:

Honors and awards:

Service activities:

Recent publications and presentations:

Recent professional development activities:

Name: Adam C. Champion

Education:

M.S., Computer Science and Engineering, The Ohio State University, 2012

B.S. (with distinction, summa cum laude), Computer Science and Engineering, The Ohio State University, 2007

Academic experience:

The Ohio State University, Lecturer, Mr., 2014–present

The Ohio State University, Graduate Teaching Associate, Mr., 2009–2013

Non-academic experience: Chemical Abstracts Service, IT Co-op, Development on STN AnaVist(TM) commercial software package (including string internationalization and development procedure documentation), Jun. 2005–Sep. 2005, full-time
AMT Systems Engineering, Inc., Engineer Level 1, Converted flight analysis software and GUI from Visual Basic to Java with run-time optimizations, Jun. 2004–Sep. 2004, full-time

Certifications or professional registrations: None

Current membership in professional organizations: None

Honors and awards: Distinguished University Fellow (2007–present)

National Society of Collegiate Scholars

Golden Key International Honour Society

Phi Kappa Phi

Upsilon Pi Epsilon

Service activities: Reviewer for IEEE INFOCOM (2015–2017), ACM Transactions on Sensor Networks (2016), and IEEE Transactions on Parallel and Distributed Systems (2012–2014)

Designed website for U.S.-China Workshop on Environmental Monitoring for Public Health and Disaster Recovery, 2012, with Boying Zhang and Dong Xuan, <http://web.cse.ohio-state.edu/~xuan/NW/>

Recent publications and presentations:

Paul Y. Cao, Gang Li, Adam C. Champion, Dong Xuan, Steve Romig, and Wei Zhao, "On Mobility Predictability Via WLAN Logs," in Proc. IEEE INFOCOM, 2017.

Shigen Shen, Longjun Huang, Jianhua Liu, Adam C. Champion, Shui Yu, and Qiyong Cao, "Reliability Measurement for Clustered WSNs under Malware Propagation," Sensors, vol. 16, no. 6, 2016.

Fan Yang, Qiang Zhai, Guoxing Chen, Adam C. Champion, Junda Zhu and Dong Xuan, "Flash-Loc: Flashing Mobile Phones for Accurate Indoor Localization," in Proc. IEEE INFOCOM, April 2016.

Jihun Hamm, Adam C. Champion, Guoxing Chen, Dong Xuan, and Mikhail Belkin, "Crowd-ML: A Privacy-Preserving Learning Framework for a Crowd of Smart Devices," in Proc. IEEE ICDCS, July 2015.

Fan Yang, Yiran Xuan, Sihao Ding, Adam C. Champion and Yuan F. Zheng, "R-Focus: A Rotating Platform for Human Detection and Verification Using Electronic and Visual Sensors," in Proc. WASA, 2014. (Best Paper Award) Adam C. Champion, Zhimin Yang, Boying Zhang, Jiangpeng Dai, Dong Xuan and Du Li, "E-SmallTalker: A Distributed Mobile System for Social Networking in Physical Proximity," in IEEE Trans. Parallel Distrib. Syst. (TPDS), vol. 24, no. 8, Aug. 2013, pp. 1535–1545.

Adam C. Champion, Xinfeng Li, Qiang Zhai, Jin Teng and Dong Xuan, "Enclave: Promoting Unobtrusive and Secure Mobile Communications with a Ubiquitous Electronic World," in Proc. WASA, 2012.

Recent professional development activities:

Advised undergraduate students who expressed interest in (extracurricular) mobile application development and Web design, ongoing Wrote and maintained mobile applications and course materials for CSE 5236: (Mobile Application Development, ongoing

Name: Bryan H. Choi

Education:

J.D., Harvard Law School, 2007

B.A., Computer Science, Harvard College, 2003

Academic experience:

The Ohio State University, Assistant Professor, 2016-present, FT

University of Pennsylvania Law School, Faculty Fellow, 2015-2016, FT

New York Law School, Visiting Associate Professor, 2013-2015, FT

Yale Law School, Information Society Project, Director of Law & Media, 2010-2013, FT

Non-academic experience: U.S. Court of Appeals for the Federal Circuit, Law Clerk for the Honorable William C. Bryson, 2009-2010, FT

U.S. Court of Appeals for the Third Circuit, Law Clerk for the Honorable Leonard I. Garth, 2008-2009, FT

Certifications or professional registrations: Admitted member of the bar in California, District of Columbia, Third Circuit Court of Appeals, and Federal Circuit Court of Appeals

Current membership in professional organizations: See above.

Honors and awards: None.

Service activities: Moderator of Continuing Legal Education session on Digital Security, The Ohio State University, Jan. 2017

Participant at Cybersecurity and Data Analytics Exchange, University of Maryland, Dec. 2016

Keynote speaker at Translational Data Analytics Fall Forum, The Ohio State University, Nov. 2016

Recent publications and presentations:

For Whom the Data Tolls: A Reunified Theory of Fourth and Fifth Amendment Jurisprudence, 37 *Cardozo Law Review* 185 (2015)

A Prospect Theory of Privacy, 51 *Idaho Law Review* 623 (2015)

The Anonymous Internet, 72 *Maryland Law Review* 501 (2013)

Recent professional development activities:

Presenter at Internet Law Works-In-Progress Workshop, Santa Clara University School of Law, Mar. 2017

Presenter at Junior Tech Law Scholars Workshop, The Ohio State University, Feb. 2017

Commentator at Privacy Law Scholars Conference, George Washington University Law School, June 2016

Presenter at Law and Computer Science Conference, University of Pennsylvania Law School, May 2016

Panelist at Symposium on Bulk Data Collection and Personal Privacy, University of Maryland School of Law, Apr. 2016

Panelist at Symposium on Government Access to Cloud Data, New York University School of Law, June 2015

Panelist at Symposium on Privacy in the Age of Pervasive Surveillance, Idaho Law School, Apr. 2015

Name: Alan Cline

Education:

B.S. mathematics, OSU, 1973

M.S. physics, Univ of Akron, 1986

Academic experience:

OSU, CSE Lecturer, Autumn 1997- Spring 2006, part-time

OSU, CSE Sr. Lecturer, Spring 2016 - present, full-time

Non-academic experience: Carolla Development Inc., CEO and owner (4/1997 - 3/2016): project management and software consulting firm for small to large projects. About 50Flairsoft, Director of Software Development (10/2009 - 6/2013)

Project lead for converting Flairsoft to SEI CMMi Level 2 and 3. Project manager and technical lead to Air Force Research Labs (\$3.3M project).

Nationwide Insurance (11/2006 – 2/2009) Systems Officer (AVP), Solution Analysis Center of Excellence.

Certifications or professional registrations: Project Management Professional (PMP) (2004-present); Agile Certified Professional (PMI-ACP; ICAgile; Sigma Pi Sigma honorary; Ohio Foundation for Entrepreneurial Education FastTrack II (OSU outreach), MBA level; Dale Carnegie, Toastmasters (CTM), Steven Covey. Previously certified to conduct SEI CMMi, ISO, and Sarbanes-Oxley assessments.

Current membership in professional organizations: Project Management Professional (PMP) (2004-present), Agile Certified Professional (PMI-ACP ()), ICAgile, Sigma Pi Sigma honorary

Honors and awards: Nominated: Best Small Business Person of the Year, TopCat Award by OSU CIS dept.; Elected Star Project of the Year by Central Ohio QA Association

Finalist: Best Educator, Columbus TopCat Award

Awarded Best Instructor for 2008, as sr. instructor for PMI

Service activities: Frequent speaker at professional meetings: PMI, COQAA, ACM

Recent publications and presentations:

Agile Development in the Real World, Apress Books, 2015. Course book for CSE 3231 at OSU.

The NEBS Transform, Carolla Development white paper, 2014; <https://Carolla/pubhtml/pubhtml/wp-nebs.htm>. Top-searched paper from academic.edu, later expanded into the article "4 Things to Remember to Ensure Good Test Coverage", by Terry Wiegmann (July 4, 2016) for Sticky Minds magazine, <https://www.stickyminds.com/article/4-things-remember-ensure-good-test-coverage>

Practical Extensions to UML, 2011, Carolla Development white paper, later published as "Validating Use Cases with XUML" in addendum to Chapter 9 of Agile Development in the Real World.

Joint Application Development (JAD) for Requirements Collection and Management; Carolla Development white paper 2000; <https://Carolla/pubhtml/pubhtml/wp-jad.htm>, also in academia.edu

Recent professional development activities:

Involvement with various OSU events, e.g., CSE Hack-a-thon, and School of Engineering Make-a-thon.

Project Manager for open source project: eChronos, multi-platform, multi-interface, application for developing interactive novels and games

Name: Doreen P Close

Education:

B.S. CIS, OSU, 1979

M.S. CIS, OSU, 1981

Academic experience:

OSU, Senior Lecturer, Sept. 2013 – present, full-time.

OSU, Lecturer, Sept. 2010-August 2013, full-time.

OSU, Lecturer, Jan. 2010-June 2010, part-time.

Ohio Dominican University, Adjunct Assistant Professor of Mathematics and Computer Science, August 2009-May 2012, August 2009 – May 2012, part-time.

Capital University, Assistant Professor of Mathematics, August 2006 – August 2009, full-time.

Capital University, Adjunct Assistant Professor of Computer Science, January 1995-July 2006.

Non-academic experience: Worked at various companies: Lucent Technologies, System Engineering Associates, Cranston/Csuri Productions, AT&T Bell Laboratories, Battelle Memorial Institute 1980-1990, some full-time, some as contractor.

Certifications or professional registrations: None

Current membership in professional organizations: SIGCSE, ACM, ACM-W

Honors and awards: Nominated for OSU Provost's Award for Distinguished Teaching by a lecturer – 2015, 2016.

Service activities: Represented department at CSE Information Night at Archer/Torres Dorm Complex, OSU, April 2016.

Recent publications and presentations:

None

Recent professional development activities:

SIGCSE 2013

Reviewer of manuscript for new Discrete Mathematics textbook for John Wiley & Sons, December 2013 – January 2016.

Name: Roger A Crawfis

Education:

Ph.D., Computer Science. September 1995, University of California, Davis, CA

Academic experience:

September 2001 – present, Associate Professor, The Ohio State University., full-time

Non-academic experience: February 2015 – present: CEO, Games That Move You, PBC.

November 2014 – present: CTO, Games That Move You, PBC.

March 2014 – present: President and Founder, Crawfis Software, LLC.

June 2012 – August 2012, Electronic Arts, Inc. NBA Live product

December 2004 – 2011, Chief Architect, VISION platform, DSCI, Inc.

May 1993 - September 1996: Graphics Technology Group Leader, Lawrence Livermore National Lab.

June 1984 - May 1993: Computer Scientist, Lawrence Livermore National Lab.

Certifications or professional registrations: None.

Current membership in professional organizations: IEEE Computer Society

Honors and awards: Best paper award for Applying Formal Picture Languages to Procedural Content Generation, in (CGAMES), 2015

Best paper award for Optimal Cover Placement against Static Enemy Positions, in FDG 2013

Best paper nomination for Procedural Textures Using Tilings With Perlin Noise in CGAMES 2012

Best paper award for Effective Texture Models for Three Dimensional Flow Visualization, SCCG 2012.

Best paper award for Volume Interval Segmentation and Rendering at the IEEE Volume Visualization 2004 Workshop.

Best panel award for the panel Do I Really See a Bone? at the IEEE Visualization 2003 conference.

2000 College of Engineering Lumley Award.

1999 College of Engineering Annual Research Accomplishment Award

Naval Notable Achievement Award for IEEE Transactions on Visualization and Computer Graphics paper, Splatting Errors and Anti-Aliasing, (June 1998)

Service activities: OSU Faculty Senate

Computer Committee

Associate Editor, IEEE Transactions on Visualization and Computer Graphics, 2000-2004

Faculty Advisor, Game Creation Club

Faculty Advisor, BuckeyeLan Club

Faculty Advisor, STEP Program: Sophomore Transformational Experience Program, 2013-2015

Bible Study teacher, Vineyard Columbus

Recent publications and presentations:

Alexandra Borstad; Roger Crawfis, PhD; Kala Phillips, MS; Linda Pax Lowes, PhD; Lise Worthen-Chaudhari, MFA; David Maung, MS; Ryan McPherson, PhD; Amelia Siles, MS, DPT; Lynne V Gauthier, PhD; “In-home delivery of constraint induced movement therapy via virtual reality gaming is safe and feasible: a pilot study”, in Archives of Physical Medicine and Rehabilitation (in press).

Gauthier, LV, Borstad, A, Luong, E, Phillips, K, Lowes, L, Worthen-Chaudhari, L, Crawfis, R, Maung, D. Upper extremity recovery following gamified Constraint-Induced Movement therapy: a case study in dense amnesic TBI. *Brain Injury Professional*. Vol. 12, No. 4.

Linda P Lowes, Lindsay N Alfano, Roger Crawfis, Katherine Berry, Han Yin, Igor Dvorchik, Kevin M Flanigan, Jerry R Mendell. Reliability and validity of ACTIVE-seated: An outcome in dystrophinopathy. *Muscle & Nerve*, 2014; DOI: 10.1002/mus.24557

Jiongqian Liang, David Fuhry, David Maung, Alexandra Borstad, Roger Crawfis, Lynne Gauthier, Arnab Nandi, and Srinivasan Parthasarathy. "Data Analytics Framework for A Game-based Rehabilitation System." In *Proceedings of the 6th International Conference on Digital Health Conference 2016 (DH '16)*, pp. 67-76. ACM, 2016.

Yinxuan Shi, Erin Ferlet, Roger Crawfis, Patricia Phillis, and Karen Durano, 3D Hospital: Design and Implement Quest-Based Game Framework for Transitional Training, in *Computer Games: AI, Animation, Mobile, Multimedia, Educational and Serious Games (CGAMES)*, 2015, Louisville, KY, USA, July 2015.

Paul Kim and Roger Crawfis, Quest for the Perfect Perfect Maze, in *Computer Games: AI, Animation, Mobile, Multimedia, Educational and Serious Games (CGAMES)*, 2015, Louisville, KY, USA, July 2015.

David Maung and Roger Crawfis, Applying Formal Picture Languages to Procedural Content Generation, in *Computer Games: AI, Animation, Mobile, Multimedia, Educational and Serious Games (CGAMES)*, 2015, Louisville, KY, USA, July 2015. (Best paper award).

Jaffe J, Lowes L, Borstad A, Worthen-Chaudhari L, Crawfis R, Phillips K, Maung D, Adams J, Siles A, Marlin A, McPherson R, Gauthier L. Gaming for the brain: video game based arm rehabilitation. Poster session present at: *International Research Congress on Integrative Medicine and Health*; 2014 May 13-16; Miami, FL.

Shi, Yinxuan and Roger Crawfis, Group Tactics Utilizing Suppression and Shelter, in *Computer Games: AI, Animation, Mobile, Multimedia, Educational and Serious Games (CGAMES)*, 2014, Louisville, KY, USA, July 2014, pp.1-8.

Maung, D., Crawfis, R., Gauthier, L.V., Worthen-Chaudhari, L., Lowes, L.P., Borstad, A., McPherson, R., Greal, J., and Adams, J. Development of Recovery Rapids - A Game For Cost Effective Stroke Therapy. in *Foundations of Digital Games (FDG 2014)*, April 2014, Ft. Lauderdale, FL, USA.

Shi, Y., R. Crawfis, Optimal Cover Placement against Static Enemy Positions, *Foundations of Digital Games*, May 2013, Crete, Greece (Best Paper).

Oleg Mishchenko and Roger Crawfis, Effective Texture Models for Three Dimensional Flow Visualization, In *Proceedings of SCCG 2012*, May 2012, Smolenice castle, Slovakia, pp. 45-52. (Best paper award).

Teng-Yok Lee, Oleg Mishchenko, Han-Wei Shen, and Roger Crawfis, View Point Evaluation and Streamline Filtering for Flow Visualization, In *Proceedings of the IEEE Pacific Visualization Symposium 2011*, March 2011, Hong Kong, pp. 83-90

Recent professional development activities:

Attended Start-up Grind Week.

Attended several Social Impact investing venues

Demo'd at Change for Good festival.

Name: James W. Davis

Education:

Ph.D., Media Arts & Sciences, Massachusetts Institute of Technology, 2000

Academic experience:

Ohio State University, Full Professor, 2013 - present, full time

Ohio State University, Associate Professor, 2005 - 2013, full time

Ohio State University, Assistant Professor, 2000 - 2005, full time

Non-academic experience: Knockout Concepts, Advisory board member, industrial advisement, 2015 – present, part time

General Dynamics, Consultant, video surveillance and monitoring technology, 2007-2008, part time

SAIC, Dayton, Consultant, video surveillance and monitoring technology, 2007-2008, part time

Certifications or professional registrations: None

Current membership in professional organizations: IEEE

Honors and awards: OSU College of Engineering Innovators Award, 2015

OSU College of Engineering Lumley Engineering Research Award, 2012

Best Paper Award for "Attention-based Target Localization using Multiple Instance Learning," published in International Symposium on Visual Computing, 2010

IEEE Computer Vision and Pattern Recognition Outstanding Reviewer Award, 2010

OSU CSE Departmental Teaching Award, 2010

Service activities: OSU, Chair of CSE Computer Committee, 2012 - current

Recent publications and presentations:

"A Multi-Transformational Model for Background Subtraction with Moving Cameras" D. Zamalieva, A. Yilmaz, and J. Davis European Conference on Computer Vision, September 2014

"Summarizing High-Level Scene Behavior" K. Streib and J. Davis Machine Vision and Applications Journal, 2013

"One-Class Multiple Instance Learning and Applications to Target Tracking" K. Sankaranarayanan and J. Davis Asian Conference on Computer Vision, November 2012

"Segmentation and Scene Modeling for MIL-based Target Localization" K. Sankaranarayanan and J. Davis International Conference on Pattern Recognition, November 2012

"Detecting Behavioral Zones in Local and Global Camera Views" M. Nedrich and J. Davis Machine Vision and Applications, Vol. 23, 2012, pp. 1-27

Recent professional development activities:

Engaged in a Special Research Assignment and Faculty Professional Leave for one year (2015-2016) to develop skills and techniques in audio and video processing

Name: Tamal Krishna Dey

Education:

Post-Doctorate, Computer Science, U. Illinois Urbana-Champaign, 1992
Ph.D. , Computer Science, Purdue University, 1991
M.Tech., Computer Science, I.I.Sc., Bangalore, India, 1987
B.E., Electronics, Jadavpur University, India, 1985

Academic experience:

The Ohio State U., Professor (2004–), full time
The Ohio State U., Associate Professor (1999–2004), full time
I. I. T. Kharagpur, India, Associate Professor (1998-1999), full time
I. I. T. Kharagpur, India Assistant Professor (1994-1998), full time
Indiana Univ.-Purdue Univ. at Indianapolis, Assistant Professor (1992-1994), full time

Non-academic experience: Systems Engineer (1987-1988). R & D center of Computer Maintenance Corp., Hyderabad, India, full time

Certifications or professional registrations: None

Current membership in professional organizations: ACM and IEEE

Honors and awards: Fellow, IEEE

Lumley Research award, Engineering College, The Ohio State U. (2010) and (2004).
Selected for Humboldt Fellowship from Humboldt Foundation, Germany (1998).
Received Young Scientist award from DST, Govt. of India (1995).
Awarded David Ross Fellowship by Purdue University, USA, (1989).

Service activities: Chair Graduate Admission Committee, 2007-2017

Member Faculty search committee, 2010-2015
Program Committees: SODA (ACM-SIAM), SoCG (ACM), SPM (ACM), SMI(IEEE) and many others.
Editorial Board: Discrete & Computational Geometry, Computational Geometry: Theory & Applications, CAD, Geometric Modeling
Executive committee: Chair, Solid Modeling Association, 2008-2011
Award committee: IEEE Fellow selection committee member, 2017
Plenary talks: International Meshing Roundtable 2011, Canadian conference on Computational Geometry 2014, Conference ALGO 2002, Conference ISAAC 2006, and many others.
Invited Lectures: ACAT workshop, Austria 2015, SoCG workshop on Computational Topology 2016, IMA workshop on topology 2013, and many others.

Recent publications and presentations:

Delaunay Mesh Generation. S.W.-Cheng, T. K. Dey, J. Shewchuk. CRC Press, 2012. Curve and Surface Reconstruction, T. K. Dey, Cambridge Press, 2007
Multiscale Mapper: Topological summarization via codomain covers. T. K. Dey, F. Memoli, and Y. Wang. ACM-SIAM Sympos. Discrete Algorithms (SODA 2016)
Parameter-free topology inference and sparsification for data on manifolds. T. K. Dey, Z. Dong, and Y. Wang. (2015), Proc. ACM-SIAM Sympos. Discrete Algorithms (SODA 2017).

Topological analysis of scalar fields with outliers M. Buchet, F. Chazal, T. K. Dey, F. Fan, S. Oudot and Y. Wang. 31st Annu. Sympos. Comput. Geom. (SoCG 15)

Comparing graphs via persistence distortion. T. K. Dey, D. Shi and Y. Wang. 31st Annu. Sympos. Comput. Geom. (SoCG 15).

Computing topological persistence for simplicial maps T. K. Dey, F. Fan, and Y. Wang., (SoCG 2014), Proc. 30th Annu. Sympos. Comput. Geom. (2013).

Graph induced complex on point data. T. K. Dey, F. Fan, and Y. Wang., (SoCG 2013) Proc. 29th Annu. Sympos. Comput. Geom. (2013), pages 107–116.

The compressed annotation matrix: an efficient data structure for computing persistent cohomology. J.-D. Boissonnat, T. K. Dey, C. Maria, (ESA 2013), LNCS 8125, 2013.

An efficient computation of handle and tunnel loops via Reeb graphs. T. K. Dey, F. Fan, and Y. Wang. ACM Trans. Graphics (Siggraph 2013), Vol. 32 (4).

Localized Delaunay Refinement for Piecewise-Smooth Complexes (full version) T. K. Dey and A. Slatton (SoCG 2013) Proc. 29th Annu. Sympos. Comput. Geom. (2013), pages 47–56.

Weighted graph Laplace operator under topological noise T. K. Dey, P. Ranjan, and Y. Wang. (SODA 2013), ACM-SIAM Symposium on Discrete Algorithms (2013).

Animating bubble interactions in a liquid foam O. Busaryev, T. K. Dey, H. Wang, and R. Zhong. (SIGGRAPH 2012), ACM Trans. Graphics, Vol. 31 (4), 2012.

Topological Persistence for circle valued maps D. Burghilea and T. K. Dey. Discrete & Computational Geometry, Volume 50, No. 1 (2013), 69–98.

Recent professional development activities:

Software developments: Architect of Shortloop software, SimBa, SimPers software used in topological data analysis

Course developments: A course on computational topology and data analysis taught in Spring 2017

Name: Chris Domas

Education:

BS in CSE with specialization Hardware/software systems; Math minor; Psychology minor; Ohio State Univ, 2009

Academic experience:

Lecturer, Ohio State University, Part-time, 2015-present

Non-academic experience: Cyber Embedded Systems Engineer, Battelle Labs, 2009-present, full-time

Certifications or professional registrations: None

Current membership in professional organizations: None

Honors and awards: Battelle 2012 Tech Achievement award
Battelle 2012 Emerging Scientist award

Service activities: None

Recent publications and presentations:

None

Recent professional development activities:

Speaker at Black Hat 2012, DerbyCon 2012, TED (Columbus) 2013

Name: Stephanie Domas

Education:

B.S Electrical and Computer Engineering. The Ohio State University 2009

Academic experience:

Lecturer, Part Time

Non-academic experience: Full time Battelle Memorial Institute. Lead Medical Product Security Engineer. 2009-Present

Certifications or professional registrations: Professional Engineer (PE)

Certified Ethical Hacker (CEH)

Current membership in professional organizations: None

Honors and awards: None

Service activities: None

Recent publications and presentations:

TEDxColumbus October 2016 "Protecting Medical Devices from Cyberharm" - <https://youtu.be/EyqwUFJKZo0>

Recent professional development activities:

Battelle Leadership Cohort, Class of 2017

Name: Jeff Eden

Education:

MS in CS, University of Dayton, 1990

BS in CS, Kent University, 1988

Academic experience:

Lecturer, Ohio State, Part-time, August 2016-present

Lecturer, Franklin University, Part-time, 2012-present

Non-academic experience: Software Engineer, Lucent, full-time, 1990-1996

Lead Software Engineer, QWEST, 1996-2003, full-time

Enterprise Architect, Safelite Group, full-time, 2003-2005

Senior research scientist, Battelle Memorial, full-time, 2005-present

Certifications or professional registrations: None

Current membership in professional organizations: None

Honors and awards: None

Service activities: None

Recent publications and presentations:

None

Recent professional development activities:

None

Name: Eric Fosler-Lussier

Education:

B.A.S. Computer and Cognitive Science, U. Pennsylvania, 1993

B.A. Linguistics, U. Pennsylvania, 1993

Ph.D. Computer Science, U. California, Berkeley, 1999

Academic experience:

International Computer Science Institute, Postdoctoral Researcher, 1999-2000, full time.

Columbia U., Visiting Research Scientist, 2003, part time.

The Ohio State University, Assistant Professor of CSE, 2003-2010, full time

The Ohio State University, Assistant Professor of Linguistics by Courtesy, 2004-2010, full time

The Ohio State University, Associate Professor of CSE, 2010-2016, full time

The Ohio State University, Associate Professor of Linguistics by Courtesy, 2010-2016, full time

The Ohio State University, Associate Professor of Biomedical Informatics by Courtesy, 2016, full time

The Ohio State University, Professor of CSE, 2016-present, full time

The Ohio State University, Professor of Linguistics, Biomedical Informatics by Courtesy, 2016-present, full time

Non-academic experience: Bell Labs, Lucent Technologies, Member of Technical Staff, 2000-2002, full time

Certifications or professional registrations: None.

Current membership in professional organizations: Senior Member, IEEE

Member, Association for Computational Linguistics

Member, International Speech Communication Association

Honors and awards: NSF Early Career Award, 2006

IEEE Signal Processing Society Best Paper Award (best journal paper in 5 year period), 2010

Computer Science & Engineering Faculty Teaching Award, The Ohio State University, 2011

IBM Watson Faculty Award, 2014

Service activities: Action Editor, Transactions of the Association for Computational Linguistics, 2012-2018

Member of IEEE SPS Speech and Language Technical Committee, 2006-2008, 2011-2013, 2017-2019.

Tutorials chair, Interspeech 2016

Area chair, NAACL HLT 2016

Program co-chair, North American Association for Computational Linguistics Annual Meeting - Human Language Technologies Conference (NAACL HLT), 2012

Executive Committee, Center for Cognitive and Brain Sciences, The Ohio State University, 2011-present

Associate Editor, ACM Transactions on Speech and Language Processing, 2011-2013

Finance chair, IEEE Automatic Speech Recognition and Understanding Workshop (ASRU 2011)

Panels co-chair, IEEE Spoken Language Technology Workshop (SLT 2010)

Publication chair, 2010 Conference on Empirical Methods in Natural Language Processing

ACL Archivist, 2006-2010

Executive committee, ACL Special Interest Group in Computational Morphology and Phonology (SIGMORPHON), 2006-2007

Publicity chair, IEEE/ACL Workshop on Spoken Language Technology, 2006.

Student Workshop Faculty Co-advisor, HLT/NAACL Conference, 2004.

Publicity chair, IEEE Workshop on Automatic Speech Recognition and Understanding, 2003.

Co-organizer, ISCA Tutorial and Research Workshop on Pronunciation Modeling and Lexicon Adaptation for Spoken Language Technology, 2002.

Recent publications and presentations:

K Livescu, P Jyothi, E Fosler-Lussier, "Articulatory feature-based pronunciation modeling," *Computer Speech & Language* 36, 212-232, 2016.

Y He, P Baumann, H Fang, B Hutchinson, A Jaech, M Ostendorf, E. Fosler-Lussier, J. Pierrehumbert, "Using pronunciation-based morphological subword units to improve OOV handling in keyword search," *IEEE/ACM Transactions on Audio, Speech and Language Processing (TASLP)* 24, 2016.

Y. He and E. Fosler-Lussier. "Segmental Conditional Random Fields with Deep Neural Networks as Acoustic Models for First-Pass Word Recognition," *Interspeech 2015*, Dresden, Germany, 2015.

K. Han, Y. He, D. Bagchi, E. Fosler-Lussier, and D. Wang. "Deep Neural Network Based Spectral Feature Mapping for Deep Neural Network Based Spectral Feature Mapping for Robust Speech Recognition," *Interspeech 2015*, Dresden, Germany, 2015.

C. Shivade, M. C. de Marneffe, E. Fosler-Lussier, and A. Lai. "Corpus-based discovery of semantic intensity scales," *Proc. North American Association for Computational Linguistics Annual Meeting (NAACL)*, Denver, Colorado, 2015.

Y. Ma and E. Fosler-Lussier. "A Discriminative Sequence Model for Dialog State Tracking using User Goal Change Detection," *IEEE Spoken Language Technology Workshop (SLT 2014)*, South Lake Tahoe, NV, 2014.

Y. He, B. Hutchinson, P. Baumann, M. Ostendorf, E. Fosler-Lussier, and J. Pierrehumbert, "Subword-based modeling for handling OOV words in keyword spotting," *ICASSP 2014*.

P. Raghavan, J. Chen, E. Fosler-Lussier, and A. Lai, "How essential are unstructured clinical narratives and information fusion to clinical trial recruitment?" *AMIA Joint Summits on Translational Science*, 2014.

Y. Ma and E. Fosler-Lussier. "Detecting 'Request Alternatives' User Dialog Acts from Dialog Context," *5th International Workshop on Spoken Dialog Systems (IWSDS)*, Napa, CA, 2014.

C. Shivade, P. Raghavan, E. Fosler-Lussier, P. Embi, N. Elhadad, S. Johnson, and A. Lai. "A review of approaches to identifying patient phenotype cohorts using electronic health records," *Journal of American Medical Informatics Association*, 21:221-230, 2014.

P. Jyothi, E. Fosler-Lussier, and K. Livescu, "Discriminative Training of WFST Factors with Application to Pronunciation Modeling," *Proceedings of Interspeech*, 2013.

W. Hartmann, A. Narayanan, E. Fosler-Lussier, and D. Wang, "A Direct Masking Approach to Robust ASR," *IEEE Transactions on Acoustics, Speech, and Language Processing*, 21:10, pp 1993-2005, Oct 2013.

Recent professional development activities:

Organized special session on Sharing Resources for Speech Recognition Education and Research at *Interspeech 2016*.

Co-led Teaching Evaluation Working Group, 2016.

Name: Michael Fritz

Education:

B.S Psychology - The Ohio State University - 1997

B.S. Mathematics - Minor Computer Science - The Ohio State University - 2005

M.S. Computer Science Engineering - The Ohio State University - 2013

Academic experience:

Columbus School for Girls - High School Math Instructor - 2005 to 2010 - Full-time

The Ohio State University - Lecturer - Fall 2013 to present. (Part-time Fall 2013, full-time Spring 2014 to present).

Non-academic experience: Math Plus Academy, Technology and Computer Programming Instructor: Taught computer programming and problem solving to elementary and middle school students using Python, Scratch, Processing (Java) and Lego Robotics 2012 - 2013, Part time
The Princeton Review, Tutor/Trainer Taught SAT/ACT and GRE prep classes. Trained instructors for SAT classes. Developed SAT, SAT II and AP Calculus study material, 1993 - 1999, Part-time

Certifications or professional registrations: Franklin University, Web Programmer, Designed and programmed Java applications for Franklin's web-based courses, Full-time, 2001-2003
Qwest Communications, IT Engineer – Web Developer/Designer, Developed intranet sites and databases, 1999 - 2001, Full-time
The National Foreign Languages Resource Center at OSU, Web and Database Designer, Developed and updated relational databases and websites for customer orders and instructional materials, 1998 - 1999, part time

Current membership in professional organizations: Sun Certified Programmer for the Java 2 Platform
Sun Certified Java Web Component Developer

Honors and awards: None

Service activities: "Distinguished 1st-Year Graduate Teaching Associate Award" – The Ohio State University Department of Mathematics
Faculty Teaching Award - The Ohio State University Department of Computer Science Engineering

Recent publications and presentations:

Volunteer with code.org

Recent professional development activities:

Attended Ohio State's Innovate Conference

Coursework post-masters through the School of Education and the Department of Statistics at Ohio State

Name: David Fuhry

Education:

PhD in CS, Ohio State, completed in Spring 2017

MS in CS, Ohio State, 2008

BS in CS, Kent State, 2005

Academic experience:

Lecturer, full-time, Ohio State, 2016-'17

Non-academic experience: GIS Analyst, Geauga County Auditor, Part-time, 1999-2007

Certifications or professional registrations: None

Current membership in professional organizations: ACM, UPE

Honors and awards: Graduate research award of the CSE Dept., Ohio State, 2015

Service activities: Peer reviewer for various professional conferences

Recent publications and presentations:

Toward a parameter free and parallel itemset mining algorithm, G Buehrer, R deOliveira, D Fuhry, S Parthasarathy, ICDE 2015

PLASMA-HD: Probing the Lattice Structure and Makeup of High-dimensional Data, D Fuhry et al., VLDB, 2013

Recent professional development activities:

None

Name: Charles Giles

Education:

MS, Computer Science, The Ohio State University, 2000

BS, Computer Science, The Ohio State University, 1998

Academic experience:

Part-time Lecturer, CSE Department, Ohio State University, 2001 - present

Non-academic experience: Staff Software Engineer, IBM, 2010 - present

Senior Software Engineer, Sterling Commerce, 2005 - 2010

Consultant, Quick Solutions, Inc., 2003-2005

Member of Technical Staff, Lucent Technologies, 2000-2003

Certifications or professional registrations: Sun Certified Java Programmer

Current membership in professional organizations:

Honors and awards:

Service activities: Participate in IBM service opportunities and church projects

Recent publications and presentations:

"Specifying and Testing Liveness Properties in Distributed Object Systems", Giles, Masters Thesis, June 2000

"A Tool for Testing Liveness in Distributed Object Systems" Giles and Sivilotti, TOOLS USA, July 2000

"The Specification of Distributed Objects: Liveness and Locality" Sivilotti and Giles, CASCON, Nov 1999

Recent professional development activities:

Numerous IBM training courses

Name: Stephen Gomori

Education:

MS, Mathematics, Youngstown State University, Youngstown, OH, 1989.

BS, Computer Science, Youngstown State University, Youngstown, OH, 1989.

BS, Mathematics, Youngstown State University, Youngstown, OH, 1987.

Academic experience:

Franklin University, Columbus OH; Information Technology Dept.; Adjunct Professor; 2010 - Present; part-time

Ohio State University, Columbus OH; Computer Science and Engineering Dept.; Lecturer; 1995 - Present; part-time

Non-academic experience: RTI International; Manager/Programming Leader; 2015 - Present; full-time

Battelle Memorial Institute; Manager/Principal Research Scientist; 2001 - 2015; full-time

Certifications or professional registrations: None

Current membership in professional organizations: Member, Association for Computing Machinery (ACM)

Honors and awards: Excellence in Teaching, Franklin University, 2013

Service activities: Volunteer - Miracle League of Central Ohio

Volunteer - St. Joan of Arc Men's Club

Recent publications and presentations:

Thomas, A., Huff, A., Gomori, S., & Evans, S. (Invited Speaker) (2015, June). Air quality models to address air pollution and climate change in Central America. Poster presented at the 108th A&WMA Conference and Exhibition, Raleigh NC.

Bornman, D., Rigsby, D., Kasoji, M., Sawchuk, J., Gomori, S., Hartford, P. (Invited Speaker) (2012, November). Utilization of the Battelle informatics portal for data management and analysis of systems biology data in biomarkers discovery. Poster presented at Battelle Memorial Institute, Columbus, OH

Recent professional development activities:

Crucial Accountability, November 2014

Crucial Conversations, October 2014

Situational Frontline Leadership, August 2014

Social Styles - Improving Managerial Effectiveness with Versatility, June 2014

Proposal Development Workshop, April 2014

The Craft of Scientific Writing, October 2012

Name: George Mike Green

Education:

MS in CSE, Ohio State Univ., 2012
JD, Ohio State College of Law, 1994
MA in Linguistics, Ohio State Univ., 1988
BA in Linguistics, Ohio State Univ., 1986

Academic experience:

Lecturer, Ohio State, full-time, 2014-present
ESL Program Specialist, Ohio State, 1986-2014, part-time

Non-academic experience: Lawyer, part-time, 1994-2014

Certifications or professional registrations: None

Current membership in professional organizations: None

Honors and awards: None

Service activities: None

Recent publications and presentations:

None

Recent professional development activities:

None

Name: Jihun Hamm

Education:

Ph.D., Electrical and Systems Engineering, U. Pennsylvania, 2008

Academic experience:

Research Scientist, Computer Science and Engineering, The Ohio State University, 2012–present, full-time

Postdoctoral Researcher, Computer Science and Engineering, The Ohio State University, 2011–2012, full-time

Postdoctoral Researcher, School of Medicine, University of Pennsylvania, 2008–2011, full-time

Non-academic experience: None

Certifications or professional registrations: None

Current membership in professional organizations: IEEE Member

Honors and awards: Google Internet of Things (IoT) Technology Research Pilot Award, 2016 Google Faculty Research Award, 2015, "Privacy-Preserving Machine Learning for Smart Devices," Single PI, \$45K gift Finalist, MICCAI Young Scientist Publication Impact Award, 2013
Best Paper Award, MedIA-MICCAI, 2010, "GRAM: A Framework for Geodesic Registration on Anatomical Manifolds," 1st place (out of 804 submissions), 1st author
Departmental Research Fellowship, 2002 – 2008
University Merit Scholarship, 1998 – 2001

Service activities: Workshop co-chair, 2017, Asian Conference on Machine Learning, 2017.

Program Committee for Association for the Advancement of Artificial Intelligence (AAAI'17), Artificial Intelligence and Statistics (AISTATS'17), Neural Information Processing System (NIPS'15,'14,'13), Private Multi Party Machine Learning (PMPML'16) International Conference on Machine Learning (ICML'16,'13)

Invited Reviewer for Data Mining and Knowledge Discovery (PKDD), Conference on Learning Theory (COLT), Journal of Machine Learning Research (JMLR), IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI), IEEE Transactions on Neural Networks (TNN), IEEE Transactions on Image Processing (TIP), IEEE Transactions for Information Forensics and Security (TIFS), Neural Networks (NN), Pattern Recognition (PR), International Journal of Pattern Recognition (IJPR), Medical Image Computing and Computer Assisted Intervention (MICCAI), Medical Image Analysis (MedIA)

Student research advising: undergraduate and graduate students

Recent publications and presentations:

J. Hamm, J. Luken and Y. Xie, "Crowd-ML: Library for Privacy-Preserving Machine Learning on Smart Devices," 41st IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), 2017

J. Hamm, "Enhancing Utility and Privacy with Noisy Minimax Filters," submitted to the 41st IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), 2017

Y-K. Noh, J. Hamm, F. C. Park, B-T. Zhang, and D. Lee, "Fluid Dynamic Models for Bhattacharyya-based Discriminant Analysis," In publication, IEEE Transactions on Pattern Analysis and Machine

Intelligence (PAMI), 2017

J. Hamm, P. Cao, and M. Belkin, "Learning Privately from Multiparty Data," International Conference on Machine Learning (ICML), 2016

J. Hamm, C. Kohler, R. Gur, and R. Verma, "Automated Video-based Analysis of Facial Expressions in Schizophrenia," in *Researching Interaction Behavior: A Sourcebook of Methods and Measures*, eds. C.A. Van Lear and D.J. Canary, Sage Publication, 2016

J. Hamm, "Preserving Privacy of Continuous High-dimensional Data with Minimax Filters," International Conference on Artificial Intelligence and Statistics (AISTATS), 2015

J. Hamm, A. Champion, G. Chen, M. Belkin, and D. Xuan, "Crowd-ML: A Privacy-Preserving Learning Framework for a Crowd of Smart Devices," IEEE International Conference on Distributed Computing Systems (ICDCS), 2015

B. Han, J. Hamm, "Qualitative Tracking Performance Evaluation without Ground-Truth," IEEE Winter conference on Applications of Computer Vision (WACV), 2015

Recent professional development activities:

Attended intramural seminars on grant writing, counselling with Dept. Law for legal advice for startup companies, and departmental invited talks

Name: Wayne D. Heym

Education:

Ph.D., Computer and Information Science, The Ohio State University, 1995
M.S., Computer and Information Science, The Ohio State University, 1989
M.S., Operations Research and Industrial Engineering, Cornell University, 1980
B.Phil., Interdisciplinary Studies, Miami University, 1978

Academic experience:

OSU, Senior Lecturer, teaching undergraduate courses in computer science, 1999-current, full time
Otterbein College, Assistant Professor, teaching undergraduate courses in computer science, 1994-1999, full time

Non-academic experience: Cornell University, Research Support Specialist, computer programming support for simulation of potato crop growth, 1984-1988, part time
Eastman Kodak Company, Programmer/Analyst I, computer programming support for product ordering and distribution, 1980-1983, full time

Certifications or professional registrations: None

Current membership in professional organizations: ACM, IEEE-CS

Honors and awards: OSU, Department of Computer Science and Engineering Outstanding Teaching Award, 2012

Service activities: Lay Delegate to the West Ohio Annual Conference of the United Methodist Church, 2015 and 2016

Recent publications and presentations:

Kulczycki, G., Sitaraman, M., Krone, J., Hollingsworth, J.E., Ogden, W.F., Weide, B.W., Bucci, P., Cook, C.T., Drachova, S., Durkee, B., Harton, H., Heym, W., Hoffman, D., Smith, H., Sun, Y., Tagore, A., Yasmin, N., and Zaccai, D., "A Language for Building Verified Software Components", Proceedings 2013 International Conference on Software Reuse, June 2013, 308-314.

Sitaraman, M., Adcock, B., Avigad, J., Bronish, D., Bucci, B., Frazier, D., Friedman, H.M., Harton, Heym, W., Kirschenbaum, J., Krone, J., Smith, H., and Weide, B.W., "Building a Push-Button RESOLVE Verifier: Progress and Challenges", Formal Aspects of Computing 23, 5 (2011), 607-626.

Recent professional development activities:

Attended the annual ACM Technical Symposium on Computer Science Education 2012, 2013, and 2016.

Name: Shaikh Mohammed Zahid Hossain

Education:

Master of Business Administration (MBA), The Ohio State University, Fisher College of Business, Columbus, OH 2014 – 2016

Bachelor of Science, Computer Science and Engineering, the University of Illinois at Chicago, College of Engineering – Chicago, IL 1989 – 1993

Academic experience:

The Ohio State University, Lecturer, Aug 2015 - Present, Part Time

Non-academic experience: Nationwide Insurance, Columbus, Ohio, 2006 – Present, Director, Enterprise Architecture Establish and lead enterprise architecture practice, develop enterprise architecture vision and execution roadmap, and oversee architecture skills and capability development of over 250 IT and Business Architects.

Certifications or professional registrations: o Teach Software Engineering and Enterprise Architecture at The Ohio State University 2015 – Present

o Frequent speaker and contributor to Architecture and Management forums/conferences

o TOGAF 9 (Level 2) Certification, Open Group 2012

o Master Certified IT Architect, Open Group 2010

o Sun Certified Enterprise Architect for J2EE Technologies, Sun Micro Systems 2003

Current membership in professional organizations: Open Group

Honors and awards: Winner of the iCMG Global Architecture Award of Excellence 2015

Service activities: Director and Founder, Bengali American Liberal Arts Foundation

Recent publications and presentations:

The Open Group. Enterprise Architecture Modeling Language - A practical Approach - January, 2016

Nationwide Insurance, Enterprise Architecture Reference Guide (publication), March, 2015

Recent professional development activities:

Attended Digital Transformation Workshop

Name: Roman Ilin

Education:

Ph.D. , Computer Science, The University of Memphis, August 2008

M.Sc., Computer Science, The University of Memphis, May 2002

B.S., Mathematics, minor Computer Science, December, Christian Brothers University, 1997

Academic experience:

OSU, Senior lecturer, part-time, Fall 2013-Present

Non-academic experience: Sensors Directorate, Air Force Research Lab, Research Computer Scientist, November 2009 – Present

Sensors Directorate, Air Force Research Lab, NRC Research Associate, December 2008 – November 2009

Dunavant Enterprises, Inc, Senior Software Developer, July 2002 – December 2008 Software developer for internal web based system.

Certifications or professional registrations: None

Current membership in professional organizations: IEEE member

Honors and awards: Young Investigator Award from the International Neural Networks Society, 2012

Morton Dissertation Award, 2007

1st Place at Computer Science Department Research Day , 2007

1st Place at the University of Memphis Student Research Day, 2005

Christian Brothers University: graduated Cum Laude, 1998

Service activities: Facilitate collaboration between OSU and AFRL, attract students to AFRL's summer programs.

Recent publications and presentations:

Ilin R. (2016). Classification with Concept Lattice and Choquet Integral. International Conference on Information Fusion, FUSION' 16, Heidelberg, Germany

Ilin R.,Izmailov R., Goncharov Y., Streltsov S. (2016). Fusion of Privileged Features for Efficient Classifier Training. International Conference on Information Fusion, FUSION' 16, Heidelberg, Germany

Ilin R. (2016) Formal Concept Analysis of Rodent Carriers of Zoonotic Disease. International Conference on Machine Learning, ICML' 16, New York, NY

Ilin R., Zhang J. (2015). Information Fusion with Topological Event Spaces. International Conference on Information Fusion, FUSION' 15, Washington, DC

Ilin R., Blasch E. (2015). Information Fusion with Belief Functions: a comparison of Proportional Conflict Redistribution PCR5 and PCR6 rules for Networked Sensors. International Conference on Information Fusion, FUSION' 15, Washington, DC

Ilin, R., Clouse, S. H. (2015). Extraction and Classification of Moving Targets in multi-sensory MAMI-1 Data Collection. In Aerospace and Electronics Conference, NAECON 2015-IEEE National, IEEE.

Ilin, R. (2014). Machine learning approach to fusion of high and low resolution imagery for improved target classification. In Aerospace and Electronics Conference, NAECON 2014-IEEE National, (pp.

195-199). IEEE.

Ilin R., Zhang J. (2014). Information Fusion with Uncertainty Modeled on Topological Event Spaces. Symposium Series on Computational Intelligence, SSCI' 14, Orlando, Florida.

Ilin R. (2014). Combined Linguistic and Sensor Models For Machine Learning. Symposium Series on Computational Intelligence, SSCI' 14, Orlando, Florida.

Ilin R. (2014). Object classification in multisensory MAMI data collection. The MSS Passive Sensors Symposium. Gaithersburg, MD. Myers, Kozma,

Ilin R. (2014). Phase Cone Detection Optimization in EEG Data. Proceedings of International Joint Conference on Neural Networks, IJCNN' 14, Beijing, China.

Ilin R., & Kozma R. (2012). Cognitively Motivated Learning of Categorical Data with Modeling Fields Theory. Proceedings of International Joint Conference on Neural Networks, IJCNN' 12, Brisbane, Australia.

Deming R., Ilin R., MacIntosh S, Best M. (2012). Improved GMTI Target Geo-location in non-homogeneous clutter. The MSS Tri-Service Radar Symposium. Boulder, CO.

Ilin R. (2012). Improved ISR by cognitively based automatic combining of sensing and communication, 39th Annual Kittyhawk Week, Dayton, OH

Ilin, R., & Perlovsky, L. (2011). Dynamic Logic Learning in cognitive-based situation models. IEEE First International Multi-Disciplinary Conference on Cognitive Methods in Situation Awareness and Decision Support, CogSIMA' 11. Miami, FL.

Recent professional development activities:

Attended tutorials at FUSION' 15 and FUSION' 16 conferences

Name: Khaled Jaber

Education:

PhD Computer Science - Software Engineering. Ohio University. August, 2016.

Academic experience:

OSU, Senior lecturer, part-time, 2016-current

ITT Technical Institute - 2010 - 2015. Part time. Adjunct instructor.

Non-academic experience: Manager, JPMorgan Chase, Columbus, OH 7/2015 – Present

TELNET CORPORATION - Worthington, OH, Technical Manager Consultant, Software Development, 1/2014 – 9/2014

EMERSON – Liebert, Delaware, OH Technical Manager, Software Development, 7/2006 – 4/2013

Certifications or professional registrations: Scrum Master Certificate.

Current membership in professional organizations: Project Management Institution (PMI)

Honors and awards: None.

Service activities: Starting from this month, April, in the last Friday of each month I will be helping collecting food items as part of JPMorgan Chase program. This food will be sent to low income families.

Recent publications and presentations:

An empirical study on the effect of 3D visualization for project tasks and resources. First author - Khaled Jaber. Second authors - Dr. Chang Liu and Dr. Bonita Sharif. Journal of systems and Software, Jan 2016.

A study on the effect of traceability links in software maintenance. First author - Khaled Jaber. Second authors - Dr. Chang Liu and Dr. Bonita Sharif. IEEE Access, Oct. 2013.

Recent professional development activities:

Training on Agile development

Certified scrum master

Self learning about: Lean software development; requirement analysis - specification by example; immunity to change; Essential of scrum.

Name: Suribabu Jayanti

Education:

M.S. (ABD) Material Science, 1985, University of Florida
M.S. Computer Science, 1987, University of South Carolina

Academic experience:

The Ohio State University, Adjunct, Lecturer, 2014 - Present.

Non-academic experience: UES Inc. Senior Technical Staff, Design products and respond to RFP's, 1988 - 1997, Full time

Checkfree, Senior Development Staff, Design and develop web bill payment system, 1997 - 2002, Full time

CenturyLink, Senior Developer and Architect, SME Billing Systems, 2003 - 2016.

Fast switch, Senior Consultant, 2016 - Present.

Certifications or professional registrations: None.

Current membership in professional organizations: Member ASME

Honors and awards: Spotlight award at CenturyLink for mentoring off site resources.

Service activities: Community service at Mid Ohio food bank.

Volunteer Furniture Bank

Recent publications and presentations:

Provided a series of presentations for improving Billing processes within CenturyLink to peers and off shore personal.

Recent professional development activities:

Developed processes to help CenturyLink IT achieve CMMi Level 3.

Work towards TOGAF certification.

Name: Jeremy Johnston

Education:

SUNY Empire State College - BA History - 2014 SUNY Adirondack Community College - AA - 1992

Academic experience:

Lecturer, Ohio State University, Part-time, Jan 2017-current

Non-academic experience: JP Morgan Chase, Executive Director, 1998-Current, Full Time

US Air Force 1993-1997

Certifications or professional registrations: Certified Information Systems Security Professional (CISSP)

- 44877

Certified Ethical Hacker (CEH) - ECC03061993482

Current membership in professional organizations: ISC2.org

Honors and awards: None.

Service activities: None.

Recent publications and presentations:

None.

Recent professional development activities:

Maintain and continuing education credits via CISSP & CEH accreditations

Training via JPMorganChase executive leadership opportunities.

Annual attendance at Black Hat USA conference.

Annual attendance at Defcon USA conference.

Attendance at IBM InterConnect conference.

Name: Janis E. Jones

Education:

M.S., Computer Science, The Ohio State University, 1986

B.S., Mathematics, Ohio University, 1979

Academic experience:

The Ohio State University, CSE Department, Senior Lecturer, Autumn 2015, part-time

The Ohio State University, CSE Department, Senior Lecturer, Spring 2017, part-time

The Ohio State University, CSE Department, Senior Lecturer, Autumn, 2017, full-time

Non-academic experience: 1996-2013: Great Northern Consulting Services, Inc., Owner and Chief Executive Officer

1980 – 1996: AT&T Bell Laboratories, Member of Technical Staff

Certifications or professional registrations: None

Current membership in professional organizations: None

Honors and awards: Ohio University College of Arts & Sciences Distinguished Alumni, 2001

Service activities: Ohio University Foundation Trustee, (2014 – Present)

CSE Development Committee, The Ohio State University (2014-Present)

Ohio University Dept. of Electrical Engineering & Computer Science Advisory Committee (2012 – Present)

The Ohio State University CSE Advisory Committee (2014 – 2015)

Ohio University College of Arts & Sciences Dean's Executive Advisory Committee (2001 – 2013)

Ohio University Women in Science & Engineering (WISE) Seminar Speaker (1983 – 2012)

Recent publications and presentations:

None

Recent professional development activities:

2012 PMI Project Management Certification BootCamp - 40 hour class

Name: Jeffrey S. Jones

Education:

Ph.D., Computer Science, Ohio University, Athens, Ohio, 2015.

Master of Science, Computer and Information Science, The Ohio State University, Columbus, Ohio, 1988

Bachelor of Science, summa cum laude, Ohio University, Athens, Ohio, 1981

Academic experience:

2014 - present, full time Senior Lecturer, The Ohio State University

2010 - 2014, part time, Instructor, Ohio University

Non-academic experience: 1993 - 2010, full time, President, CFO, Founder, Great Northern Consulting Services, Inc.

1988 - 1993, full time, Systems Engineer, Sun Microsystems, Inc.

1981 - 1988, full time, Member of Technical Staff, AT&T

Certifications or professional registrations: Certificate in Executive Leadership, Cornell University

Current membership in professional organizations: International Society for Computational Biology, member (past)

Honors and awards: OSU UCAT Lecturers Learning Community 2016-17 nominee, OSU Provost's Award for Excellence in Teaching by a Lecturer, 2016

Distinguished Alumnus, Ohio University, college of Arts and Sciences

Founder and Sponsor, the "Jeffrey S. and Janis E. Jones Scholarship in Computer Science," Ohio University

Owens Corning Vendor of the Year

Scott McNealy (CEO Sun Microsystems) Solaris Champion award

Stocker Fellowship and Choose Ohio First Scholarship in Bioinformatics

Sun Microsystems SunRise Club

Service activities: Data Analytics Capstone, program development, OSU, 2016-17

Faculty Advisor, Louis Stokes Alliance for Minority Participation, 2014 - 2016

Program committee, Great Lakes Bioinformatics Conference (GLBIO) 2015

CSE development committee member, The Ohio State University, 2014-15

Recent publications and presentations:

An Extended Abstract: A Generic Framework for Approximation Analysis for Algorithms for Star Bicoloring, David Juedes and Jeffrey Jones, 13th Cologne-Twente Workshop on Graphs and Combinatorial Optimization (CTW), May 2015.

Discovering Gene Regulatory Elements Using Coverage-based Heuristics, Al-Ouran, Schmidt, Naik, Jones, Drews, Juedes and Welch, 10th Great Lakes Bioinformatics Conference (GLBIO), May 2015.

Mining for gene regulatory motifs through Sequence Coverage, Naik, Jones, Al Ouran, Schmidt, Wolfe, Welch and Juedes, Great Lakes Bioinformatics Conference (GLBIO) 2014, poster presentation, May 2014.

Coloring Jacobians Revisited: A New Algorithm for Star and Acyclic Bicoloring, David Juedes and Jeffrey Jones, Optimization Methods and Software, vol 27, No. 2, April 2012, pp. 295-309.

Recent professional development activities:

OSU UCAT Lecturers Learning Community 2016-17

Great Lakes Bioinformatics Conference (GLBIO) 2015

Name: Robert Joseph

Education:

Masters of Science, Computer Science, Ohio State University, 2001

Academic experience:

CSE Dept., Ohio State University, Part-time lecturer, 2002-present, part time

Non-academic experience: Ohio State University, Database Administrator, backend and web interface developer of applications to support the Computer Science Department's academic and research needs using Ruby, Perl, and Java; 2001-present, full-time.

Certifications or professional registrations: None.

Current membership in professional organizations: None.

Honors and awards: None.

Service activities: None.

Recent publications and presentations:

None.

Recent professional development activities:

OSU Cyber Security Day 2016; this conference included a day-long seminar on web security and web penetration testing.

Name: Swaroop R. Joshi

Education:

Master of Science, Computer Science and Engineering, Ohio State University, 2016.

Master of Technology, Computer Science and Engineering, Indian Institute of Technology Bombay (India), 2010.

Bachelor of Engineering, Computer Engineering, National Institute of Technology Karnataka Surathkal (India), 2005.

Academic experience:

The Ohio State University, Senior Lecturer, 01/01/2017 - present, full time.

Non-academic experience: GCC Resource Center at Indian Institute of Technology Bombay (India), Senior Project Engineer, Developing a software for generic data flow analysis in GCC, 2010-2011, full time.

SoftJin Technologies Pvt. Ltd., Software Engineer, Part of the team for developing an electronic design automation software, 2005-2006, full time.

Certifications or professional registrations: None.

Current membership in professional organizations: Member, ASEE

Honors and awards: Best Student Paper Award, ASEE North Central Section, 2016.

Service activities: Reviewer, ASEE Annual Conference and Exposition, 2017

8th International Conference on university learning and teaching InCULT'2016

Frontiers in Education Conference FIE'2016

Volunteer, Buck-i-code, ACM-W, OSU, 2016.

Denman Undergraduate Research Forum, OSU, Research Poster Judge, 2015.

Graduate Representative, Mobile Governance, OSU, 2015-present.

Recent publications and presentations:

S. Joshi and N. Soundarajan. "Enabling Deep Conceptual Learning in Computing Courses through Conflict-based Collaborative Learning". In: 2016 IEEE Frontiers in Education Conference (FIE). Erie, USA: Institute of Electrical and Electronics Engineers (IEEE), Oct. 2016.

S. Joshi and N. Soundarajan. "CONSIDER: A Novel Approach to Conflict-Driven Collaborative Learning in Engineering Courses". In: 2016 ASEE Annual Conference & Exposition Proceedings. American Society for Engineering Education, June 2016.

S. Joshi and N. Soundarajan. "Exploring conflict-based collaborative learning in engineering courses". In: ASEE North Central Sectional Conference Proceedings. American Society for Engineering Education, Mar. 2016.

N. Soundarajan, S. Joshi, and R. Ramnath. "Collaborative and Cooperative- Learning in Software Engineering Courses". In: 2015 IEEE/ACM 37th IEEE International Conference on Software Engineering. Institute of Electrical & Electronics Engineers (IEEE), May 2015.

Recent professional development activities:

Attended workshop on Engineering Education Research, as part of ACM's Special Interest Group on Computer Science Education (SIGCSE), Mar. 2015

Name: Chris Kiel

Education:

M.S. in CIS, OSU, 1986

Academic experience:

All full-time except where noted otherwise
Ohio State University; 1987, Instructor
Otterbein College; 1987-1991, Instructor
Edinboro University; 1991-1994, Instructor
Penn State Erie; 1994-2002, Instructor
Cuyahoga Community College; 2002-2003, Part-time Instructor
University of Toledo; 2003-2009, Instructor
College of Coastal Georgia; 2010-2013, Part-time Instructor
Florida State College; 2011-2012, Assistant Professor
Kent State University, 2012-2013, Part-time Instructor
Ohio State University, 2013-Present, Senior Lecturer

Non-academic experience: None

Certifications or professional registrations: None

Current membership in professional organizations: ACM member since 1986

Honors and awards: CSE Faculty Teaching Award, 2017

Service activities: Women in Engineering Outreach to HS students (Alice), 2014
Seminar on OOP for University of Toledo, 2005
Make Your Own Web Page, part of Math Options Day, 2001 and 2002
Numerous outreaches to teachers in public schools (hardware & software)

Recent publications and presentations:

In-House Publications:
Introduction to Alice (for FSCJ faculty), 2011
Introduction to Alice & Media Computation (for EECS faculty at University of Toledo), 2008
CMPBD 205 Prequel (a study guide for second-course students at Penn State), 2001
Computer Science Major Brochure (for Penn State Erie), 2001
Computer Science Minor Brochure (for Penn State Erie), 2002
Class Notes for the Macintosh (for Ohio State Grad Students & Faculty), 1985

Recent professional development activities:

Attended OCWiC, 2017
Attended SIGCSE, 2016

Name: Perumal N. Krishnasamy

Education:

MS, Computer and Information Science, The Ohio State University, 1981

Academic experience:

The Ohio State University, Senior Lecturer, 2009-Current (part-time)

The Ohio State University, Lecturer, 1983-2008 (part-time)

Denison University, Lecturer, 1981-1982 (full time)

Non-academic experience: Public Utilities Commission of Ohio, Senior Manager, 2001-Current (full time)

Lucent Technologies, Director, 1999-2001 (full time)

AT&T/Lucent Technologies, Senior Manager, 1992-1999 (full time)

AT&T, Distinguished Member of Technical Staff, 1985-1992

OCLC, Senior Systems Analyst, 1983-1985

Certifications or professional registrations:

Current membership in professional organizations:

Honors and awards:

Service activities:

Recent publications and presentations:

Recent professional development activities:

Program/Project management in government, State of Ohio Project Management Office

Microsoft .Net application development overview for managers, Microsoft approved training vendor

Effectively working with difficult people and difficult situations, John Glenn Institute (MAPS Program) Motivating employees through positive reinforcement - John Glenn Institute (MAPS Program)

Emotional intelligence: What makes a good leader? - John Glenn Institute (MAPS Program) Effective

delegation - John Glenn Institute (MAPS Program)

Name: Praveen Kumar

Education:

M.B.A. Fisher College of Business, Ohio State University, Columbus OH, 2014
Ph.D. Civil Engineering, Carleton University, Canada, 1998
M.Eng. Structural Dynamics, Indian Institute of Technology, Roorkee, India 1993
B.Eng. Civil Engineering, Indian Institute of Technology, Roorkee, India 1991

Academic experience:

Ohio State University, Senior Lecturer, 2012 - 2017, Part Time
Franklin University, Faculty, Autumn 2013, Part Time

Non-academic experience: Nationwide Insurance, Consultant IT Architecture - Enterprise Architect, 2004 - 2017, Full Time

Nationwide Insurance, Consultant IT Application Development - Technical Lead & Software Engineer, 1999 - 2004, Full Time

Intelligent Business Systems, Computer Systems Analyst - Software Engineer & System Analyst, 1998 - 1999, Full Time

Certifications or professional registrations: Open Group Certified Master Level 2 Architect, Open Group, 2010

TOGAF Certified Professional, Open Group, 2014

Member, Business Architecture Guild, 2015

Member, Financial Domain task force, Object Management Group, 2000

Current membership in professional organizations: Member, Association of Enterprise Architects (AEA), Open Group

Honors and awards: Service Over and Above Requirement (SOAR) award, Nationwide Insurance, multiple instances between 1999 - 2016

Service activities: Instructor, Foreign Language classes (Hindi), Bhartiya Hindu Temple, Powell OH 2009 - 2013

Recent publications and presentations:

Enterprise Architecture enabled DR Planning. Kumar, P., Open Group Conference, Ottawa, Canada, July 2017

Measuring and Improving Business Process resiliency using Enterprise Architecture. Maryam, B., Kumar, P., Snow, P., Hoag, J., 125th Meeting of the Ohio Academy of Science, Ohio University, 2016

Recent professional development activities:

Speaker, Open Group Conference, Ottawa, Canada, July 2016

Speaker, TechCON, Nationwide Insurance, Feb 2017, Feb 2015, March 2014

Speaker, Java Users Group Attendee, Gartner Application Strategies & Solutions Summit, Las Vegas, December 2016

Attendee, Open Group Technical Conference and Member meeting, Baltimore, July 2015

Name: Ten H. Lai

Education:

PhD, Computer Science, University of Minnesota, 1982.

Academic experience:

Ohio State University, Professor, 9/1997-present, full time.

Ohio State University, Associate Professor, 9/1988-9/1997, full time.

Ohio State University, Assistant Professor, 9/1982-9/1988, full time.

Non-academic experience: None

Certifications or professional registrations: None

Current membership in professional organizations: None

Honors and awards: None

Service activities: General Co-Chair, 2012 IEEE International Conference on Distributed Computing Systems (ICDCS 2012), Macau, China

General Chair, 2010 International Conference on Parallel Processing (ICPP'10), San Diego, USA.

Recent publications and presentations:

"Private and Secure Tag Access for Large-Scale RFID Systems" (with M.T. Sun, K. Sakai, W.S. Ku, and A.V. Vasilakos), IEEE Transactions on Dependable and Secure Computing (TDSC), 13(6), 2016.

"A Novel Coding Scheme for Secure Communications in Distributed RFID Systems", (with K. Sakai, M.T. Sun, W.S. Ku) IEEE Transactions on Computers, 65(2), 2016.

"A Framework for the Optimal k-Coverage Deployment Patterns of Wireless Sensors" (with K. Sakai, M.T. Sun, W.S. Ku, A. Vasilakos) IEEE SENSORS JOURNAL, 15(12), 2015.

"Energy-Efficient Intrusion Detection with a Barrier of Probabilistic Sensors: Global and Local," (with Jiming Chen, Junkun Li), IEEE Transactions on Wireless Communications, 12(9), 2013.

"Multi-Path-Based Avoidance Routing in Wireless Networks" (with Kazuya Sakai, Min-Te Sun, Wei-Shinn Ku, Jie Wu), IEEE ICDCS'15, July 2015, Columbus, Ohio.

Recent professional development activities:

Invited talk at National Chiao Tung University, May 2014. Title: "A brief story of computing on private data"

Invited talk at National Chiao Tung University, August 2015. Title: "Barrier Coverage: A Case Study on How We Might Ask a More Beautiful Question"

Name: Raghu K. Machiraju

Education:

Ph.D, Computer and Information Science, The Ohio State University, 1996.

Academic experience:

The Ohio State University, Professor Computer Science, Aug 2012-current, Full time

The Ohio State University, Associate Professor, Sept 2003-July 2012, Full time

The Ohio State University, Assistant Professor, Jan 2000-Aug 2003, Full time

Mississippi State University, Assistant Professor, Aug 1996-Dec 1999, Full time

Non-academic experience: aBioBot Inc., Co-founder/CEO, Jan 2015-current, Part time

National Institutes of Health, Summer Fellow, National Library of Medicine, Jun 2006- Aug 2006, Part time

Mitsubishi Electric Research Laboratory, Consultant, Jan 2004-Jul 2005, Cambridge MA, Part time

Certifications or professional registrations: None

Current membership in professional organizations: IEEE Computer Society

International Society for Molecular Biology

Honors and awards: 2012 Lumley Award for Senior Faculty, College of Engineering, The Ohio State University

2006-2013 Service Awards (Various Roles), IEEE Visualization Conferences

2002 Lumley Award for Junior Faculty, College of Engineering, The Ohio State University

1998 Herrin-Hess Award for Research Accomplishment, Mississippi State University

Service activities: Mar 2016- Committee on Translational Data Science, National Science Foundation

2015-2016 Member, University Fellowship Committee, The Ohio State University

2012-2015 Associate Editor, Transactions on Visualization and Computer Graphics

2010-2011 Paper Co-Chair of IEEE Visualization Conference

Recent publications and presentations:

1. Li Q, Zachmann G, David F, Huang K, Machiraju R. Observing Genomics and Phenotypical Patterns in the Developing Mouse Brain. IEEE Computer Graphics and Applications, September 2014, pp. 88-97.

2. Ding H, Wang C, Huang K, Machiraju R. iGPSe: A Visual Analytic System for Integrative Genomic Based Cancer Patient Stratification. BMC Bioinformatics, 15: 203 (2014).

3. Yates A, Webb, A, Chamberlin H, Huang K, Machiraju R. Visualizing Relationships in Multidimensional Data with Glyph SPLOMs and Necessity Graphs. Computer Graphics Forum (Proceedings of Eurovis 2014, Swansea, Wales), Vol. 33, No. 3, June 2014, pp. 301-310.

4. Wang C, Machiraju R, Huang K. Breast cancer patient stratification using a molecular regularized consensus clustering method. Methods, 67 (3), 304-12. 5. Zhang L, Deng Q, Machiraju R, Rangarajan A, Thompson D, Walters DK, Shen H-W. Boosting Techniques for Physics-Based Vortex Detection. Computer Graphics, Volume 33, No. 1, February, 2014, pp. 282-293.

Recent professional development activities:

Learning more about entrepreneurship in technical accelerators; Participating in leadership roles at University; Organizing data contests.

Name: Leon J. Madrid

Education:

M.Sc. Electrical Engineering, The Ohio State University, 1989

Academic experience:

The Ohio State University, Senior Lecturer, Aug 2013 - Mar 2017, Full time

Universidad EAFIT, Medellin-Colombia, Lecturer, 1993, 1997, part-time

Universidad de Medellin, Medellin - Colombia, Senior lecturer, 1997, 1998, part-time

Universidad San Buenaventura, Medellin - Colombia, Information Systems Department Dean, 1994-1997

Universidad San Buenaventura, Medellin - Colombia, Lecturer and Chair, 1992- 1996, part-time

Universidad de Antioquia, Medellin- Colombia, Information Systems Department Lecturer, 1992-1996, part-time

Non-academic experience: Infomanagement Ltd - CEO and Tech director, Consultant, founder and technical services director of a consulting and IT management services firm, providing enterprise and solutions architecture, systems, network and security management services for energy power, health and social sector. 1997-2015, full-time

REACHOUT LLC - Columbus, OH Architecture and Security advisor for startup company. 2013 - present, part-time

DNV KEMA Energy & Sustainability, Latin America region, Associate consultant in Latinamerica, Enterprise and Solutions Architecture for real time energy trading systems, SCADA and EMS systems for ISO (Power grid operators) and information system architecture projects for latinamerica power companies. 1997-2013

Certifications or professional registrations: None

Current membership in professional organizations: IEEE

Honors and awards: None

Service activities: Volunteer Services for non-profit organizations

Humanitarian Engineering group, OSU, Columbus-Ohio, 2015-2017

Student organization Advisor, OSU, Columbus-ohio, 2016-

COSI, Columbus-Ohio, 2013-2016

Colegio Marymount, Board member and technical committee group, 1991-2010

Dame La Mano, La Casa del Camino, Technical advisor, non-profit children organizations, 200-2013

Computer Users Association, Medellin-Colombia, Engineer and Industry professional organization, 1993-1996

Recent publications and presentations:

Enterprise Architecture, Leon Madrid, develop and hold an on-line course for OSU MGEL-CSE program, Autumn 2016

Technology and security roadmap for FEISA, Leon Madrid - high-level assessment and strategy development for the company Financial and social service mutual fund manager, 2014

Assessment and Enterprise/Technology governance Plan for CDEC-SIC operation division, Leon Madrid - Marcos Tellez DNV-KEMA Chilean Electric Power Grid Operator- Interconnected Central System, 2013

Recent professional development activities:

eXperience Play: game design workshop, ODEE, 2017

Engaging students through online collaborations, UCAT, 2017

Student organization Advisor Training, OSU, 2016

Course design institute, UCAT-OSU, 2015

Name: Michelle Mallon

Education:

The Ohio State University: Master of Social Work, June 1999

The Ohio State University: Bachelor of Arts, Psychology/Sociology, June 1997

Academic experience:

The Ohio State University: Autumn 1995-present: Full Time Lecturer

Non-academic experience: March 22, 2013 Presented at Pearson PHIT Conference at Columbus State:
Presented entitled "Who took my students?" and discussed the use of the flipped classroom model as a tool to combat student distraction.

I have attended Technology conferences for Pearson 2012, 2013, 2014 and with Cengage 2009,2010, 2011 and with McGraw- Hill 2016.

Certifications or professional registrations: MOS Certified in MS Excel and MS Access

Current membership in professional organizations: None

Honors and awards: 2003 CSE Department Outstanding Teaching Award

Service activities: Various church activities

Grade school volleyball coach

Recent publications and presentations:

None

Recent professional development activities:

Currently learning Java.

Name: Venkata Krishna Manda

Education:

B.Tech (equal to BS), Electrical Engineering, Jawaharlal Nehru Technological University, India, 1980
MS, Computer Science concentration, Ohio University, 1986
MCPM - Masters Certificate in Project management, George Washington University & AT&T School of Business, 1997
MBA, Ohio Dominican University, 2006

Academic experience:

Ohio State Univ., August-Dec. 2016, Part-time lecturer

Non-academic experience: Nationwide Insurance, Automation Lead / Consultant / Division Manager - full time - From 2003 to 2017 (current).

Bell Labs / Lucent Technologies/ AT&T, Technical Manager / Member of Technical Staff - full time - from 1991 to 2003

Motorola Inc., Engineer, full time - 1990 to 1991

IBM Corporation, Engineer, full time 1987 - 1990

Certifications or professional registrations: PMP - Project Management Professional (since 2004)

INS 21 - Property and Liability Insurance Principles (since 2004)

CSTE – Certified Software Test Engineer (Since 2006)

Current membership in professional organizations: Member of Project Management Institute

Member of Central Ohio Agile Association

Member of Central Ohio Quality Assurance Association

Honors and awards: Nationwide CEO Award

Department Quality Award, Lucent Technologies

Service activities: Voluntary Service - Coordinating and managing a Technology/Web based applications development for HandsOnColumbus / HandsOn Central Ohio, a non-profit organization

Recent publications and presentations:

1. Automation in Large program - presented at TechCon2017 conference by Nationwide Insurance
2. Test Automation in Application Development Center - presented at TechCon 2014 conference by Nationwide Insurance

Recent professional development activities:

Coordinated a professional development meeting at Nationwide Insurance

Name: William Thomas Martin (Tom Martin) – Martin

Education:

Master Certificate in Software Testing, Villanova University
Executive Certificate in Leadership and Management, Notre Dame's Mendoza College of Business
BS in Business Information Systems, University of Phoenix, AZ, 1998

Academic experience:

The Ohio State University, Part-time Lecturer, 2012 - Present

Non-academic experience: JP Morgan Chase, Columbus, OH: 1996 - Present Executive Technology Director: Provided executive leadership as head of Digital Internet Channel (Chase.Com / JPMOL) development teams. Responsible for all aspects of strategic IT planning, development, implementation, and support of strategic business plans to drive ecommerce.

Certifications or professional registrations: None

Current membership in professional organizations: None

Honors and awards: JP Morgan Chase Distinguished Engineer Award 2009

Key Note Speaker 'Aligning IT Resources with Business Needs', Austin Texas 2003

Key Note Speaker 'Computer Measurement Group', Chicago Illinois 2004

Winner of HP Excellence in IT Applications Runner up for 2007 Ventra Research Best Practice Award

Service activities: Manage OYAA Softball League for 300 youth girls ages 10-12

Trainer for Expert Engineers in JPMorgan Chase

Judge for OSU HackAthon, 2016

Coordinator for Code for Good, JPMorgan Chase

Recent publications and presentations:

Published /Interviewed in Banking Technology News – Merging Large Banks 2005

Interviewed for CIO Magazine – Capacity Planning March 2005

Recent professional development activities:

Scrum Master Training

Ethical Hacking Training

Name: Roberto Facundo Memoli Techera

Education:

PhD, Major: Electrical Engineering, Minor: Mathematics, University of Minnesota, 2005.
M.Sci., Electrical Engineering, Universidad de la Republica, 2001.
Electrical Engineer, EE, Universidad de la Republica, 2000.

Academic experience:

The Ohio State University, Department of Mathematics and Department of Computer Science, Associate Professor. 2013 – present, full time. Stanford University, Mathematics Department, Postdoctoral fellow, 2005 – 2011, full time.

Research Assistant. University of Minnesota, Electrical and Computer Engineering Department, 2002-2005, part time.

Non-academic experience: None

Certifications or professional registrations: None

Current membership in professional organizations: IEEE, SIAM, AMS

Honors and awards: None

Service activities: Service in several committees in the Math department. Have been part of several PhD and masters committees. NSF panel reviewer. Co-Organizer of Summer at ICERM 2017. Co-Organizer of TGDA at OSU 2016 conference. Organizer of minisimposia at SIAM 2016 (Albuquerque, NM) and AMS 2016 sectional meeting (Raleigh, NC). Co-organizer of Summer at ICERM 2017 summer research activity for undergrads.

Recent publications and presentations:

Improved Error Bounds for Tree Representations of Metric Spaces. S. Chowdhury, F. Memoli, and Z. Smith. NIPS 2016.

Admissible Hierarchical Clustering Methods and Algorithms for Asymmetric Networks. G. Carlsson, F. Memoli, A. Ribeiro and S. Segarra. Arxiv preprint. IEEE Transactions on Signal and Information Processing over Networks. Volume: PP, Issue: 99, 2017.

Classifying Clustering Schemes. G. Carlsson and F. Memoli. Foundations of Computational Mathematics. May 2012.

Topological Analysis of Nerves, Reeb Spaces, Mappers, and Multiscale Mappers Tamal K. Dey, Facundo Memoli, Yusu Wang. SOCG 2017.

Multiscale Mapper: A Framework for Topological Summarization of Data and Maps Tamal K. Dey, Facundo Memoli, Yusu Wang. SODA 2016.

Some properties of Gromov-Hausdorff distances. F. Memoli. Discrete and Computational Geometry. February 2012.

Recent professional development activities:

Speaker at CNA Ki-Net Workshop CMU, 2017. Speaker at Rabadan Lab, Columbia University, 2017.

Name: Scott Mills

Education:

Bachelor of Science in Computer Science and Mathematics, Ball State University, May 1984

Academic experience:

The Ohio State University, Part-time Senior Lecturer 08/2014 - Present

Non-academic experience: HighJump/Accellos, Vice President of Development 01/2010 - present (full time)

Certifications or professional registrations: None

Current membership in professional organizations: None

Honors and awards: User definable interface system, method and computer program product, United States U.S. Patent 6918091, Issued July 12, 2005

Service activities: Dublin Baptist Church - Stewardship Team 1/2017 - present
Dublin Baptist Church - Ministry Placement team 1/2013 - 12/2015

Recent publications and presentations:

Elevate Users Conference March 2017 - Presenter

Elevate Users Conference April 2016 - Presenter

Elevate Users Conference April 2015 - Presenter

Recent professional development activities:

None

Name: Golrokh Mirzaei

Education:

Ph.D.; Electrical Engineering and Computer Science; University of Toledo, USA; 2014

Academic experience:

Ohio State University at Marion , Clinical Asst. Professor, 2014- present, full-time

Azad University , University Instructor, 2008- 2009, full time

University of Toledo, Application Developer at University Computer Center, 2012-2014

Non-academic experience: None.

Certifications or professional registrations: ACM, IEEE, Society of Women Engineers(SWE), Association of Women in Science (AWIS)

Current membership in professional organizations: a. IEEE Young Engineer of the Year Award, 2014
b. IEEE Best Graduate Student in Computer Science Award, 2014
c. Best Research Assistant of the Year Award, Department of Electrical Engineering and Computer Science, University of Toledo, 2012
d. Best Poster Technical/Scientific Merit Award, University Clean Energy Alliance of Ohio, (UCEAO 2012), Ohio State University, Columbus, 2012
e. NSF travel student award, IEEE International Joint Conference in Neural Network ,(IJCNN2012)

Honors and awards: a. Chair of IEEE Young Professional, Toledo Section (2013- 2014)
b. Session chair of Signal, Image, and Video Processing in IEEE Electro/Information Technology Conference, Milwaukee, Wisconsin, 2014
c. Officer and Executive Committee member of IEEE Toledo Section (April 2013- 2014)
d. Leader/Coordinator of Summer Engineering Institute, Ohio State University, Marion, 2015-2017
e. Leader/Coordinator for Summer Engineering Camp, Ohio State University, Marion, 2015-2017

Service activities: a. G. Mirzaei, H. Adeli, A. Adeli, “Imaging and Machine Learning Techniques for Diagnosis of Alzheimer Disease”, Reviews in NeuroScience, 2016
b. G. Mirzaei, H. Adeli, “Resting State Functional Magnetic Resonance Imaging Processing Techniques in Stroke Studies ”, Reviews in NeuroScience, 2016
c. G. Mirzaei, M. Jamali, J. Frizado, P. V. Gorsevski, V. P. Bingman, “Data Fusion of Acoustic, Infrared, and Marine Radar for Avian Studies”, IEEE Sensors Journal, 2015
d. M. W. Majid, G. Mirzaei, ”Mastering Angular JS , 2015”, Publisher : Packt publishing, 2015
e. P. V. Gorveski, S. C. Cathcart, G. Mirzaei, M. M. Jamali, X. Ye, E. Gomezdelcampo, “A Group-based Spatial Decision Support System for Wind Farm Site Selection in Northwest Ohio”, Elsevier, Energy Policy, 2012

Recent publications and presentations:

Active involvement in the growth of engineering program in OSU Marion campus. Development of Engineering curriculum, sheets, and summer engineering programs in OSU Marion. Advising CSE club in OSU Marion

Recent professional development activities:

None.

Name: Jeremy Morris

Education:

PhD, Computer Science & Engineering, The Ohio State University, 2010
MS, Computer Science & Engineering, The Ohio State University, 2007
MA, Education, The Ohio State University, 1998
BS, Computer Science/Mathematics, Bowling Green State University, 1996

Academic experience:

The Ohio State University, Department of Computer Science and Engineering, Assistant Professor of Practice, 08/2016 - present, full-time
The Ohio State University, Department of Computer Science and Engineering, Senior Lecturer, 09/2010 - 08/2016

Non-academic experience: State Teachers Retirement System of Ohio, Network Engineer, 03/2002 - 09/2004, full time

Kent State University Department of Mathematics and Computer Science, Sr. System Administrator, 08/1999 - 03/2002, full time

Wright State University, LAN Administrator, 06/1998 - 08/1999

Nationwide Insurance, Database Application Programmer, 05/1996 - 09/1997

Certifications or professional registrations: None

Current membership in professional organizations: ACM - Member since 2014

IEEE - Member since 2015

Honors and awards: 2015 - Department of Computer Science and Engineering Outstanding Teaching Award

Service activities: Undergraduate Honors Advisor, Member of College of Engineering Undergraduate Honors committee

Member of College of Engineering Outcomes and Assessment committee
co-Recruitment Coordinator for CSE Department

Member of departmental Undergraduate Studies committee

Member of departmental Curriculum committee

Course coordinator for CSE 1223 Introduction to Programming in Java

co-advisor of the Open Source Club

Recent publications and presentations:

None

Recent professional development activities:

ACM/SIGCSE 2016 (March 2016)

ABET Symposium 2016 (April 2016)

ABET Fundamentals of Program Assessment Workshop (October 2016)

Name: Arnab Nandi

Education:

University of Michigan, Ann Arbor: Ph.D. Computer Science, 2011

University of Delhi, India: Bachelors in Information Science, 2004

Academic experience:

Assistant Professor, Computer Science and Engineering, The Ohio State University (Jan 2012 – present)

Non-academic experience: Microsoft Research Search Labs, Mountain View (Manager: Stelios Paparizos / Rakesh Agrawal), Research Intern (June 2011 – September 2011)

Yahoo! Research, New York (Manager: Cong Yu), Research Scientist – Student (Oct 2009 – Apr 2010), Research Intern, Web Info. Management Group (May 2009 – Aug 2009)

Certifications or professional registrations: None

Current membership in professional organizations: ACM Member

Honors and awards: IEEE TCDE Early Career Award, 2016 “for contributions towards user-focused data interaction: building data analysis, exploration, and querying systems that allow highly interactive experiences for end-users”

Ohio State College of Engineering Lumley Research Award, 2016

CCC Best Paper Award, CIDR 2013 Vision Track

Best Paper Honorable Mention Award, IUI 2017

Best Papers of WWW Web Science (Journal Invitation), Journal of Web Science 2015

Best Papers of ICDE 2011 (Journal Invitation), TKDE 2012

Service activities: Demonstrations co-chair: ICDE 2017

Publicity co-chair: SIGMOD 2017

Student Scholarship co-chair: SoCC 2016

Organizer / co-chair: HILDA 2016 (SIGMOD Human In-the-Loop Data Analytics Workshop), SIGMOD (2015, 2016)

Co-founder & Director, OHI/O Program: Created with the goal of fostering a tech culture at Ohio State, activities include running the University’s annual Hackathon (2x growth/year, 770+ students from 25+ univs / 25+ industry partners in 2016.)

Co-founder & Director, STEAM Factory: Platform for Collaborative Interdisciplinary Research & Outreach, comprising over 150 faculty and staff members at Ohio State, round-the-year activities, and a 3400sq ft. thinkerspace.

Recent publications and presentations:

Juan Felipe Beltran, Ziqi Huang, Azza Abouzied, Arnab Nandi: Don’t Just Swipe Left, Tell Me Why: Enhancing Gesture-based Feedback with Reason Bins: IUI 2017 (Best Paper Honorable Mention Award)

Yi Wang, Gagan Agrawal, Arnab Nandi: SAGA: Array Storage as a DB with Support for Structural Aggregations: SSDBM 2014, Article No. 9

Arnab Nandi, Lilong Jiang, Michael Mandel: Gestural Query Specification: VLDB 2014, pg 289–300

Lilong Jiang, Arnab Nandi: SnapToQuery: Providing Interactive Feedback during Exploratory Query

Specification: VLDB 2015, pg 1250–1261

Arnab Nandi: Querying Without Keyboards: CIDR 2013 (Vision Track: Best Paper Award)

Arnab Nandi, Cong Yu, Philip Bohannon, Raghu Ramakrishnan: Data Cube Materialization And Mining Over Mapreduce: TKDE 2012, pg 1747–1759

Recent professional development activities:

National Science Foundation CAREER Proposal Reviewer, 2015

National Science Foundation Proposal Review Panelist, 2015

National Science Foundation Proposal Review Panelist, 2014

Reviewer, Ohio State University Discovery Themes, Data Analytics New Faculty Hiring Proposals

National Science Foundation Proposal Review Panelist, 2012

Technical Mentor, GiveBackHack 2016 – Columbus / Community-focused Social Hackathon

Invited to present Hackathon efforts to the Ohio State Board of Trustees Finance Committee Meeting, 2016

Speaker: “Designing for Interaction: Broadening our View of Working with Data”, VLDB 2015 Panel
OSU Faculty Researcher Representative, Coalition for National Science Funding (CNSF) Reception
2015

Name: Murthy (Bhuvaramurthy) Narasimhan

Education:

Ph.D. Chemistry Department of Chemistry, Michigan Technological University, Houghton, MI - 1995
MS (Eng.) Department of Chemical engineering, Indian Institute of Technology, Madras, India - 1988

Academic experience:

The Ohio State University, 2013 – current date; Senior Lecturer, Part time

Non-academic experience: Nationwide Insurance, Senior Consultant, 2016 -present; Full time

Lucent Technologies, Columbus, Ohio, 1998 To 2015; Full time

Certifications or professional registrations: Six sigma black belt certification from MoreSteam University

ITIL - Foundation Certification and ITIL & Practitioner's certification on Service Management

Master Certificate in Software Testing, Villanova University

Current membership in professional organizations: Association for Software Testing

Honors and awards: Recipient of the 2004 Nationwide Insurance CEO award for Continuous Improvement

Recipient of Nationwide CTO recognition for the contributions made in improving the testing practices during embedded coaching (2011)

Recipient of the Lucent - Bell Labs President's silver award on March '01, and LWS President's GROWS award on March '05

Service activities: Mentored 6 interns at Nationwide insurance and trained the students in SDLC practices followed in the Industry.

Volunteer at Friends of the homeless at Columbus, Ohio; prepare and serve food at the Men's shelter

Volunteer at the Mid-Ohio food bank through Nationwide; Packing and organizing food at the Mid-Ohio food bank

Recent publications and presentations:

Techconn 2017 - March 2017, Presented at the IT technical Conference at Nationwide Insurance Columbus OH. Topic: "QA automation challenges in implementing large programs"

Techconn 2016 - March 2016, Presented at the IT technical Conference at Nationwide Insurance Columbus OH. Topic: "Test Ecosystem and Accelerators for Automation"

Techconn 2015- March 2015, Presented at the IT technical Conference at Nationwide Insurance Columbus OH. Topic: "PLT Data Migration Testing Strategy"

Recent professional development activities:

Presented work related to software testing, test automation in agile environment at the "Teaching Thursday" sections at Nationwide Insurance, Columbus, Ohio (2015-16).

Provided QA coaching at the enterprise IT at Nationwide Insurance Columbus, Ohio (2012-2013). In the QA coach role at the build capability department, enabled software agile teams to improve the QA automation capability.

Agile coach at the application development center, Nationwide Insurance Columbus, Ohio (2011-2012). Provide Agile coaching to 30+ software development teams.

Name: Dhabaleswar K. (DK) Panda

Education:

Ph.D., Computer Engineering, Univ. of Southern California, 1991
MS, Electrical and Communication Engg., IISC Bangalore, 1986
BS, Electrical Engg., IIT Kanpur, 1984

Academic experience:

OSU, University Distinguished Scholar, 2015-current
OSU, Prof, 2001-current
OSU, Assoc. Prof., 1997-2001
OSU, Asst. Prof., 1991-1997

Non-academic experience: WIPRO Information Technology (R&D), Senior Hardware Engineer, 1984-1986, Full-time

Certifications or professional registrations: None

Current membership in professional organizations: ACM, IEEE-CS (Fellow)

Honors and awards: Best paper award at EuroMPI '16, ISC '10, Cluster '08, Cluster '07 and IPDPS '03

Service activities: Member, Grad. Adm. Comm., CSE Dept., 2009-current

Member, Computer Comm., CSE Dept., 2010-current
Member, IEEE Fellow Evaluations Committee (2008-09, 2013-15)
Program Chair/Co-Chair, Exacomm (15-17), HPBDC (15-17), ESPM2 (15-16), SC '08, HotI '07, IPDPS '07, ICCP '99, CANPC (97-98), CAC (01-04) conferences and workshops
Vice Chair/Co-Chair, CCGrid '16, CCGrid '12, HiPC '11 conferences
General Chair/Co-Chair, ICCP '06 and ICCP '01
Program Committee Member for more than 140 international conferences and workshops
Associate Editor, IEEE TPDS, IEEE TC, and JPDC
50 Invited Keynote/Plenary Talks, 125 Invited tutorials and 260 Invited presentations at institutions worldwide

Recent publications and presentations:

H. Subramoni, S. Chakraborty, and D. K. Panda, Designing Dynamic and Adaptive MPI Point-to-point Communication Protocols for Efficient Overlap of Computation and Communication IEEE International Supercomputing Conference (ISC '17), Jun 2017 [Best Paper Nominee]
D. Shankar, X. Lu, and D. K. Panda High-Performance and Resilient Key-Value Store with Online Erasure Coding for Big Data Workloads 37th IEEE International Conference on Distributed Computing Systems (ICDCS 2017), Jun 2017
J. Zhang, X. Lu, and D. K. Panda High-Performance Virtual Machine Migration Framework for MPI Applications on SR-IOV enabled InfiniBand Clusters 31st IEEE International Parallel & Distributed Processing Symposium (IPDPS '17), May 2017
M. Li, K. Hamidouche, X. Lu, H. Subramoni, J. Zhang, and D. K. Panda, Designing MPI Library with On-Demand Paging (ODP) of InfiniBand: Challenges and Benefits SuperComputing 2016, Nov 2016
A. Awan, K. Hamidouche, A. Venkatesh, and D. K. Panda Efficient Large Message Broadcast using

NCCL and CUDA-Aware MPI for Deep Learning The 23rd European MPI Users' Group Meeting (EuroMPI 16), Sep 2016 [Best Paper Runner-Up]

M. Bayatpour, H. Subramoni, S. Chakraborty, and D. K. Panda Adaptive and Dynamic Design for MPI Tag Matching IEEE Cluster 2016, Sep 2016 [Best Paper Nominee]

Recent professional development activities:

Academic Visitor, IBM T.J. Watson Research Center, NY (1998-99)

Name: Srinivasan Parthasarathy

Education:

PhD, Computer Science, Rochester Institute of Technology, 2000

Academic experience:

OSU, Assistant Professor, CSE, July 2000-September 2005, full time

OSU, Associate Professor, CSE October 2005-September 2010, full time

National University of Singapore, Visiting Associate, Professor, Jan 2008 - Dec 2008, full time

OSU, Full Professor, CSE, October 2010 - present, full time

Non-academic experience: Intel Corporation, Consulting Researcher, 1997-1999, part time

Certifications or professional registrations: None

Current membership in professional organizations: SIAM, IEEE, ACM

Honors and awards: NSF CAREER, DOE ECPI, Multiple best paper awards from leading Database and Data Mining conferences

Service activities: Led the creation of the Data Analytics Program (Undergraduate Major) with Chris Hans (Statistics) – one of the first of its kind nationwide.

Elected Steering Committee Chair for SIAM Data Mining conference series – oversaw the conference going to international locations (instead of being just USA based) and introduced a new young researcher award.

Recent publications and presentations:

Anirban Roychowdhury, Brian Kulis, Srinivasan Parthasarathy: Robust Monte Carlo Sampling using Riemannian Nos-Poincar Hamiltonian Dynamics. ICML 2016: 2673-2681

Jiongqian Liang, Deepak Ajwani, Patrick K. Nicholson, Alessandra Sala, Srinivasan Parthasarathy: What Links Alice and Bob?: Matching and Ranking Semantic Patterns in Heterogeneous Networks. WWW 2016: 879-889 Best of Conference Selection

Aniket Chakrabarti, Venu Satuluri, Atreya Srivathsan, Srinivasan Parthasarathy: A Bayesian Perspective on Locality Sensitive Hashing with Extensions for Kernel Methods. TKDD 10(2): 19:1-19:32 (2015)

Aniket Chakrabarti, Srinivasan Parthasarathy: Sequential Hypothesis Tests for Adaptive Locality Sensitive Hashing. WWW 2015: 162-172

Gregory Buehrer, Roberto L. de Oliveira Jr., David Fuhry, Srinivasan Parthasarathy: Towards a parameter-free and parallel itemset mining algorithm in linearithmic time. ICDE 2015: 1071-1082

G. Tziantzioulis, A. M. Gok, S. M. Faisal, Nikolaos Hardavellas, Seda Ogrenci Memik, Srinivasan Parthasarathy: b-HiVE: a bit-level history-based error model with value correlation for voltage-scaled integer and floating point units. DAC 2015: 105:1-105:6

Quoc Trung Tran, Chee Yong Chan, Srinivasan Parthasarathy: Query reverse engineering. VLDB J. 23(5): 721-746 (2014)

Arash Ashari, Naser Sedaghati, John Eisenlohr, Srinivasan Parthasarathy, P. Sadayappan: Fast Sparse Matrix-Vector Multiplication on GPUs for Graph Applications. SC 2014: 781-792

Roberto Loureno de Oliveira Jr., Adriano Veloso, Adriano C. M. Pereira, Wagner Meira Jr., Renato Ferreira, Srinivasan Parthasarathy: Economically-efficient sentiment stream analysis. SIGIR 2014:

637-646

Ye Wang, Ahmed Metwally, Srinivasan Parthasarathy: Scalable all-pairs similarity search in metric spaces. KDD 2013: 829-837

Yiye Ruan, David Fuhry, Srinivasan Parthasarathy: Efficient community detection in large networks using content and links. WWW 2013: 1089-1098

Venu Satuluri, Srinivasan Parthasarathy: Bayesian Locality Sensitive Hashing for Fast Similarity Search. PVLDB 5(5): 430-441 (2012)

Recent professional development activities:

None

Name: Chunyi Peng

Education:

Ph.D., Computer Science, University of California, Los Angeles, 06/2013
MS, Computer Science, University of California, Los Angeles, 06/2012
M.E, Automation, Tsinghua University, China, 01/2005
B.E, Automation, Tsinghua University, China, 06/2002

Academic experience:

Assistant Professor, Department of Computer Science and Engineering, The Ohio State University, 08/2013 – present
Research Assistant, Department of Computer Science, University of California, Los Angeles, 09/2009 to 06/2013

Non-academic experience: Associate Researcher, Microsoft Research Asia, China, 08/2008- 09/2009

Assistant Researcher, Microsoft Research Asia, China, 12/2005-08/2008
Engineer, T3G Ltd. Co., China, 01/2005 to 12/2005

Certifications or professional registrations: None

Current membership in professional organizations: IEEE Member, ACM Member

Honors and awards: None

Service activities: Faculty Search Committee (2016- Present)

Curriculum Committee (2016-present)

Graduate Studies Committee (2015-present)

Technical Program Committee Co-Chair and General Co-Chair: (1) WiNTech, ACM International Workshop on Wireless Network Testbeds, Experimental evaluation & Characterization (co-located with MobiCom), 2017, (2) VLCS, ACM Workshop on Visible Light Communication Systems (co-located with MobiCom), 2015

Technical Program Committee Member: ACM MobiCom (2014, 2015, 2016, 2017), ACM MobiSys (2014, 2015, 2017), IEEE INFOCOM(2016,2017), ICNP (2015, 2016), IEEE SECON (2015, 2017), WWW(2017), NDSS (2017), CNS (2016, 2017), PAC (2017), ICCCN(2017), WCNC (2017), WiN-Tech (2016)ACM HotMobile (2016, 2017), etc.

Reviewers for top journals in networking like TON, TMC, TWC etc.

Recent publications and presentations:

Towards Automated Intelligence in 5G Systems, Haotian Deng, Qianru Li, Yuanjie Li, Songwu Lu, Chunyi Peng, Taqi Raza,Zhaowei Tan, Zengwen Yuan, Zhehui Zhang, (ICCCN'17), Vancouver, Canada, August 2017.

NaviLight: Indoor Localization and Navigation Under Arbitrary Lights, Zenghua Zhao, Jiankun Wang, Xingya Zhao, Chunyi Peng, Qian Guo, Bin Wu, (INFOCOM'17), Atlanta, GA, USA, May 2017.

TUM: Towards Ubiquitous Multi-Device Localization for Cross-Device Interaction, Han Xu, Zheng Yang, Zimu Zhou, Ke Yi, Chunyi Peng, (INFOCOM'17), Atlanta, GA, USA, May 2017.

New Security Threats Caused by IMS-based SMS Service in 4G LTE Networks, Guan-Hua Tu, Chi-Yu Li, Chunyi Peng, Yuanjie Li and Songwu Lu (CCS'16), Vienna, Austria, Oct. 2016

MobileInsight: Extracting and Analyzing Cellular Network Information on Smartphones, Yuanjie Li, Chunyi Peng, Zengwen Yuan, Jiayao Li, Haotian Deng and Tao Wang (MobiCom'16), New York, USA, Oct. 2016.

ARTcode: Preserve Art and Code In Any Image, Zhe Yang, Yuting Bao, Chuhao Luo, Xingya Zhao, Siyu Zhu, Chunyi Peng, Yunxin Liu and Xinbing Wang (UbiComp'16), Heidelberg, Germany, Sep. 2016

Instability in Distributed Mobility Management: Revisiting Configuration Management in 3G/4G Mobile Networks, Yuanjie Li, Haotian Deng, Jiayao Li, Chunyi Peng and Songwu Lu (SIGMETRICS'16), Antibes Juan-Les-Pins, France, June 2016.

Understanding and Diagnosing Real-World Femtocell Performance Problems, Chunyi Peng, Yuanjie Li, Zhuoran Li, Jie Zhao, Jiaqi Xu, (INFOCOM'16), San Francisco, CA, April 2016.

iCellular: Define Your Own Cellular Network Access on Commodity Smartphones, Yuanjie Li, Haotian Deng, Chunyi Peng, Guan-Hua Tu, Jiayao Li, Zengwen Yuan, Songwu Lu (NSDI'16), Santa Clara, CA, March 2016.

Recent professional development activities:

None

Name: Feng Qin

Education:

Ph.D., Computer Science, University of Illinois at Urbana-Champaign, 2006

Academic experience:

The Ohio State University, Associate Professor, 09/2013 - now, full time

The Ohio State University, Assistant Professor, 09/2006 - 08/2013, full time

Non-academic experience: None

Certifications or professional registrations: None

Current membership in professional organizations: IEEE Member, ACM Member, USENIX Campus Representative

Honors and awards: OSU Lumley Research Award, 2015

NSF CAREER Award, 2010

IEEE Micro's Top Pics, 2007, 2004

Best Papers Award, the 20th ACM Symposium on Operating Systems Principles, 2005

Outstanding Teaching Assistant Award, 2005

Service activities: Associate Editor, IEEE Transactions on Parallel and Distributed Systems (TPDS), 2016 - now

Program Committee, IEEE IPDPS, 2017

Workshop Chair, IEEE ICDCS, 2015

Program Vice Char, ICPP, 2015

Financial Chair, IEEE ICDCS, 2011

Publicity Chair, IEEE ICDCS, 2010

Recent publications and presentations:

(1) Mai Zheng, Joseph Tucek, Feng Qin, Mark Lillibridge, Bill W. Zhao, and Elizabeth S. Yang. Reliability Analysis of SSDs Under Power Fault. In ACM Transactions on Computer Systems (TOCS). Vol. 34, No. 4, Oct. 2016

(2) Ignacio Laguna, Dong H. Ahn, Bronis R. de Supinski, Todd Gamblin, Gregory L. Lee, Martin Schulz, Saurabh Bagchi, Milind Kulkarni, Bowen Zhou, Zhezhe Chen, and Feng Qin. Debugging High-Performance Computer Applications at Massive Scales. In Communications of the ACM (CACM), Vol. 58, No. 9, Sep. 2015

(3) Yanyan Jiang, Haicheng Chen, Feng Qin, Chang Xu, Xiaoxing Ma, and Jian Lu. Crash Consistency Validation Made Easy. In Proceedings of the 24th International Symposium on the Foundations of Software Engineering (FSE'16), Nov. 2016.

(4) Juan Zhai, Jianjun Huang, Shiqing Ma, Xiangyu Zhang, Lin Tan, Jianhua Zhao, and Feng Qin. Automatic Model Generation from Documentation for Java API Functions. In Proceedings of the 38th International Conference on Software Engineering (ICSE'16), May 2016.

(5) Zhezhe Chen, James Dinan, Zhen Tang, Pavan Balaji, Hua Zhong, Jun Wei, Tao Huang, and Feng Qin. MC-Checker: Detecting Memory Consistency Errors in MPI One-Sided Applications. In Proceedings of the International Conference for High Performance Computing, Networking, Storage and Analysis (SC'14), Nov. 2014

(6) Mai Zheng, Joseph Tucek, Dachuan Huang, Feng Qin, Mark Lillibridge, Elizabeth S. Yang, Bill W. Zhao, and Shashank Singh. Torturing Databases for Fun and Profit. In Proceedings of the 11th USENIX Symposium on Operating Systems Design and Implementation (OSDI'14), Oct. 2014

Recent professional development activities:

- (1) Serving in a NSF review panel, 2017
- (2) Visiting Chinese Academy of Sciences, 2016
- (3) Attending the conference SOSP, 2015
- (4) Giving research talks at Purdue, Virginia Tech, UC-Riverside, 2012

Name: P.N. Ramasamy

Education:

M.S.E.E Electrical and Computer Engineering, Iowa State University, Ames, IA 50011 June 1981

B.E Electronics and Telecommunications Engineering, University of Madras, Madras, INDIA, June 1978

Academic experience:

Senior Lecturer, Computer Science and Engineering, The Ohio State University, Columbus, OH. Jan. 2012 - Present. Part-time/Adjunct Faculty.

Assistant Professor of Computer Sciences, with joint appointment in Engineering Technology, University of Pittsburgh, Johnstown, PA August 1981 - June 1985. Tenure Track full-time faculty position.

Assistant Professor of Electrical and Computer Engineering Technology, Arizona State University, Tempe, AZ July 1985 - June 1986. Tenure Track full-time faculty position.

Non-academic experience: Vice President, Data & Quality Programs, NetJets, Columbus, OH July 2016 - Present. Full-time position.

IT Director, Nationwide Insurance, Columbus, OH 43215. A Fortune 69 Company in Financial Services & Insurance - Full-time position, 2005 – June 2016

Director, Lucent Worldwide Services, Lucent Technologies, Whippany, NJ. Oct. 2000 - Aug. 2005 - Full-time position.

Certifications or professional registrations: ITIL Foundations Certification – V2: 2007 & V3: 2009

ITIL Practitioner’s Certificate in Service Level Management– 2007

ITIL Practitioner’s Certificate in IT Service Management, Release and Control - 2007

Current membership in professional organizations: None

Honors and awards: 2011 TECH Columbus Innovation Awards: Outstanding Technology Team – Semi-finalist - 2012

Nationwide’s 2010 IT Outstanding Contribution Award -2011

Nationwide’s 2012 IT Outstanding Contribution Award top 10 project

Bell Labs President’s Silver Award – 2000

Several AT&T Bell Labs Leadership Recognition awards and Peer Team awards

Service activities: Franklin University Computing Sciences Advisory Board

Recent publications and presentations:

None

Recent professional development activities:

Participation in MIT Data Conference in Boston: July 2016

Name: Rajiv Ramnath

Education:

Ph.D., Computer and Information Science, The Ohio State University, September 1988.

M.S., Computer and Information Science, The Ohio State University, August 1983.

Bachelor of Technology, Electrical Engineering, Indian Institute of Technology, New Delhi, India, 1981.

Academic experience:

September 2016 – present: Professor of Practice, Dept. of Computer Science and Engineering, The Ohio State University. Full-time.

September 2010 – August 2016: Associate Professor of Practice, Dept. of Computer Science and Engineering, The Ohio State University. Full-time.

September 2007 – September 2010: Assistant Professor of Practice, Dept. of Computer Science and Engineering, The Ohio State University. Full-time. July 2007 – September 2007: Senior Lecturer, Dept. of Computer Science and Engineering, The Ohio State University (temporary appointment). Full-time

September 2002 – June 2007: Visiting Assistant Professor, Dept. of Computer Science and Engineering, The Ohio State University. Full-time.

1999-2002: Senior Lecturer (adjunct faculty), Department of Computer and Information Science, The Ohio State University. Part-time

Non-academic experience: January 2015 - present. Program Director, National Science Foundation, Office of Advanced Cyberinfrastructure, Software Cluster. Manage a portfolio of \$140M in awards. Full-time.

September 2014 – January 2015. Expert, National Science Foundation, Division of Advanced Cyberinfrastructure (ACI). Part-time.

October 2013 – December 2014 AweSIM Evangelist, Ohio Supercomputer Center, OH-Tech.Support and advice business development, software architecture and training and workforce development for the AweSIM initiative (<http://www.awesim.org>). Part-time

April 1998 – June 2002: Vice President, Concentus Technology Corp., Officer of the company. Full-time.

December 1989 – June 2000, various positions, Full-time.

Certifications or professional registrations: None

Current membership in professional organizations: Member ACM, IEEE

Honors and awards: Department of Computer Science and Engineering Faculty Teaching Award in 2007. College of Engineering Charles E. MacQuigg Award for Outstanding Teaching in 2010.

Service activities: 2015-current: NSF service (see above)

September 2002 – present: Co-Director, Collaborative for Enterprise Transformation and Innovation (CETI, <http://www.ceti.cse.ohio-state.edu>), Dept. of Computer Science and Engineering, The Ohio State University (OSU), Columbus, Ohio.

September 2008 – September 2012: Associate Director, Institute for Sensing Systems, College of Engineering (<http://www.iss.osu.edu>)

2010-2012: CSE representative on the University Senate and Faculty Council.

2011: Member of the Council for Academic Freedom.
2011-2014: Member of the University Research Council.

Recent publications and presentations:

- "NEWPATH: An innovative program to nurture IT entrepreneurs", Soundarajan, N., Ramnath, R., Weide, B., Lee, D., Camp, M., *Advances in Engineering Education's Special Issue on Entrepreneurship*, 2015.
- "Identifying Knowledge Brokers and Their Role in Enterprise Research through Social Media", Xu Zhe, Jayashree Ramanathan, Rajiv Ramnath, *IEEE Computer*, Special Issue on Collaborative Information Seeking, March 2014.
- "Novel Probability Based Ensemble Method for Improving Automated Tweet Classification", Renhao Cui, Gagan Agrawal, Vinh Khuc, Rajiv Ramnath, 2nd International Workshop on Data Science for Social Media and Risk, Barcelona, Spain, December 12, 2016.
- "Motivating Dynamic Features for Resolution Time Estimation within IT Operations Management", Kayhan Moharreri, Jayashree Ramanathan, Rajiv Ramnath. *IEEE BigData BDCOM*, Washington, D.C., December 5 – 8, 2016.
- "Vision-track: vision based indoor tracking in anchor-free regions", Gopi Krishna Tummala, Rupam Kundu, Prasun Sinha, Rajiv Ramnath, *HotWireless '16 Proceedings of the 3rd Workshop on Hot Topics in Wireless*, Pages 49-53, New York City, New York 2014 October 03 - 07, 2016.
- TopChurn: Maximum Entropy Churn Prediction Using Topic Models Over Heterogeneous Data Sources", Manirupa Das, Micha Elsner, Arnab Nandi, Rajiv Ramnath, *World-Wide Web (WWW) Conference 2015, WebScience track*, Florence, Italy, May 16th-24th 2015.
- "Collaborative and Cooperative-Learning in Software Engineering Courses", Swaroop Joshi, Neelam Soundarajan, Rajiv Ramnath, *Joint Software Engineering Education and Training (JSEET) conference*, Florence, Italy, May 16th-24th 2015.
- "An Agile Translation Process for Complex Innovations: an Industry/University Cooperative Research Center Case Study", Ramanathan, J., Ramnath, R., Herold, M., Wierwille, B., *Frontiers in Education Conference (FIE 2013)*, October 2013.
- "Innovation-Directed Experiential Learning Using Service Blueprints", Ramanathan, J., Ramnath, R., Herold, M., Wierwille, B., *Frontiers in Education Conference (FIE 2013)*, October 2013.

Recent professional development activities:

- "The Evolving Role of NSF Software Programs and Software Gateways in a National Cyberinfrastructure Ecosystem", keynote talk, *Gateways 2016 Conference*, San Diego, CA, November 2016, <https://www.youtube.com/watch?v=pEgR2hgJkp8>.
- Reviewer, 30th *IEEE International Parallel & Distributed Processing Symposium*, 2016.
- Editorial Board Member (<http://www.computer.org/web/computingnow/software/edboard>), *IEEE Software*, 2015.
- Reviewer, *ICTIEE-2015, Second International Conference on Transformations in Engineering Education*, 2015.
- Proposal review panelist, *NSF Cyberlearning Program, Information & Intelligent Systems Division (IIS)*, 2014.
- Co-Chair, *Cloud Computing Track, ACM Symposium for Applied Computing (SAC)* 2014.

Name: Lori Rice

Education:

Masters of Arts in Workforce Development and Education, The Ohio State University, Columbus, OH (2003)

Bachelors of Science in Information Systems, Ohio Dominican College, Westerville, OH (2000)

Academic experience:

Instructor, Columbus State Community College, Computer Information Technology, Columbus, OH, 1995-2000 (part time), 2000-2004 (full time)

Instructor, Tiffin University, Criminal Justice, Tiffin, OH, 2003-2004 (part time)

Lecturer, The Ohio State at Newark University, Computer Science and Engineering, Columbus, OH, 2004-2011 (Fulltime)

Lecturer, The Ohio State University, Computer Science and Engineering, Columbus, OH, 2012-present
The Ohio State University (Fulltime)

Non-academic experience: Applications Developer/Project Lead, Nationwide Insurance, Nationwide Insurance, Columbus, Ohio, 1987-1997, Coordinated new and existing IT projects, Supported new and existing programming applications, Analyzed customer requirements, Interfaced with vendors as necessary

Childrens Hospital, MS Office Training for doctors/nurses/staff, Scotts Lawn Care, MS Office Training for staff

Quick Solutions 1996-1997, IT Consultant, Worked in project teams at various local businesses converting existing systems to make them Y2K compliant.

Consultant, Hendrickson Auxiliary Systems-IT Periodically, 2005-2015. Developed a call center application for the regional office, developed a training audit system for the regional office

Certifications or professional registrations: None

Current membership in professional organizations: None

Honors and awards: Appreciation dinner for faculty who made a difference in students lives, SLDS appreciation event for faculty who worked ho were particularly sensitive to the needs of SLDS students.

Service activities: Training for advisors in Fisher College of Business, Review of Open Source Textbooks

Recent publications and presentations:

None

Recent professional development activities:

McGraw Hill Symposium on using Access and Excel r problem solving

Name: Alan Ritter

Education:

Ph.D. in Computer Science & Engineering, University of Washington, 2013

Academic experience:

The Ohio State University, Assistant Professor August 2014 - Present, Full Time

Carnegie Mellon University, Postdoctoral Fellow August 2013 - August 2014, Full Time

Non-academic experience: Microsoft Research, Consultant, August 2014-September 2015; August 2015-September 2016

Certifications or professional registrations: None

Current membership in professional organizations: Association for Computational Linguistics

Honors and awards: NDSEG Fellowship, 2008, Best Student Paper Award (IUI 2009), NSF CRII (2014)

Service activities: OSU Graduate Admissions Committee (2014,2015,2016).

OSU Graduate Studies Committee (2015,2016).

Recent publications and presentations:

Learning to Extract Events from Knowledge Base Revisions Alexander Konovalov, Benjamin Strauss, Alan Ritter and Brendan O'Connor Proceedings of WWW 2017

A Minimally Supervised Method for Recognizing and Normalizing Time Expressions in Twitter Jeniya Tabassum, Alan Ritter, Wei Xu. Proceedings of EMNLP 2016

Deep Reinforcement Learning for Dialogue Generation Jiwei Li, Will Monroe, Alan Ritter, Michel Galley, Jianfeng Gao, Dan Jurafsky. Proceedings of EMNLP 2016

Sense Discovery via Co-Clustering on Images and Text. Xinlei Chen, Alan Ritter, Abhinav Gupta, Tom Mitchell. Proceedings of CVPR 2015

Weakly Supervised Extraction of Computer Security Events from Twitter Alan Ritter, Evan Wright, William Casey and Tom Mitchell Proceedings of WWW 2015

Extracting Lexically Divergent Paraphrases from Twitter Wei Xu, Alan Ritter, Chris Callison-Burch, William B. Dolan and Yangfeng Ji Proceedings of TACL 2014

Major Life Event Extraction from Twitter based on Congratulations/Condolences Speech Acts Jiwei Li, Alan Ritter, Claire Cardie and Eduard Hovy Proceedings of EMNLP 2014

Weakly Supervised User Profile Extraction from Twitter Jiwei Li, Alan Ritter and Eduard Hovy Proceedings of ACL 2014

Modeling Missing Data in Distant Supervision for Information Extraction Alan Ritter, Luke Zettlemoyer, Mausam and Oren Etzioni Proceedings of TACL 2013

Open Domain Event Extraction from Twitter Alan Ritter, Mausam, Oren Etzioni, Sam Clark Proceedings of KDD 2012

Paraphrasing for Style Wei Xu, Alan Ritter, William B. Dolan, Ralph Grishman, Colin Cherry Proceedings of Coling 2012

Recent professional development activities:

Microsoft Research Faculty Summit (2016,2017); Amazon Faculty Summit (2015)

W-NUT Workshop Organizer (ACL 2015, Coling 2016, EMNLP 2017)

Name: Angel Rivera

Education:

BSEE, University of Ill at Chicago, 1993

Academic experience:

Lecturer CSE 3461, January 17-present, Part Time.

Non-academic experience: IBM, Lead Network Architect, full-time, 21 years.

Certifications or professional registrations: Cisco Certified Network Associate (CCNA)

Current membership in professional organizations: None

Honors and awards: None

Service activities: None

Recent publications and presentations:

None

Recent professional development activities:

Continue with studies in Cisco Certified Network Professional (CCNP)

Name: Nicoleta Roman.

Education:

Ph.D.; Computer Science; The Ohio State University, USA; 2005.

Academic experience:

The Ohio State University at Lima, Visiting Assistant Professor, 2005-2009, full time.

The Ohio State University at Lima, Assistant Professor, 2009-2016, full time.

The Ohio State University at Lima, Associate Professor, 2016-current, full time.

Non-academic experience: R&D Consultant, Smobile Systems, Columbus, OH, Oct 2005-Feb 2006.

Certifications or professional registrations: None

Current membership in professional organizations: None

Honors and awards: None

Service activities: OSU Lima Undergraduate Research Mentorship Committee, Chair (2014-current).

OSU Lima Faculty Welfare (2014 -present).

OSU Lima Teaching Effectiveness (2016-present).

Advisor for the OSU Lima Engineering Club, 2009-2011.

STEMSTEPS, OSU – Lima, Lima, OH, (2015-2016).

Denman Undergraduate Research Forum, OSU, Columbus, 2013.

”Compute This!”, Lima Regional Science Olympiad, Lima, OH (2009-2012).

Career Day, OSU-Lima, Lima, OH (2011-2012).

Science Discovery Day, OSU - Lima, Lima, OH, 2010.

Kids’ College, OSU - Lima, Lima, OH, 2010

Recent publications and presentations:

a. M. I. Mandel and N. Roman, “Enforcing Consistency in Spectral Masks Using Markov Random Fields,” Proc. of the European Signal Processing Conference, 2015.

b. N. Roman and M. I. Mandel, “Integrating Markov Random Fields and ModelBased Expectation Maximization Source Separation and Localization,” Journal of the Acoustical Society of America, vol. 137(4), p. 2232, 2015.

c. N. Roman and M. I. Mandel, ”Classification based binaural dereverberation,” Proc. INTER-SPEECH, pp. 3249-3253, 2013.

d. N. Roman and J. Woodruff, “Speech intelligibility in reverberation with ideal binary masking: Effects of early reflections and signal-to-noise ratio threshold,” Journal of the Acoustical Society of America, vol. 133(3), pp. 1707-1717, 2013.

e.C. Mihai,, A. Velea, N. Roman, L. Tugulea, and N. I. Moldovan, “Impact of solute molecular properties on the organization of nearby water,” Digest Journal of Nanomaterials and Biostructures, vol. 7(2), pp. 469-475, 2012.

f. C. Mihai,, A. Velea, N. Roman, L. Tugulea, and N. I. Moldovan, “Modeling the slaving of structural fluctuations in bio-molecules to those of nearby water,” Digest Journal of Nanomaterials and Biostructures, vol. 7(3), pp. 907-915, 2012.

Recent professional development activities:

Active involvement in introducing the 2nd year for the CSE/ECE program on the OSU Lima campus.

Name: Steve Romig

Education:

BS, Math, Carnegie Mellon University, 1982

Academic experience:

Ohio State University, Part-time Senior Lecturer, 2007-present

Non-academic experience: Ohio State University, most recent position is as Director in Enterprise Security, work consists of strategic planning and investigations, 1983-present, full time.

Certifications or professional registrations: None

Current membership in professional organizations: Member of Usenix and ACM

Honors and awards: None

Service activities: Started and now act as the staff advisor for the Cyber Security student organization (2014-present)

Recent publications and presentations:

"Security Event Management", presentation at OSU, February 2012

"Forensics Workshop", day long workshop taught for the Columbus ISSA, April and October 2012

"Security at OSU", presentation for Columbus ISACA, December 2012

"Splunk at OSU", presentation for Splunk Live, April 2013

"Security Trends", presentation at OSU's Security Day, September 2014

"Intrusion Detection and Incident Response at OSU", presentation for Columbus ISACA, September 2014

"External Attack Surface", presentation for OSU Security Liaisons, May 2015

"Investigator Training", workshop for OSU's Office of Compliance, February 2016

"Forensics", presentation for OSU's Cyber Security Club, March, 2016

"Ransomware", presentation for OSU's Security Liaisons, August, 2016

"Security Challenges", presentation for Columbus ISACA, December 2016

"TCP Security", presentation for OSU's Cyber Security Club, March 2016

Recent professional development activities:

Splunk Data Analytics course, Fall 2016; OSU's Translational Data Analytics Symposium, March 2017.

Name: Atanas Rountev

Education:

Ph.D., Computer Science, Rutgers University, 2002

Academic experience:

The Ohio State University, Professor, 9/2015 - present

The Ohio State University, Associate Professor, 10/2008 - 8/2015

The Ohio State University, Assistant Professor, 10/2002 - 9/2008

Non-academic experience: None

Certifications or professional registrations: None

Current membership in professional organizations: ACM, SIGSOFT, SIGPLAN

Honors and awards: Lumley Research Award, College of Engineering, The Ohio State University, 2009

ACM SIGSOFT Distinguished Paper Award, 2008

NSF CAREER Award, 2006

Service activities: ACM Transactions on Software Engineering and Methodology (TOSEM), Associate Editor, since March 2014

European Conference on Object-Oriented Programming (ECOOP), Program Committee member, 2016

IEEE/ACM International Conference on Mobile Software Engineering and Systems (MobileSoft), Program Committee member, 2016 and 2015

ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI), Program Committee member, 2014 and 2011

International Conference on Software Engineering (ICSE), Program Committee member, 2012

The Ohio State University, College of Engineering Promotion and Tenure Committee, 2015 and 2016

The Ohio State University, Computer Science and Engineering Faculty Search Committee, since 2008 (chair in 2016)

Recent publications and presentations:

Analysis and Testing of Notifications in Android Wear Applications, Hailong Zhang and Atanas Rountev. International Conference on Software Engineering (ICSE), 2017

Resource Conscious Reuse-Driven Tiling for GPUs, Prashant Rawat, Changwan Hong, Mahesh Ravishankar, Vinod Grover, Louis-Noel Pouchet, Atanas Rountev, and P. Sadayappan. International Conference on Parallel Architectures and Compilation Techniques (PACT), 2016

Static Detection of Energy Defect Patterns in Android Applications, Haowei Wu, Shengqian Yang, and Atanas Rountev. International Conference on Compiler Construction (CC), 2016

Static Window Transition Graphs for Android, Shengqian Yang, Hailong Zhang, Haowei Wu, Yan Wang, Dacong Yan, and Atanas Rountev. IEEE/ACM International Conference on Automated Software Engineering (ASE), 2015

Static Control-Flow Analysis of User-Driven Callbacks in Android Applications, Shengqian Yang, Dacong Yan, Haowei Wu, Yan Wang, and Atanas Rountev. International Conference on Software Engineering (ICSE), 2015

Distributed Memory Code Generation for Mixed Irregular/Regular Computations, Mahesh Ravishankar, Roshan Dathatri, Venmugil Elango, Louis-Noel Pouchet, J. Ramanujam, Atanas Rountev,

and P. Sadayappan. ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP), 2015

Recent professional development activities:

Attending conferences: ICSE and MobileSoft, 2016

Attending training: diversity training for faculty search committees, The Ohio State University, College of Engineering, 2017

Attending proposal reviews: NSF panel member, 2016

Name: Ponnuswamy Sadayappan

Education:

Ph.D., Electrical Engineering, Stony Brook University, December 1983
M.S., Electrical Engineering, Stony Brook University, December 1978
B.Tech., Electrical Engineering, Indian Institute of Technology, Madras, July 1977

Academic experience:

The Ohio State University, Professor, 1997 - Present
The Ohio State University, Associate Professor, 1990 - 1997
The Ohio State University, Assistant Professor, 1983 - 1990

Non-academic experience: Consultant, AT&T Bell Labs., 1989-1990, part time

Certifications or professional registrations: None

Current membership in professional organizations: ACM, IEEE

Honors and awards: Fellow of IEEE

Lumley Research Award, College of Engineering, Ohio State Univ., 1997, 2002, 2008
Joel & Ruth Spira Excellence in Teaching Award, Lutron, 2016
Outstanding Teaching Award, Dept. of Computer Science, Ohio State Univ., 2008, 2015

Service activities: External Advisory Committee Member: Fundamental and Computational Sciences Directorate, Pacific Northwest National Laboratory, 2011-present.

Program Chair, ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming, PPOPP-2012

Program Committee Member: PACT-2017, ICS-2017, PPOPP-2017, SC-2016, ICS-2016, PACT-2015, PPOPP-2015, IPDPS-2015, PACT-2014, PPOPP-2014, ICS-2014, PLDI-2014 (ERC), ASPLOS-2013, IPDPS-2013, SC-2013, PPOPP-2012.

P&T Committee Chair, Department of Computer Science & Engg., 2014-2016

Recent publications and presentations:

C. Hong, W. Bao, A. Cohen, S. Krishnamoorthy, L.-N. Pouchet, F. Rastello, J. Ramanujam, P. Sadayappan, "Effective Padding of Multidimensional Arrays to Avoid Cache Conflict Misses," PLDI 2016.

W. Bao, S. Krishnamoorthy, L. Pouchet, F. Rastello, P. Sadayappan, "PolyCheck: Dynamic Verification of Iteration Space Transformations on Affine Programs," POPL 2016.

V. Elango, F. Rastello, L.-N. Pouchet, J. Ramanujam, and P. Sadayappan, "On Characterizing the Data Access Complexity of Programs," POPL 2015.

S. Tavarageri, S. Krishnamoorthy, and P. Sadayappan, "Compiler-Assisted Detection of Transient Memory Errors," PLDI 2014.

K. Stock, M. Kong, T. Grosser, L.N. Pouchet, F. Rastello, J. Ramanujam and P. Sadayappan, "A Framework for Enhancing Data Reuse via Associative Reordering," PLDI 2014.

Recent professional development activities:

Attended Dagstuhl Seminar on "Advanced Stencil Engineering", April 2015.

Name: Naeem Shareef

Education:

Computer Science & Applied Math BS, Carnegie Mellon University, 1990
Computer Science MS, The Ohio State University, 1992
Computer Science PhD, The Ohio State University, 2005

Academic experience:

1992 to 2005, Research assistant, The Ohio State University, full time
2005 to present, The Ohio State University, Senior Lecturer, full time
2000 to 2010, Adjunct sometimes at The Ohio State University (Mansfield and Marion campuses)
Capital University, Ohio Dominican University, part time (adjunct)

Non-academic experience: May 1990 to September 1990, Citibank, Software Engineer, full time

Certifications or professional registrations: None

Current membership in professional organizations: ASEE and ACM

Honors and awards: 1997, IEEE Visualization, Best paper award, "An Anti-Aliasing Technique for Splatting"
1997, Naval Notable Achievement Award in the IEEE TVCG Journal, "Splatting Errors and Aliasing"
1999, IEEE Visualization, Best Hot Topics Paper Award, "IBR-Assisted Volume Rendering"

Service activities: 1997, CD-ROM co-chair for the IEEE Visualization conference
2000, Organized website (web pages and server) for IEEE Volume Visualization and Graphics Symposium
Reviewed papers for a variety of technical conferences and Journals in the areas of computer graphics and neural networks
Participated in writing questions for state board exams in technical areas related to computer science

Recent publications and presentations:

"Statistical Visualization and Analysis of Large Data Using a Value-based Spatial Distribution", Ko-ChihWang, Kewei Lu, Tzu-Hsuan Wei, Naeem Shareef, Han-Wei Shen, IEEE Pacific Vis 2017

Recent professional development activities:

Attended the 2015 ASEE conference (will attend this year as well) and the 2017 SIGCSE conference.

Name: Han-Wei Shen

Education:

Ph.D., Computer Science, University of Utah, 1998

M.S., Computer Science, State University of New York at Stony Brook, 1992

B.S., Computer Science, National Taiwan University, 1988

Academic experience:

OSU, Professor, 2012-present (Assistant: 1999-2005, Associate: 2005-2011), Full-Time

Non-academic experience: Research Scientist, NASA Ames Research Center, 09/1996-08/1999

Certifications or professional registrations: None

Current membership in professional organizations: Various

Honors and awards: Ruth and Joel Spira Award for Excellence in Teaching, 2014

CSE Outstanding Teaching Award, 2002, 2009

OSU College of Engineering Lumley Research Award, 2004

Service activities: Associate editor of professional journals

Program chair of various professional conferences

Recent publications and presentations:

Chen, Chun-Ming, Dutta, Soumya, liu, Xiaotong, Heinlein, Gregory, Shen, Han-Wei and Chen, Jen-Ping "Visualization and Analysis of Rotating Stall for Transonic Jet Engine Simulation", IEEE SciVis 2015, also in IEEE Transactions on Visualization and Computer Graphics (TVCG), vol. 22, no. 1, 2016

Dutta, Soumya and Shen, Han-Wei, "Distribution Driven Extraction and Tracking of Features for Time-varying Data Analysis", IEEE SciVIS 2015, also in IEEE Transactions on Visualization and Computer Graphics, vol. 22, no. 1, 2016

Liu, Xiaotong and Shen, Han-Wei, "Association Analysis for Visual Exploration of Multivariate Scientific Data Sets". IEEE SciVis 2015, also in IEEE Transactions on Visualization and Computer Graphics (TVCG), vol. 22, no. 1, 2016

Tong, Xin, Chen, Chun-Ming, Shen, Han-Wei, Wang, Pak. "Interactive Streamline Exploration and Manipulation Using Deformation" In IEEE Pacific Visualization 2015. Hangzhou, April 2015

Liu, Xiaotong, Shen, Han-Wei. "The Effects of Representation and Juxtaposition on Graphical Perception of Matrix Visualization" In ACM CHI. Seoul, Korea, ACM, May 2015

Recent professional development activities:

Service on various professional conference organizations

Name: Ness Shroff

Education:

PhD, Electrical Engineering, Columbia University, 1994
M.Phil, Electrical Engineering, Columbia University, 1993
M.S.E, Electrical Engineering, University of Pennsylvania, 1993
B.S., Electrical Engineering, University of Southern California, 1988

Academic experience:

The Ohio State University, Professor, Ohio Eminent Scholar, 2007-current (full time)
Purdue University, Professor, 2003-2007
Purdue University, Associate Professor, 2000-2003
Purdue University, Assistant Professor, 1994-2000

Non-academic experience: None

Certifications or professional registrations: None

Current membership in professional organizations: IEEE Member

Honors and awards: a) IEEE Infocom Achievement Award (2014) a lifetime achievement award for "seminal contributions to scheduling and resource allocation in wireless networks."
b) Listed in the 2014 Most Influential Scientific Minds Book by Thomson Reuters
c) Thomson Reuter's (previously ISI) Most Highly Cited Researchers (<http://highlycited.com>) in 2014 and 2015.
d) Best paper awards, IEEE INFOCOM 2016, IEEE INFOCOM 2008, IEEE INFOCOM 2006.
e) Best paper award Computer Networks Journal, 2003, KICS/IEEE Journal of Communications and Networks, 2005.
f) Best student paper award, WiOPT 2013, WiOPT 2012

Service activities: a) General Co-chair, WiOPT 2016, Phoenix, AZ,
b) Area Technical Program Chair, IEEE INFOCOM 2009-2014, 2016.
c) Chair, National Science Foundation Workshop on the Future of Wireless Communication Networks, Arlington, Virginia, Nov. 2009.
d) General co-chair, Fourth International Wireless Internet Conference (WICON 2008), Hawaii, Nov. 2008.
e) Technical Program co-chair, ACM MobiHoc 2008, Hong Kong, May 2008.
f) Co-Organizer, National Science Foundation workshop on Fundamental Research in Networking, April 2003, Charlottesville, VA.
g) Program Co-Chair, IEEE INFOCOM'2003, San Francisco, CA.

Recent publications and presentations:

a) F. Wu, Y. Sun, Y. Yang, K. Srinivasan, and N. B. Shroff, "Constant Delay and Constant Feedback Moving Window Network Coding for Wireless Multicast: Design and Asymptotic Analysis," IEEE Journal on Selected Areas in Communications (JSAC), vol. 33, no. 2, Mar. 2015, pp. 127 – 140.
b) Bo Ji, Gagan R. Gupta, Xiaojun Lin, and Ness B. Shroff, "Low-Complexity Scheduling Policies for Achieving Throughput and Asymptotic Delay Optimality in Multi-Channel Wireless Networks," IEEE/ACM Transactions on Networking, vol. 22, no. 1, Feb. 2014, pp. 1911-1924.

- c) S Buccapatnam, A Eryilmaz, N. B. Shroff "Stochastic bandits with side observations on networks ACM SIGMETRICS Performance Evaluation Review 42 (1), 289-300.
- d) S. Wang, F. Liu, and N. B. Shroff, "Non-additive Security Games, " The 31st AAAI conference (AAAI-17), San Francisco, CA, 2017.
- e) Y. Sun, E. Uysal-Biyikoglu, R. Yates, C. E. Koksal, and N. B. Shroff, "Update or Wait: How to Keep Your Data Fresh," IEEE INFOCOM'16, San Francisco, CA, Apr. 2016.

Recent professional development activities:

None

Name: Anastasios Sidiropoulos

Education:

PhD, Computer Science, MIT, 2008.

MsC, Computer Science, MIT, 2005.

Diploma, Computer Engineering and Informatics, University of Patras, 2002.

Academic experience:

Assistant professor, The Ohio State University, 2013-present. Full time.

University of Illinois at Urbana-Champaign, Postdoctoral fellow, 2012-2013, Full time.

Toyota Technological Institute at Chicago, Research assistant professor, 2009-2012, Full time.

University of Toronto, Postdoctoral fellow, 2008-2009, Full time.

Non-academic experience: Summer 2006 and summer 2007. Intern, Google Inc., New York. Full time.

Certifications or professional registrations: None

Current membership in professional organizations: ACM, member.

Honors and awards: NSF CAREER: Geometric Frontiers in Algorithm Design (CAREER 1453472). February 2015 – January 2020 (estimated).

Outstanding Teaching Award, CSE dept., OSU, 2017.

Service activities: Program committee member for FOCS 2015, SoCG 2015, ESA 2015, SIMBAD 2015, ESA 2014, WAOA 2013, TAMC 2013, SODA 2012.

Reviewer for FOCS, STOC, SODA, SoCG, RANDOM, APPROX, ICALP, ESA, J. ACM, SIAM J. Comp, ACM Trans. Alg, Theor. Comp. Sci., IPL, J. Comb. Theor. Series B.

Recent publications and presentations:

Algorithmic interpretations of fractal dimension. Anastasios Sidiropoulos, Vijay Sridhar. ACM Symposium on Computational Geometry (SoCG 2017).

Metric embeddings with outliers. Anastasios Sidiropoulos, Dingkan Wang, Yusu Wang. ACM-SIAM Symposium on Discrete Algorithms (SODA 2017)

Beyond the Euler characteristic: Approximating the genus of general graphs. Ken-ichi Kawarabayashi, Anastasios Sidiropoulos. ACM Symposium on Theory of Computing (STOC 2015).

Non-positive curvature and the planar embedding conjecture. Anastasios Sidiropoulos. IEEE Symposium on Foundations of Computer Science (FOCS 2013).

Approximation algorithms for Euler genus, and related problems. Chandra Chekuri, Anastasios Sidiropoulos. IEEE Symposium on Foundations of Computer Science (FOCS 2013).

Recent professional development activities:

Organized workshop “Algorithms on topologically restricted graphs” at STOC/SoCG 2016. Co-organized with Ken-ichi Kawarabayashi.

Name: Prasun Sinha

Education:

PhD, Computer Science, University of Illinois, Urbana-Champaign, 2001

Academic experience:

The Ohio State University, Professor, Professor, 09/2015 - now, Full Time

Stanford University, Associate Professor, Visiting Associate Professor, 09/2010 - 08/2011, Full Time

The Ohio State University, Associate Professor, Associate Professor, 09/2009 - 08/2015, Full Time

The Ohio State University, Assistant Professor, Assistant Professor, 09/2003 - 08/2009, Full Time

Non-academic experience: Bell Labs, Lucent Technologies (Holmdel, NJ), Member of Technical Staff, Researcher in the field of wireless networking, Mar 2001 – Jan 2003, Full Time

Certifications or professional registrations: None

Current membership in professional organizations: IEEE, Fellow

ACM, Distinguished Scientist

Honors and awards: IEEE Fellow, 2017

2. Distinguished Scientist, ACM, 2016

3. Best Paper Finalist (Top 7), ACM MOBICOM 2014

4. Best Student Paper, WiOpt 2013

5. IEEE Senior Member, April 2010

6. Lumley Research Award, College of Engineering, Ohio State University, May 2009

Service activities: Technical Program Committee (TPC) Co-Chair: IEEE INFOCOM 2018, IEEE SECON 2016, ACM MOBICOM 2014, IEEE ICDCN 2013, IEEE IWQoS 2011, ICST QShine 2009

2. Technical Program Committee (TPC) Chair: ICST BROADNETS 2010

3. Guest Co-Editor, Special Section on ICDCN, Elsevier Pervasive and Mobile Computing (PMC), 2013

4. Guest Co-Editor, Special Section on IWQoS, IEEE Transactions on Network and Service Management (TNSM), 2012

5. Steering Committee Member: IEEE IWQoS, April 2011 - April 2014

6. Area Chair, Technical Program Committee, IEEE INFOCOM 2017

Recent publications and presentations:

"BASIC: Backbone-Assisted Successive Interference Cancellation", Wenjie Zhou, Tanmoy Das, Lu Chen, Kannan Srinivasan and Prasun Sinha, Proc. of ACM MOBICOM, New York, Oct 2016

"Exploiting Large System Dynamics for Designing Simple Data Center Schedulers", Yousi Zheng, Ness B. Shroff, R. Srikant and Prasun Sinha, Proc. of IEEE INFOCOM, Hong Kong, Apr 2015

"BBN: Throughput Scaling in Dense Enterprise WLANs with Blind Beamforming and Nulling", Wenjie Zhou (co-primary), Tarun Bansal (co-primary), Prasun Sinha and Kannan Srinivasan, Proc. of ACM MOBICOM, Maui, Hawaii, Sep 2014

"When Queueing Meets Coding: Optimal-Latency Data Retrieving Scheme in Storage Clouds", Shengbo Chen, Ulas Can Kozat, Longbo Huang, Prasun Sinha, Guanfeng Liang, Xin Liu, Yin Sun and Ness B. Shroff, Proc. of IEEE INFOCOM, Toronto, Canada, Apr 2014

"R2D2: Embracing Device-to-Device Communication in Next Generation Cellular Networks", Tarun

Bansal, Karthikeyan Sundaresan, Sampath Rangarajan and Prasun Sinha. Proc. of IEEE INFOCOM, Toronto, Canada, Apr 2014

"Symphony: Cooperative Packet Recovery over the Wired Backbone in Enterprise WLANs", Tarun Bansal, Bo Chen, Prasun Sinha and Kannan Srinivasan. Proc. of ACM MOBICOM, Miami, Florida, Sep 2013

Recent professional development activities:

1. I gave an invited talk in COMSNETS 2017 held in Bangalore India on "Navigation assistance for Individuals with Visual Impairments in Indoor Environment"
2. Talk at UC Davis (Spring 2016) and Stony Brook University (Fall 2016) on the topic of scalable uplink communication in wireless networks

Name: Paolo A. G. Sivilotti

Education:

Ph.D., Computer Science, California Institute of Technology, 1997

M.S., Computer Science, California Institute of Technology, 1993

B.Sc.H., Biochemistry and Computing and Information Science, Queen's University, 1991

Academic experience:

The Ohio State University, Associate Professor, 2004-present, full time

The University of Minnesota, Visiting Associate Professor, 2005-2006, full time

The Ohio State University, Assistant Professor, 1998-2004, full time

California Institute of Technology, Postdoctoral Scholar, 1998, full time

Non-academic experience: IBM, Summer Intern, Assisted in development of protocol specification notation, 1995

Certifications or professional registrations: None

Current membership in professional organizations: ACM SIGSOFT

IEEE Computer Society

Honors and awards: Joel & Ruth Spira Excellence in Teaching Award (2015)

Ohio State University Alumni Award for Distinguished Teaching (2012)

CSE Department Award for Outstanding Teaching (2000, 2005, 2011)

Best Paper Award at ICDCS '04 (2004)

Best Paper Award at HPDC '96 (1996)

Service activities: College Committee on Academic Affairs (College)

Chair of Curriculum Committee (Department)

Faculty Search Committee (Department)

Faculty Mentor for Eminence Fellowship Program (University)

Program Committee, 2016 International Conference on Parallel Programming (external)

Recent publications and presentations:

"Enabling Modular Verification with Abstract Interference Specifications for a Concurrent Queue", Alan Weide, Paolo A. G. Sivilotti, and Murali Sitaraman, *Verified Software. Theories, Tools, and Experiments - 8th International Conference (VSTTE 2016)*, July 2016

"Getting Out of the Way—Safety Verification without Compromise" Pavlic, Peddi, Sivilotti, and Weide, *Third International Conference on Cyber-Physical Systems (ICCPS)*, April 2012.

Recent professional development activities:

Attended Innovate 2016, a workshop on leveraging technology to advance teaching and learning. Columbus, Ohio, May 2016

Name: Neelam Soundarajan

Education:

Ph.D.; Computer Science; Bombay University, India; 1978

Academic experience:

Ohio State University, Visiting Asst. Professor, 1978-1980, full-time
Oslo University, Post-doctoral fellow, 1980-1981, full-time
Ohio State University, Assistant Professor, 1982-1988, full-time
Ohio State University, Associate Professor, 1988-current, full-time

Non-academic experience: None.

Certifications or professional registrations: None.

Current membership in professional organizations: ACM, IEEE-CS, ASEE

Honors and awards: CSE Departmental Teaching Award, 2016.

Service activities: CAC/ABET Program Evaluator since 2002;
CAC Commissioner/Team Chair, since 2011
Chair of CSE Departmental Undergraduate Studies Committee (1998-current)
Advisor to CSE NEWPATH, student entrepreneurial group
Advisor to CSE CAEIAE (Center for information assurance education)

Recent publications and presentations:

- a. S. Joshi, N. Soundarajan, Enabling deep conceptual learning in computing courses through conflict-based collaborative learning, IEEE Frontiers in Education Conference (FiE), pp. 1-9, IEEE, 2016.
- b. S. Joshi, N. Soundarajan, CONSIDER: A Novel Approach to Conflict-Driven Collaborative Learning in Engineering Courses, 2016 ASEE Annual Conference and Exposition, New Orleans, Louisiana, 2016 (17 pages).
- c. N. Soundarajan, S. Joshi, R. Ramnath, Work-in-Progress: Conflict- Driven Cooperative Learning in Engineering Courses, 2015 ASEE Annual Conference and Exposition, Seattle, 2015 (14 pages).
- d. N. Soundarajan, S. Joshi, R. Ramnath, Collaborative and Cooperative- Learning in Software Engineering Courses, Proc. of JSEET/ICSE, 2015, ACM, 6319–322.
- e. N. Soundarajan, R. Ramnath, B. Weide, A multi-pronged approach to nurturing IT entrepreneurs, Proc. of the ASEE Annual Conference, pp. 18-34, 2013. (An extended version of this appeared in the journal Advances in Engineering Education, vol. 4, no. 4, 2015.)
- f. N. Soundarajan, A Novel, Sustainable Model of Assessment of Program Outcomes for a CSE Program, Computers in Education Journal, Vol. 3, No. 2, pp. 59–71, 2012.

Recent professional development activities:

Active involvement in CAC/ABET discussions related to accreditation criteria for CS programs.
Active involvement in the OSU College of Engineering in discussions on approaches to continuous improvement of engineering programs.

Name: Kannan Srinivasan

Education:

Ph.D., Stanford University, Electrical Engineering, 2010.
MS, Oklahoma State University, Electrical Engineering, 2002.
BE, University of Madras, Electrical and Electronics Engineering, 2000.

Academic experience:

The Ohio State University, Associate Professor, Sep 2016 - Present.
The Ohio State University, Assistant Professor, Sep 2011 - Sep 2016.
The University of Texas at Austin, Post-doctoral Researcher, Sep 2010 - Sep 2011.

Non-academic experience: National Research Council of Canada, Researcher, Jan 2003 - Aug 2005.

Certifications or professional registrations: None.

Current membership in professional organizations: ACM, IEEE

Honors and awards: 1. Best Student Paper Award, Usenix NSDI 2016.
2. Best Paper Award, MobiCom 2010.
3. Best Demo Award, MobiCom 2010.
4. Stanford University Electrical Engineering Departmental Fellowship, 2005.
5. Presidential Award for Academic Excellence, Oklahoma State University, 2000.

Service activities: Chairing ACM MobiCom 2017.
Chaired ACM HotWireless 2015.
Regular TPC Member of MobiCom, CoNEXT, SenSys, Infocom.

Recent publications and presentations:

1. Wenjie Zhou, Tanmoy Das, Lu Chen, Kannan Srinivasan and Prasun Sinha, "BASIC: Backbone-Assisted Successive Interference Cancellation," the 22nd Annual International Conference on Mobile Computing and Networking (MobiCom), 2016.
2. Yue Qiao, Ouyang Zhang, Wenjie Zhou, Kannan Srinivasan and Anish Arora, "PhyCloak: Obfuscating Sensing from Communication Signals," the 13th Usenix Symposium on Networked Systems Design & Implementation (NSDI (Best Student Paper)), 2016.
3. Bo Chen, Vivek Yenamandra and Kannan Srinivasan, "FlexRadio: Fully Flexible Radios and Networks," the 12th Usenix Symposium on Networked Systems Design & Implementation (NSDI), 2015.
4. Ouyang Zhang and Kannan Srinivasan, "Mudra: User-friendly Fine-grained Gesture Recognition using WiFi Signals," In the 12th ACM International Conference on emerging Networking EXperiments and Technologies (CoNEXT), 2016.
5. Tarun Bansal, Wenjie Zhou, Prasun Sinha and Kannan Srinivasan, "BBN: Throughput Scaling in Dense Enterprise WLANs with Blind Beamforming and Nulling," In the 20th Annual International Conference on Mobile Computing and Networking (MobiCom (Best Paper Finalist)), 2014.
6. Vivek Yenamandra and Kannan Srinivasan, "Vidyut: Exploiting Power Line Infrastructure for Enterprise Wireless Networks," the ACM Special Interest Group on Data Communication (SIGCOMM), 2014. (Patented by The Ohio State University)
7. Wenjie Zhou, Dong Li, Kannan Srinivasan and Prasun Sinha, "DOMINO: Relative Scheduling in Enterprise Wireless LANs," In the 9th ACM International Conference on emerging Networking

EXperiments and Technologies (CoNEXT), 2013.

8. Wenjie Zeng, Anish Arora and Kannan Srinivasan, “Low Power Counting via Collaborative Wireless Communications,” In the ACM/IEEE Conference on Information Processing in Sensor Networks (IPSN (Best Paper Runner-Up)), 2013.

Recent professional development activities:

1. Regularly attending top-tier conferences like ACM MobiCom to represent OSU.
2. Creating a curriculum that focuses on engineering for middle school kids in local schools in Columbus in under-represented communities.
3. Regularly visiting Indian institutes like IIT and IISc to recruit students at OSU.

Name: Christopher Stewart

Education:

PhD, Computer Science, University of Rochester, 2008
MS, Computer Science, University of Rochester, 2005
BS, Computer Science, Morehouse College, 2003

Academic experience:

The Ohio State University, Faculty-In-Residence for Translational Data Analytics, 2016 - Current
The Ohio State University, Associate Professor, 2016 - Current
The Ohio State University, Assistant Professor, 2009 - 2016

Non-academic experience: HP Labs, Research Intern, , 2006-2008

Sun Microsystems, Research Intern, , 2005

Certifications or professional registrations: None

Current membership in professional organizations: ACM, IEEE, USENIX

Honors and awards: 2014 NSF CAREER Award

2011 IEEE ISSST Third-Best Paper
2010 IEEE MASCOTS Best Paper

Service activities: Program Chair, IEEE International Conference on Autonomic Computing, 2016

Poster Chair, Tapia Conference on Diversity, 2015 & 2016
Program Committee, ACM Sigmetrics, USENIX ATC, IEEE ICAC, ACM ASPLOS, etc.

Recent publications and presentations:

Sprint Ability: How Well Does Your Software Exploit Bursts in Processing Capacity? Nathaniel Morris and Siva Meenakshi Renganathan and Christopher Stewart and Robert Birke and Lydia Chen International Conference on Autonomic Computing Wurzburg, Germany, 2016
Adaptive Power Profiling for Many-Core HPC Architectures Jaimie Kelley and Christopher Stewart and Devesh Tiwari and Saurabh Gupta International Conference on Autonomic Computing, Wurzburg, Germany, 2016
Blending On-Demand and Spot Instances to Lower Costs for In-Memory Storage Zichen Xu and Christopher Stewart and Nan Deng and Xiaorui Wang IEEE International Conference on Computer Communications, San Francisco, CA, 2016
Measuring and Managing Answer Quality for Online Data-Intensive Services Jamie Kelley and Christopher Stewart and Devesh Tiwari and Yuxiong He and Sameh Elnikey and Nathaniel Morris International Conference on Autonomic Computing, Grenoble France, 2015
Policy and Mechanism for Carbon-Aware Cloud Applications Nan Deng, Christopher Stewart, Daniel Gmach, and Martin Arlitt Network Operations and Management Symposium, Maui, Hawaii, 2012

Recent professional development activities:

Attended Ohio Conference on Women in Computing (OCWIC)
Attended Symposium on Edge Computing
Completed training for Google TensorFlow

Name: Huan Sun

Education:

Ph.D., Computer Science, University of California, Santa Barbara, 2015

B.S., Electronic Engineering and Information Science, University of Science and Technology of China, 2010

Academic experience:

The Ohio State University, Assistant Professor, July 2016 - present, full time

University of Washington, Visiting Scientist, Jan 2016 - June 2016, full time

Non-academic experience: Baidu Research (Sunnyvale), Visiting Scholar, Sep 2015 - Dec 2015, full time

Microsoft Research, Redmond, Summer Research Intern, 2014/2015, full time

IBM Watson Research Center, Summer Research Intern, 2013, full time

Microsoft Research Asia, Research Intern, Jan 2010 - Mar 2010, full time

Certifications or professional registrations: None

Current membership in professional organizations: None

Honors and awards: (1) SIGKDD Ph.D. Dissertation Runner-Up Award 2016

(2) Rising Star in EECS, MIT 2015

(3) Outstanding Dissertation Award, Computer Science Department, UCSB 2015

(4) Ph.D. Progress Award, Computer Science Department, UCSB 2014

(5) Regents' Special Fellowship, UCSB 2010, 2014

Service activities: (1) PC Member: CIKM 2017, SIGKDD 2016, EMNLP 2016, ICDM 2016, CIKM 2016

(2) External Reviewer: WWW 2015, TKDD 2014, ICDM 2013, ICDM 2012, ICDE 2011

(3) Serve on the Grad Admission Committee at OSU.

Recent publications and presentations:

(1) On Generating Characteristic-rich Question Sets for QA Evaluation. Yu Su, H. Sun, Brian Sadler, Mudhakar Srivatsa, Izzeddin Gur, Zenghui Yan, Xifeng Yan. EMNLP 2016.

(2) Table Cell Search for Question Answering. Huan Sun, Hao Ma, Xiaodong He, Wen-Tau Scott Yih, Yu Su, Xifeng Yan. WWW 2016.

(3) Open Domain Question Answering via Semantic Enrichment. Huan Sun, Hao Ma, Wen-tau Yih, Chen-Tse Tsai, Jingjing Liu, Ming-Wei Chang. WWW 2015.

(4) Analyzing Expert Behaviors in Collaborative Networks. Huan Sun, Mudhakar Srivatsa, Shulong Tan, Yang Li, Lance M. Kaplan, Shu Tao, Xifeng Yan. SIGKDD 2014.

(5) Schemaless and Structureless Graph Querying. Shengqi Yang, Yinghui Wu, Huan Sun, Xifeng Yan. VLDB 2014.

Recent professional development activities:

NSF career workshop, Mar 2017

OCWiC (Ohio Celebration of Women in Computing), Feb 2017

Army Research Lab Open House, Nov 2016

EMNLP conference, Nov 2016

SIGKDD conference, Aug 2016

Name: Ken Supowit

Education:

Ph.D., Computer Science, University of Illinois, 1981

Academic experience:

Assistant Professor, Princeton University, full time, 1984-1988

Associate Professor, Ohio State University, full time, 1988-present

Non-academic experience: Hewlett-Packard Labs, research and development, hardware design and testing, full time, 1981-1984

Certifications or professional registrations: None

Current membership in professional organizations: None

Honors and awards: New Jersey Bell Endowed Preceptorship, Sept. 1984 – June 1987.

NSF Presidential Young Investigator Award, 1985 –1989.

IBM Faculty Development Award, 1985 – 86.

Service activities: Chair, Curriculum Committee, CSE Dept., 2010-2014

Member, Curriculum Committee, CSE Dept., 2005-current

Member, Undergraduate Studies Comm., CSE Dept., 2010-2014

Recent publications and presentations:

None

Recent professional development activities:

None

Name: Radu Teodorescu

Education:

PhD, Computer Science, University of Illinois, 2008

MS, Computer Science, University of Illinois, 2005

BS, Computer Science, Technical University of Cluj-Napoca, Romania, 2002

Academic experience:

The Ohio State University, Associate Professor, Computer Science & Engineering, August 2014 - present, full time

The Ohio State University, Assistant Professor, Computer Science & Engineering, Sep 2008 - Jul 2014, full time

University of Illinois, Graduate Research Assistant, Computer Science, University of Illinois, 2002-2008, part time

Non-academic experience: None

Certifications or professional registrations: None

Current membership in professional organizations: ACM, IEEE

Honors and awards: Jan 2016, IEEE MICRO Top Picks from Architecture Conferences in 2015, Honorable Mention, IEEE Nov 2015, Nominated for Best Paper Award at HPCA 2016
Apr 2014, Lumley Research Award, College of Engineering, The Ohio State University
Feb 2013 - Jan 2018, Early Career Award, National Science Foundation
Jan 2010 - Jan 2010, One of the best papers at SBAC-PAD 2010, Program Committee of SBAC-PAD
Jan 2008, W. J. Poppelbaum Award, University of Illinois at Urbana Champaign
Jan 2007 - Jan 2008, Intel Foundation Ph.D. Fellowship, Intel Foundation
Jan 2006 - Jan 2006, David J. Kuck Outstanding Master's Thesis Award, University of Illinois at Urbana Champaign

Service activities: Associate Editor, IEEE Computer Architecture Letters (CAL), Since 2016

External Program Committee Member of the International Symposium on Microarchitecture (MICRO), Review Board May 2016

Program Committee Member of the 28th International Symposium on Computer Architecture and High Performance Computing (SBAC-PAD), Review Board Mar 2016

ACM Transactions on Architecture and Code Optimization (TACO), Journal Reviewer Aug 2012

ACM Transactions on Design Automation of Electronic Systems (TOADES), Journal Reviewer Jul 2012

Program Committee Member of the 2016 IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS), Review Board Jul 2015 - Mar 2016

Program Committee Member of the IFIP/IEEE International Conference on Very Large Scale Integration (VLSI-SOC), Review Board Jan 2015 - Aug 2015

Recent publications and presentations:

Xiang Pan, Anys Bacha, Radu Teodorescu, "Respin: Rethinking Near-Threshold Multiprocessor Design with Non-Volatile Memory", in IEEE International Parallel & Distributed Processing Symposium (IPDPS), 2017.

Dimitrios Skarlatos, Renji Thomas, Aditya Agrawal, Shibin Qin, Robert Pilawa, Ulya Karpuzcu, Radu Teodorescu, Nam Sung Kim, Josep Torrellas. "Snatch: Opportunistically Reassigning Power Allocation between Processor and Memory in 3D Stacks." In: International Symposium on Microarchitecture (MICRO). (Oct 2016). 1-12.

Yuan Xiao, Xiaokuan Zhang, Yinqian Zhang, Radu Teodorescu. "One Bit Flips, One Cloud Flops: Cross-VM Row Hammer Attacks and Privilege Escalation." In: USENIX Security Symposium. (Aug 2016). 19-35.

Renji Thomas, Naser Sedaghati, Radu Teodorescu. "EmerGPU: Understanding and Mitigating Resonance-Induced Voltage Noise in GPU Architectures." In: International Symposium on Performance Analysis of Systems and Software (ISPASS). (Apr 2016). 1-12.

Renji Thomas, Kristin Barber, Naser Sedaghati, Li Zhou, Radu Teodorescu. "Core Tunneling: Variation-Aware Voltage Noise Mitigation in GPUs." In: International Symposium on High-Performance Computer Architecture (HPCA). (Mar 2016). Nominated for Best Paper Award.

Anys Bacha and Radu Teodorescu. "Authenticache: Harnessing Cache ECC for System Authentication." In: International Symposium on Microarchitecture (MICRO). (Nov 2015). IEEE MICRO Top Picks from 2015 architecture conferences, Honorable Mention.

Anys Bacha and Radu Teodorescu. "Using ECC Feedback to Guide Voltage Speculation in Low-Voltage Processors." In: International Symposium on Microarchitecture (MICRO). (Dec 2014). 306-318.

Xiang Pan and Radu Teodorescu. "NVSleep: Using Non-Volatile Memory to Enable Fast Sleep/Wakeup of Idle Cores." In: IEEE International Conference on Computer Design (ICCD). (Oct 2014). 400-407.

Anys Bacha, Radu Teodorescu. "Dynamic Reduction of Voltage Margins by Leveraging On-chip ECC in Itanium II Processors." In: International Symposium on Computer Architecture (ISCA). (Jun 2013). 297-307.

Timothy N. Miller, Renji Thomas, Xiang Pan, Radu Teodorescu. "VRSync: Characterizing and Eliminating Synchronization-Induced Voltage Emergencies in Many-core Processors." In: International Symposium on Computer Architecture (ISCA). (Jun 2012). 249-260.

Timothy N. Miller, Xiang Pan, Renji Thomas, Naser Sedaghati, Radu Teodorescu. "Booster: Reactive Core Acceleration for Mitigating the Effects of Process Variation and Application Imbalance in Low-Voltage Chips." In: International Symposium on High-Performance Computer Architecture (HPCA). (Feb 2012). 27-38.

Recent professional development activities:

I regularly attend and participate in the top conferences in Computer Architecture. Some recent conferences I attended: HPCA 2017, ISCA 2016, ISPASS 2016, HPCA 2016, etc. I am currently on Sabbatical at Carnegie Mellon University as a Visiting Professor in the ECE Department.

Name: Jason Van Hulse

Education:

Ph.D. Computer Engineering, Florida Atlantic University, May 2007

M.A. Mathematics, Stony Brook University, May 2000

B.S., Mathematics, University at Albany, May 1997

Academic experience:

Sr. Lecturer, the Ohio State University since 2015, part-time Adjunct Instructor, Statistics, Southampton College/Long Island University, 1999, part-time

Non-academic experience: Executive Director, JPMorgan Chase, January 2011 - present (full-time)

Vice President, First Data Corporation, May 2000 - January 2011, full-time

Certifications or professional registrations: None

Current membership in professional organizations: None

Honors and awards: None

Service activities: Program Committee Member for IEEE International Conference on Information Reuse and Integration (IRI), 2007 - 2010; IEEE International Conference on Machine Learning Applications (ICMLA), 2010 - 2017; IEEE International Conference on Tools with Artificial Intelligence (ICTAI), 2014.

Session chair for IRI 2005, IRI 2006 and ICTAI 2004 conferences.

Journal/conference reviews: Knowledge and Information Systems: An International Journal, ICTAI 2004, IRI 2005 -2010, ICTAI 2006, IEEE Transactions on Software Engineering.

Recent publications and presentations:

Jason Van Hulse and Taghi M. Khoshgoftaar. Incomplete-case nearest neighbor imputation in software measurement data. *Information Sciences*, 259:571-595, February 2014

Jason Van Hulse, Taghi M. Khoshgoftaar, and Amri Napolitano. A novel noise-resistant boosting algorithm for class-skewed data. In *Proceedings of the 11th IEEE International Conference on Machine Learning and Applications (ICMLA)*, pages 551 - 557, Boca Raton, FL December 2012

Recent professional development activities:

None

Name: Richard Wagner

Education:

BSCSE, Computer Science and Engineering, The Ohio State University, 2002

Master's Degree, Computer Science and Engineering, The Ohio State University, 2015

Academic experience:

The Ohio State University, ??, Lecturer, August 2016 - present, part time

Non-academic experience: The Ohio Bureau of Workers' Compensation, IT Manager 2, Manage networking, data warehouse, server logistics, and mainframe teams, February 2013 - present, full time

The Ohio Bureau of Workers' Compensation, Infrastructure Specialist 3, Managed Solaris and Linux systems, input/output file interface systems, architected infrastructure solutions, April 2010 - February 2013, full time

The Ohio Bureau of Workers' Compensation, Programmer Analyst 3, Managed Solaris and Linux systems, programmed in PERL, created web applications, input/output file interface systems, August 2005 - April 2010, full time

The Ohio State University, System Developer/Engineer, Managed Solaris and Linux systems, programmed in PERL, created web applications, December 1998 - August 2005, full time

Certifications or professional registrations: ITIL V3 Foundations GR750173817RW, May 2015

Current membership in professional organizations: None

Honors and awards: Won Winter 2011 Best Capstone project award for CSE department at OSU.

Won 2004 Computer Science and Engineering Department service award.

Service activities: Elected Historian, Upsilon Pi Epsilon (Computer Science honor society)

Recent publications and presentations:

None

Recent professional development activities:

Went to Gartner IT Symposium conference in Oct 2013, attended other management development training provided internally by BWC

Name: DeLiang Wang

Education:

Ph.D., Computer Science, University of Southern California, 1991

M.S., Computer Science, Beijing (Peking) University, 1986 B.S., Computer Science, Beijing University, Beijing, 1983

Academic experience:

Ohio State University: Professor, 2001 present, full time; Associate Professor, 1997 2001, full time; Assistant Professor, 1991 1997, full time

Non-academic experience: None

Certifications or professional registrations: None

Current membership in professional organizations: International Neural Network Society (Senior Member), IEEE Computational Intelligence Society, IEEE Signal Processing Society, and IEEE (Fellow)

Honors and awards: National Science Foundation Research Initiation Award, 1992

Office of Naval Research Young Investigator Award, 1996

OSU College of Engineering Lumley Research Award, 1996, 2000, 2005, 2010

IEEE Fellow, 2004

IEEE Computational Intelligence Society Outstanding Paper Award, 2007

International Neural Network Society Helmholtz Award, 2008

OSU Distinguished Scholar Award, 2014

Service activities: Co-Editor-in-Chief: Neural Networks, 2011-present

Chair: IEEE Computational Intelligence Society Neural Networks Technical Committee, 2004

President: International Neural Network Society, 2006

Program Co-Chair: International Joint Conference on Neural Networks, 2003, and International Conference on Neural Information Processing, 2006

General Co-Chair: International Conference on Intelligent Computing, 2011

Chair: College of Engineering Promotion and Tenure Advisory Committee, 2013-2014

Recent publications and presentations:

Wang, D.L. (2017). Deep learning reinvents the hearing aid. *IEEE Spectrum*.

Chen J., Wang Y., Yoho S. E., Wang D.L., and Healy E.W. (2016). Large-scale training to increase speech intelligibility for hearing-impaired listeners in novel noises. *Journal of the Acoustical Society of America*.

Williamson D.S., Wang Y., and Wang D.L. (2016): Complex ratio masking for monaural speech separation. *IEEE/ACM Transactions on Audio, Speech, and Language Processing*.

Healy E.W., Yoho S.E., Chen J., Wang Y., and Wang D.L. (2015): An algorithm to increase speech intelligibility for hearing-impaired listeners in novel segments of the same noise type. *Journal of the Acoustical Society of America*.

Narayanan A. and Wang D.L. (2015): Improving robustness of deep neural network acoustic models via speech separation and joint adaptive training. *IEEE/ACM Transactions on Audio, Speech, and Language Processing*.

Jiang Y., Wang D.L., Liu R.S., Feng Z.M. (2014): Binaural classification for reverberant speech

segregation using deep neural networks. *IEEE/ACM Transactions on Audio, Speech, and Language Processing*.

Wang Y., Narayanan A. and Wang D.L. (2014): On training targets for supervised speech separation. *IEEE/ACM Transactions on Audio, Speech, and Language Processing*.

Healy E.W., Yoho S.E., Wang Y., and Wang D. (2013). An algorithm to improve speech recognition in noise for hearing-impaired listeners. *Journal of the Acoustical Society of America*.

Wang Y. and Wang D.L. (2013). Towards scaling up classification-based speech separation. *IEEE Transactions on Audio, Speech, and Language Processing*.

Hu K. and Wang D.L. (2013): An unsupervised approach to cochannel speech separation. *IEEE Transactions on Audio, Speech, and Language Processing*.

Recent professional development activities:

Spent a sabbatical leave during 2014 at Starkey, the largest hearing aid company in America, to gain insights into the strengths and weaknesses of signal processing in digital hearing aids. This sabbatical leave is closely related to my NIH project on improving speech intelligibility for hearing impaired listeners in background noise.

Introduced supervised learning to address the speech segregation problem. Furthermore, leveraging rapid advances in deep learning, we were the first to introduce deep neural networks for supervised speech segregation, which elevated speech segregation performance to a new level.

Name: Huamin Wang

Education:

Ph.D., Computer Science, Georgia Institute of Technology, 2009

M.S., Computer Science, Stanford University, 2004

B.Eng., Computer Science, Zhejiang University, 2002

Academic experience:

The Ohio State University, Assistant Professor, 2011 to 2017, full-time

University of California at Berkeley, Postdoctoral Researcher, 2009 to 2011, full-time

Non-academic experience: None

Certifications or professional registrations: None

Current membership in professional organizations: ACM member and IEEE member

Honors and awards: NVIDIA fellowship

Service activities: Graduate admission committee from 2011 to 2017

Committee members of various graphics conferences

Associate editor of Computer Animation and Virtual Worlds

NSF Panelist

Committee Co-chair of CASA 2017

Recent publications and presentations:

Huamin Wang and Yin Yang. 2016. Descent Methods for Elastic Body Simulation on the GPU. ACM Transactions on Graphics (SIGGRAPH Asia).

Huamin Wang. 2015. A Chebyshev semi-iterative approach for accelerating projective and position-based dynamics. ACM Transactions on Graphics (SIGGRAPH Asia), vol. 34, no. 6, pp. 246:1–246:9.

Miaojun Yao, Zhili Chen, Linjie Luo, Rui Wang and Huamin Wang. 2015. Level-set-based partitioning and packing optimization of a printable model. ACM Transactions on Graphics (SIGGRAPH Asia), vol. 34, no. 6, pp. 214:1–214:11.

Zhili Chen, Miaojun Yao, Renguo Feng and Huamin Wang. 2014. Physics-inspired adaptive fracture refinement. ACM Transactions on Graphics (SIGGRAPH), vol. 33, no. 4, pp. 113:1–113:7.

Zhili Chen, Renguo Feng and Huamin Wang. 2013. Modeling friction and air effects between cloth and deformable bodies. ACM Transactions on Graphics (SIGGRAPH), vol. 32, no. 4, pp. 88:1–88:8.

Recent professional development activities:

None

Name: Yang Wang

Education:

Ph.D., Computer Science, The University of Texas at Austin, 2014
M.E., Computer Science and Technology, Tsinghua University, 2008
B.E., Computer Science and Technology, Tsinghua University, 2005

Academic experience:

The Ohio State University, Assistant Professor, 2015 - Present, full time

Non-academic experience: None.

Certifications or professional registrations: None.

Current membership in professional organizations: Member of ACM; member of USENIX

Honors and awards: Google Ph.D. Fellowship in Distributed Computing , 2013
Best paper award, SysTor 2014

Service activities: PC member: SoCC 2016, SysTOR 2016, ICPP 2015

External Reviewer: ACM Transactions on Computer Systems (TOCS), ACM Transactions on Storage (TOS), IEEE Transactions on Parallel and Distributed Systems (TPDS), ACM Transactions on Parallel Computing (TOPC).

In CSE department of OSU: member of curricular committee (2016-2017), member of Ph.D. proposal and defense committee of several students, member of master defense committee of several students

In OSU: Graduate School Representative for one Ph.D. student's final defense

Recent publications and presentations:

R. Shi and Y. Wang. "Cheap and Available State Machine Replication". In Proceedings of the 2016 USENIX Annual Technical Conference (USENIX ATC), Denver, CO, June, 2016.

C. Xie, C. Su, C. Littley, L. Alvisi, M. Kapritsos, and Y. Wang. "High-Performance ACID via Modular Concurrency Control". In Proceedings of The 25th ACM Symposium on Operating Systems Principles (SOSP '15), Monterey, CA, October 2015

C. Xie, C. Su, M. Kapritsos, Y. Wang, N. Yaghmazadeh, L. Alvisi, and P. Mahajan. "Salt: Combining ACID and BASE in a Distributed Database". In Proceedings of the 11th USENIX Symposium of Operating Systems Design and Implementation (OSDI '14), Broomfield, CO, October 2014.

Y. Wang, M. Kapritsos, L. Schmidt, L. Alvisi, and M. Dahlin. "Exalt: Empowering Researchers to Evaluate Large-Scale Storage Systems". In Proceedings of the 11th USENIX Symposium of Networked Systems Design and Implementation (NSDI '14), Seattle, WA, April 2014.

Y. Wang, M. Kapritsos, Z. Ren, P. Mahajan, J. Kirubanandam, L. Alvisi, and M. Dahlin. "Robustness in the Salus scalable block store". In Proceedings of the 10th USENIX Symposium of Networked Systems Design and Implementation (NSDI '13), Lombard, IL, April 2013.

M. Kapritsos, Y. Wang, V. Quema, A. Clement, L. Alvisi, and M. Dahlin. "All About Eve: Execute-Verify Replication for Multi-Core Systems". In Proceedings of the 10th Symposium on Operating Systems Design and Implementation (OSDI 12), Hollywood CA, October 2012, pp. 237-250.

Y. Wang, L. Alvisi and M. Dahlin. "Gnothi: Separating Data and Metadata for Efficient and Available Storage Replication". In Proceedings of the 2012 USENIX Annual Technical Conference, Boston, MA, June 2012, pp. 413-424.

A. Clement, M. Kapritsos, S. Lee, Y. Wang, L. Alvisi, M. Dahlin, and T. Riche. “UpRight Cluster Services”. In Proceedings of the 22nd ACM Symposium on Operating Systems Principles (SOSP 2009), BigSky, MT, October 2009, pp. 272-290.

Recent professional development activities:

Attending OSDI 2016

Visiting Tsinghua University, Shanghai Jiaotong University, and Huazhong University of Science and Technology, 2016 Summer

Attending USENIX ATC 2016

Attending SOSP 2015

Attending NSF Career Workshop 2015

Name: Yusu Wang

Education:

BS, Computer Science, Tsinghua University (China), 1998
MS, Computer Science, Duke University, 2000
PhD, Computer Science, Duke University, 2004

Academic experience:

Stanford University Postdoc 09/2004 – 08/2005
Institute of Science and Technology, Austria Visiting professor, 09/2012–06/2013
Ohio State University Assis. Prof 09/2005 – 08/2011
Ohio State University Assoc. Prof 09/2011 – Present

Non-academic experience: None

Certifications or professional registrations: None

Current membership in professional organizations: ACM member, Neuroscience Society,

Honors and awards: Best Paper Award, ACM SIGSPATIAL 2015.

Lumley Research Award, College of Engineering, OSU, 2011.
A Best Paper Award, EuroVis 2010.
NSF Career Award, 2008
DOE Career Award, 2006
Best PhD Dissertation Award, CS Dept, Duke, 2004

Service activities: PC member for Symposium of Computational Geometry (SoCG), 2016, 2012, 2006

PC member for SIAM/ACM Symposium on Discrete Algorithms (SoDA), 2015

Co-chair for Joint Workshop Day of STOC/SoCG 2016

Co-organizer of 5-day TGDA@OSU Conference, May 2016

Co-organizer of AMS-sponsored MRC summer conference on Discrete and Computational Geometry
Associate Editor of Journal of Computational Geometry, 2010 – Present

Recent publications and presentations:

- a) A. Sidiropoulos, D. Wang and Y. Wang. "Metric embeddings with outliers". In ACM-SIAM Sympos. Discrete Alg. (SoDA), 2017.
- (b) J. Eldridge, M. Belkin and Y. Wang. "Graphons, mergeons, and so on!" In Proc. 30th Annu. Conf. Neural Information Processing Systems (NIPS), 2307–2315, 2016. Selected for Oral presentation.
- (c) T. Dey, F. Memoli and Y. Wang. "Multiscale Mapper: Topological Summarization via Codomain Covers". In ACM/Siam Sym. Discrete Alg. (SoDA), 997–1013, 2016.
- (d) Y. Li, S. Wang and Y. Wang. "Efficient map reconstruction and augmentation via topological methods". In 23rd ACM SIGSPATIAL Intl. Conf. Advances in Geographic Info Sys (ACM SIGSPATIAL GIS), 25:1-25:10, 2015. Received the Best Paper Award.
- (e) J. Eldridge, M. Belkin and Y. Wang. "Beyond Hartigan consistency: Merge distortion metric for hierarchical clustering". In 28th Conf. Learning Theory (COLT), 588–606, 2015. Received the Best Student Paper Award.
- (f) U. Bauer, X. Ge and Y. Wang. "Measuring distance between Reeb graphs". In Proc. 29th Annu. ACM Sympos. Comput. Geom. (SoCG), 464–473, 2014.

(g) T. K. Dey, F. Fan and Y. Wang. "Computing topological persistence for simplicial maps". In Proc. 29th Annu. ACM Sympos. Comput. Geom. (SoCG), 345–354, 2014.

(h) T. K. Dey, F. Fan, and Y. Wang. "An efficient computation of handle and tunnel loops via Reeb graphs". ACM Trans. Graphics (Special issue from SIGGRAPH), 2013.

Recent professional development activities:

(a) Long-term visiting scientist at Simons Institute for the Theory of Computing, UC Berkeley, 01/2017–05/2017

(b) One of the group leaders at Women in Computational Topology (WinCompTop) Workshop held at IMA in 08/2016

Name: Rephael Wenger

Education:

B.S.E. - Computer Science, Princeton U, 1984.
Ph.D. - Computer Science, McGill U, 1988.
Postdoc - Computer Science, U. of Montreal, 1988-1989.
Postdoc - Computer Science, Rutgers U, 1989-1990.

Academic experience:

The Ohio State U, Assistant Prof, 1990-1996.
The Ohio State U, Associate Prof, 1996-present.

Non-academic experience: None

Certifications or professional registrations: None

Current membership in professional organizations: IEEE

Honors and awards: OSU CSE Dept Teaching Award, 2012
OSU CSE Dept Undergrad Research Advising Award, 2017

Service activities: None

Recent publications and presentations:

Wenger R., *Isosurfaces: Geometry, Topology and Algorithms*, CRC Press, 2013.
Bhattaca, A. and Wenger R., Constructing isosurfaces with sharp edges and corners using cube merging, *Computer Graphics Forum*, 32, 2013, pp. 11-20.
Chaudhuri, A., Lee, T.Y., Shen, H.W. and Wenger R. Exploring flow fields using space-filling analysis of streamlines, *IEEE Transactions on Visualization and Computer Graphics*, 20, 2014, pp. 1392-1404.
Wang, S., Wang, Y., and Wenger, R., The JS-graphs of Join and Split Trees, *Proc. of the 30'th Annual Symposium on Computational Geometry*, 2014.
Bhattacharya, A., Weissenbock, J., Wenger, R., Amirkhanov, A., Kastner, J., Heinzl, C., Interactive exploration and visualization using MetaTracts extracted from Carbon Fiber Reinforced Composites, *IEEE Transactions on Visualization and Computer Graphics*, 2016.

Recent professional development activities:

None

Name: Parker Wiksell

Education:

B.S. Computer and Information Sciences Engineering, The Ohio State University, 1996

Academic experience:

The Ohio State University, lecturer, Autumn 2013 - Present, part-time

Non-academic experience: a. Atos Origin, Software Engineer, Consultant and developer in C++ and Java, May 1996 - November 2002, full time.

b. Qwest Communications, Software and Database Engineer, Developer for 1-800 toll free provisioning and data warehousing systems, November 2002-February 2012, full time.

c. Battelle Memorial Institute, Cyber Security Engineer, Security researcher/Proposal writer/team lead/project manager, February 2012 - present, full time.

Certifications or professional registrations: None

Current membership in professional organizations: None

Honors and awards: None

Service activities: State Science Fair judge 2014 - present.

Recent publications and presentations:

None

Recent professional development activities:

None

Name: Annatala Trixie Wolf

Education:

M.S. in Computer Science and Engineering, OSU, 2014
B.S. in Computer Science and Engineering, OSU, 2006
B.A. in Psychology, University of Illinois, 1999

Academic experience:

OSU, Lecturer, 8/2012 to current, full time
OSU, Graduate Researcher, 8/2012 to 5/2014, part time
OSU, Graduate Researcher, 8/2007 to 7/2012, full time
OSU, Lecturer, 8/2007 to 7/2012, part time
OSU, Lecturer, 8/2010 to 7/2011, full time
OSU, Graduate Researcher, 8/2007 to 7/2010, full time
OSU, Lecturer, 8/2007 to 7/2010, part time
OSU, Undergraduate Researcher, 1/2005 to 8/2006, part time
SIU School of Medicine (Microbiology), Researcher, 1/2001 to 7/2001
SIU School of Medicine (Psychometric Testing), Researcher, 8/2000 to 12/2000

Non-academic experience: D&S Consultants, Software Engineer (Intern), 11/2006 to 7/2007

Certifications or professional registrations: None

Current membership in professional organizations: None

Honors and awards: OSU CSE Eleanor Quinlan Memorial Award for Excellence in Teaching, 2011
OSU Engineering Honors Research Scholarship, 2005
OSU Daimler-Chrysler Award, 2005
OSU President's Salute Recipient, 2006

Service activities: Brief assistance with Columbus School for Girls tech program

Recent publications and presentations:

"Empowering Resource Management and Task Prioritization with Decision Support Software", Thesis, 2013, presented at OSU

Recent professional development activities:

None

Name: Wei Xu

Education:

Ph.D., Computer Science, New York University, 2014
M.S., Computer Science and Technology, Tsinghua University, 2007
B.S., Computer Science and Technology, Tsinghua University, 2004

Academic experience:

Assistant Professor, Ohio State University, Columbus, OH Aug 2016 – Present
Visiting Researcher, University of Washington, Seattle, WA Jan 2012 – Dec 2013
Postdoctoral Fellow, University of Pennsylvania, Philadelphia, PA Feb 2014 – Aug 2016

Non-academic experience: Consultant, Educational Testing Service, Princeton, NJ Mar – Dec 2010

Certifications or professional registrations: None

Current membership in professional organizations: Member of Association for Computational Linguistics

Honors and awards: MacCracken Fellowship (2007-2012)

Service activities: NSF Review Panel: CISE (2017)

Workshop Chair: ACL (2017)
Area Chair: EMNLP (2016)
Publicity Chair: NAACL (2016)
Organizer: The International Workshop on Noisy User-generated Text (2015-2017)
Colloquium Chair: OSU CSE Department

Recent publications and presentations:

A Minimally Supervised Method for Recognizing and Normalizing Time Expressions in Twitter. Jeniya Tabassum, Alan Ritter, Wei Xu. In EMNLP 2016.
Optimizing Statistical Machine Translation for Simplification. Wei Xu, Courtney Napoles, Ellie Pavlick, Quanze Chen, Chris Callison-Burch. In TACL 2016 (presentation at ACL).
Discovering User Attribute Stylistic Differences via Paraphrasing. Daniel Preotiuc, Wei Xu, Lyle Ungar. In AAAI 2016.
Problems in Current Text Simplification Research: New Data Can Help. Wei Xu, Chris Callison-Burch, Courtney Napoles. In TACL 2015 (presentation at EMNLP).
Cost Optimization for Crowdsourcing Translation. Mingkun Gao, Wei Xu, Chris Callison-Burch. In NAACL 2015.
Extracting Lexically Divergent Paraphrases from Twitter. Wei Xu, Alan Ritter, Chris Callison-Burch, William B. Dolan, Yangfeng Ji. In TACL 2014 (presentation at NAACL).
Filling Knowledge Base Gaps for Distant Supervision of Relation Extraction. Wei Xu, Raphael Hoffmann, Le Zhao, Ralph Grishman. In ACL 2013.

Recent professional development activities:

Visiting and giving invited talks:
Dec 2016, Microsoft Research Asia, Beijing, China
Sep 2016, University of Delaware, Newark, DE
Aug 2016, Amazon.com, Berlin, Germany

Attending academic conferences and events:

Jul 2017 (expected), Microsoft Research Faculty Summit

Jul 2017 (expected), NLU/NLP Workshop at Google NYC

Jul 2017, ACL conference

Dec 2016, COLING conference

Nov 2016, EMNLP conference

Name: Dong Xuan

Education:

Ph.D., Computer Engineering, Texas A&M University, USA, 2001
M.S., Electronic Engineering, Shanghai Jiao Tong University, China, 1993
B.S., Electronic Engineering, Shanghai Jiao Tong University, China, 1990

Academic experience:

Dept. of Computer Science and Engineering, The Ohio State University, Professor, October 2013 – Present, full time
Dept. of Computer Science and Engineering, The Ohio State University, Associate Professor, October 2007 – September 2013, full time
Dept. of Computer Science and Engineering, The Ohio State University, Assistant Professor, October 2001 - September 2007, full time
Dept. of Computer Science, Texas A&M University, Research Associate/Assistant, June 1998 - August 2001, part time
Dept. of Electronic Engineering, Shanghai Jiao Tong University, China, Lecturer/Assistant Lecturer, April 1993 - March 1998, full time

Non-academic experience: None

Certifications or professional registrations: None

Current membership in professional organizations: IEEE

Honors and awards: Lumley Research Award, College of Engineering, The Ohio State University, USA, 2009
National Science Foundation (NSF) CAREER Award, USA, 2005
SBC/Ameritech Faculty Fellow, The Ohio State University, USA, 2002

Service activities: Associated Editor, IEEE Transactions on Sensor Networks, 2014-2017
Associated Editor, IEEE Transactions on Parallel and Distributed Systems (TPDS), 2010-2014
Program Co-Chair of IEEE International Workshop on Cyber Physical Networking Systems (CPNS), in conjunction with IEEE International Conference on Computer Communications (INFOCOM), 2011
Program Vice Chair of IEEE International Conference on Distributed Computing Systems (ICDCS), 2010
IEEE Conference on Computer Communications (INFOCOM), 2018, 2017, 2016, 2015, 2014, 2013, 2012, 2011, 2010, 2009, 2008, 2007
IEEE International Conference on Distributed Computing Systems (ICDCS), 2014, 2013, 2012, 2011, 2009, 2008, 2006, 2005, 2004, and 2002

Recent publications and presentations:

Paul Y. Cao, Gang Li, Adam C. Champion, Dong Xuan, Steve Romig and Wei Zhao, On Human Mobility Predictability via WLAN Logs, in Proc. of IEEE International Conference on Computer Communications (INFOCOM), May 2017.
Fan Yang, Qiang Zhai, Guoxing Chen, Adam C. Champion, Junda Zhu and Dong Xuan, Flash-Loc: Flashing Mobile Phones for Accurate Indoor Localization, in Proc. of IEEE International Conference

on Computer Communications (INFOCOM), April 2016.

Jin Teng, Boying Zhang, Xinfeng Li, Xiaole Bai and Dong Xuan, E-Shadow: Lubricating Social Interaction using Mobile Phones, in IEEE Transactions on Computers (TC), Vol. 63, No. 6, June 2014, pp. 1422-1433.

Jin Teng, Boying Zhang, Junda Zhu, Xinfeng Li, Dong Xuan, Yuan F. Zheng, EV-Loc: Integrating Electronic and Visual Signals for Accurate Localization, in IEEE/ACM Transactions on Networking (ToN), Vol. 22, No. 4, April 2014, pp. 1285-1296.

Zuoming Yu, Jin Teng, Xiaole Bai, Dong Xuan and Weijia Jia, Connected Coverage in Wireless Networks with Directional Antennas, in ACM Transactions on Sensor Networks (ToSN), Vol. 10, No. 3, Article 51, April 2014.

Recent professional development activities:

None.

Name: Diego S. Zaccai

Education:

Ph.D., Computer Science and Engineering, The Ohio State, University, May 2016

M.S., Computer Science and Engineering, The Ohio State, University, July 2013

B.S., Computer Science and Engineering, The Ohio State, University, June 2009

Academic experience:

The Ohio State University, (what is rank?), Senior Lecturer, May 2017 - Present, full time

The Ohio State university, Graduate Teaching assistant, September 2010-May 2016,

Non-academic experience: None

Certifications or professional registrations: None

Current membership in professional organizations: ACM

Honors and awards: None

Service activities: CSE Department Eleanor Quinlan Memorial Award for Excellence in Teaching, 2013

University Fellowship (UF), 2009

Frank B. Kroeger Undergraduate Scholarship, 2006-2007

Recent publications and presentations:

Zaccai, D., Tagore, A., Hoffman, D., Kirschenbaum, J., Bainazarov, Z. Friedman, H.M., Pearl, D.K., Weide, B.W. Syrus: Providing Practice Problems in Discrete Mathematics with Instant Feedback. In: Proceedings of the 45th ACM Technical Symposium on Computer Science Education (SIGCSE 14), pages 61–66, Atlanta, GA, March 5 –8, 2014.

Tagore, A., Zaccai, D., Weide, B.W. Automatically Proving Thousands of Verification Conditions Using an SMT Solver: An Empirical Study. In: NASA Formal Methods: 4th International Symposium (NFM 2012), pages 195–209, Norfolk, VA, April 3 –5, 2012.

Hoffman, D., Tagore, A., Zaccai, D., and Weide, B.W. Providing Early Warnings of Specification Problems. In: NASA Formal Methods: 6th International Symposium (NFM 2014), pages 92 –97, Houston, TX, April 29–May 1, 2014.

Recent professional development activities:

None

Name: Xiaodong Zhang

Education:

Ph.D. in Computer Science, University of Colorado at Boulder, 1989

Academic experience:

Robert M. Chritchfield Professor in Engineering and Department Chair, Ohio State University, 2006-now

Lettie Pate Evans Professor in Computer Science and Department Chair, College of William and Mary, 2003-2005

Professor of Computer Science, College of William and Mary, 1997-2003

Associate Professor of Computer Science, University of Texas at San Antonio, 1993-1997

Assistant Professor of Computer Science, University of Texas at San Antonio, 1989-1993

Non-academic experience: Program Director, CISE, National Science Foundation, 2001-2003

Certifications or professional registrations: None

Current membership in professional organizations: ACM and IEEE

Honors and awards: ACM Fellow (2012), IEEE Fellow (2009), Distinguished Alumni Award, University of Colorado at Boulder (2011)

Service activities: Selection Committee Chair, IEEE Transactions on Parallel and Distributed Systems (2017), IEEE Fellow Election Committee (2012-2016), Steering Committee Chair, International Conference on Distributed Systems (2012-now)

Recent publications and presentations:

"Software support inside and outside solid state devices for high performance and high efficiency", F. Chen, T. Zhang, and X. Zhang, Proceedings of the IEEE, May 2017.

"Feisu: Fast Query Execution over Heterogeneous Data Sources on Large-Scale Clusters", A. Qin, Y. Yuan, D. Tan, P. Sun, X. Zhang, H. Cao, R. Lee and X. Zhang, Proceedings of International Conference on Data Engineering, April, 2017

"BCC: reducing false aborts in optimistic concurrency control with low cost for in-memory databases", Y. Yuan, K. Wang, R. Lee, X. Ding, J. Xing, S. Blanas, and X. Zhang, Proceedings of the VLDB Endowment, 2016.

"Mega-KV: a case for GPUs to maximize the throughput of in-memory key-value store", K. Zhang, K. Wang, Y. Yuan, L. Guo, R. Lee, and X. Zhang, Proceedings of the VLDB Endowment, 2015.

"GDM: device memory management for GPGPU computing", K. Wang, X. Ding, R. Lee, S. Kato, and X. Zhang, Proceedings of ACM SIGMETRICS Conference, 2014.

"Major technical advancement in Apache Hive", Y. Huai, A. Chauhan, A. Gates, G. Hagleitner, N. E. Hanson, O. O'Malley, J. Pandey, Y. Yuan, R. Lee, and X. Zhang, Proceedings of ACM SIGMOD Conference, 2014.

Recent professional development activities:

None

Name: Yinqian Zhang

Education:

Ph.D., Computer Science, University of North Carolina-Chapel Hill, 2014
M.E., Communication and Information Systems, Shanghai Jiao Tong University, 2009
B.E., Information Security, Shanghai Jiao Tong University, 2006

Academic experience:

The Ohio State University, Assistant Professor, Jan. 2015 – present, full time
The Ohio State University, Visiting Assistant Professor, Oct. 2014 – Dec. 2014, part time
University of North Carolina-Chapel Hill, Postdoc researcher, Aug. 2014 - Dec. 2014, full time

Non-academic experience: Google, research intern, conducting security related research projects, May 2012 – Aug. 2012, part time
RSA lab, EMC, research intern, conducting security related research projects, May 2011 – Aug. 2011, part time
Intel Asia-Pacific R&D Center, software engineer intern, software development, Oct. 2005 – Jun. 2006, part time

Certifications or professional registrations: None

Current membership in professional organizations: ACM, IEEE, USENIX

Honors and awards: Microsoft Azure Research Award, 2016
Google Ph.D. fellowship in Security, 2013

Service activities: IEEE Symposium on Security and Privacy(S&P), 2016, 2017
ACM Conference on Computer and Communications Security (CCS), 2015, 2016, 2017
USENIX Security Symposium, 2017
Network and Distributed System Security Symposium (NDSS), 2017
ACM Asia Conference on Computer and Communications Security (ASIACCS), 2016
IEEE Conference on Computer Communications (INFOCOM), 2016 (Distinguished TPC Member Award), 2017 (Distinguished TPC Member Award)
ACM Cloud Computing Security Workshop (CCSW), 2015, 2016
IEEE International Conference on Cloud Computing Technology and Science (CloudCom), 2015, 2016

Recent publications and presentations:

X. Zhang, Y. Xiao, Y. Zhang, "Return-Oriented Flush-Reload Side Channels on ARM and Their Implications for Android Devices". In Proceedings of the 23rd ACM Conference on Computer and Communications Security (CCS), Vienna, Austria, Oct. 2016.
Z. Zhou, M. K. Reiter, Y. Zhang, "A Software Approach to Defeating Side Channels in Last- Level Caches". In Proceedings of the 23rd ACM Conference on Computer and Communications Security (CCS), Vienna, Austria, Oct. 2016.
T. Zhang, Y. Zhang, R. Lee, "CloudRadar: A Real-Time Side-Channel Attack Detection System in Clouds". In Proceedings of the 19th International Symposium on Research in Attacks, Intrusions and Defenses (RAID), Telecom SudParis, France, Sep. 2016.
Y. Xiao, X. Zhang, Y. Zhang, M.-R. Teodorescu, "One Bit Flips, One Cloud Flops: Cross-VM Row

Hammer Attacks and Privilege Escalation”. In Proceedings of the 25th USENIX Security Symposium, Austin, TX, Aug. 2016.

Q. Xiao, M. K. Reiter, Y. Zhang, ”Mitigating Storage Side Channels Using Statistical Privacy Mechanisms”. In Proceedings of the 22nd ACM Conference on Computer and Communications Security (CCS), Denver, Colorado, Oct. 2015.

V. Varadarajan, Y. Zhang, T. Ristenpart and M. Swift, ”A Placement Vulnerability Study in Multi-Tenant Public Clouds”. In Proceedings of the 24th USENIX Security Symposium, Washington, D.C., Aug. 2015.

Y. Zhang, A. Juels, M. K. Reiter, T. Ristenpart, ”Cross-Tenant Side-Channel Attacks in PaaS Clouds”. In Proceedings of the 21th ACM Conference on Computer and Communications Security (CCS), pages 990-1003, Nov. 2014.

Y. Zhang, M. K. Reiter, ”Duppel: Retrofitting Commodity Operating Systems to Mitigate Cache Side Channels in the Cloud”. In Proceedings of the 20th ACM Conference on Computer and Communications Security (CCS), pages 827-838, Nov. 2013.

Y. Zhang, A. Juels, M. K. Reiter, T. Ristenpart, ”Cross-VM Side Channels and Their Use to Extract Private Keys”. In Proceedings of the 19th ACM Conference on Computer and Communications Security (CCS), pages 305-316, Oct. 2012.

Recent professional development activities:

Purdue University, Dec 2016 (topics: side-channel attacks, memory DOS attacks and row-hammer attacks in clouds) Apple Inc, May 2016 (topics: side-channel attacks, memory DOS attacks and row-hammer attacks in clouds)

Attending academic conferences: IEEE S&P 2016, USENIX Security 2016, ACM CCS 2016

Name: Justin Ziniel

Education:

PhD, Electrical and Computer Engineering, The Ohio State University, 2014
MS, Electrical and Computer Engineering, The Ohio State University, 2012
BS, Electrical and Computer Engineering, The Ohio State University, 2007

Academic experience:

The Ohio State University, Senior Lecturer, 2016 - Present, Part-time

Non-academic experience: IBM Watson Group, Staff Software Engineer, Responsible for software development for IBM's Watson cognitive computing system, 2013 - Present, Full-time

Certifications or professional registrations: None

Current membership in professional organizations: IEEE

Honors and awards: Patent: J. Ziniel, M. Chu, P. Agrawal, and S. Pritko, "Returning Search Results Utilizing Topical User Click Data When Search Queries Are Dissimilar," US 15/336107, Oct. 28, 2016. [Filed]

Patent: J. Boyer, K. Fadnis, C. Murray, and J. Ziniel, "Training a similar passage cognitive system using ground truth from a question answering cognitive system," US 9,495,648, Nov. 15, 2016. [Issued]

1st Place, Engineering: Edward F. Hayes Graduate Research Forum (2012)

Featured Researcher: Ohio Supercomputer Center Annual Research Report (2012)

Service activities: Hearing Panel Member - University Committee on Academic Misconduct (2008 - 2012)
Council Member - University Council on the Physical Environment (2008 - 2010)
Committee Member - University Senate Fiscal Committee (2009 - 2010)
Anonymous Reviewer - IEEE Trans. on Signal Processing, IEEE Signal Processing Letters, IEEE Transactions on Information Theory

Recent publications and presentations:

Binary Linear Classification and Feature Selection via Generalized Approximate Message Passing. J Ziniel, P Schniter, P Sederberg, IEEE Transactions on Signal Processing 63 (8), 2020-2032. 2015.

Dynamic compressive sensing of time-varying signals via approximate message passing, J Ziniel, P Schniter, IEEE Transactions on Signal Processing 61 (21), 5270-5284. 2013.

Efficient High-Dimensional Inference in the Multiple Measurement Vector Problem, J Ziniel, P Schniter, IEEE Transactions on Signal Processing 61 (2), 340-354. 2012.

A Generalized Framework for Learning and Recovery of Structured Sparse Signals, J Ziniel, S Rangan, P Schniter, Statistical Signal Processing Workshop, (Ann Arbor, MI), Aug. 2012.

Recent professional development activities:

None

Appendix C. Equipment

Please see details of equipment under Criterion 7 (page 59).

Appendix D – Institutional Summary

1. The Institution

- a. The Ohio State University, College of Engineering, 2070 Neil Ave, Columbus, OH 43210-1275
- b. President: Dr. Michael Drake
- c. Submitted by: Dr. David B. Williams, Dean & Monte Ahuja Endowed Dean's Chair, College of Engineering
- d. The Ohio State University has been accredited by the Higher Learning Commission (HLC) since 1913. In March 2017 the university underwent its decennial reaffirmation of accreditation.

2. Type of Control

The Ohio State University is a Land Grant, State Institution.

3. Educational Unit

See Table D-3: The Ohio State University Engineering Programs.

4. Academic Support Units

Within the College of Engineering:

- Biomedical Engineering: Dr. Richard Hart, Department Chair
- Civil & Environmental Engineering & Geodetic Science: Dr. Dorota Grejner-Brzezinska, Department Chair
- Chemical & Biomolecular Engineering: Dr. Andre F. Palmer, Department Chair
- Computer Science and Engineering: Dr. Xiaodong Zhang, Department Chair
- Electrical and Computer Engineering: Dr. Joel Johnson, Department Chair
- Engineering Education: Dr. Monica Cox, Department Chair (see 4.1)
- Integrated Systems Engineering: Dr. Farhang Pourboghra, Department Chair
- Materials Science and Welding Engineering: Dr. Peter Anderson, Department Chair
- Mechanical & Aerospace Engineering: Dr. Vish V. Subramaniam, Department Chair

Outside of the College of Engineering:

- Anatomy: Dr. Kirk McHugh, Director
- Biochemistry: Dr. Susan Olesik, Department Chair
- Food, Agricultural, and Environmental Sciences: Dr. Cathann Arcenaux Kress
- Fisher College of Business: Dr. Anil K. Makhija, Dean
- Earth Sciences: Dr. Berry Lyons, Director
- Economics: Dr. Trevon Logan, Department Chair
- Evolution, Ecology, and Organismal Biology: Dr. Elizabeth Marschall, Department Chair
- Natural and Mathematical Sciences (Biology, Chemistry, Math): Dr. David Manderscheid, Dean, Physics: Dr. Brian Winer, Department Chair
- Statistics: Steve Dr. MacEachern, Department Chair

4.1 The Department of Engineering Education (EED)

The Department of Engineering Education (EED) advances the engineering profession and enables student success by developing and delivering state-of-the-art, innovative, multidisciplinary engineering courses and programs; by modeling and advocating scholarly, evidence-based teaching within the College of Engineering; and by integrating pedagogical discovery, practice, and dissemination through world class engineering education research.

With approximately 200 faculty, staff, and student employees, the EED is the the academic home of Ohio State's first-year engineering program, undergraduate multidisciplinary capstone design, and engineering technical communications courses.

In addition to maintaining high-quality undergraduate student programs, the EED has developed a proposal to create a graduate program where admitted graduate students will earn Ph.D.s in Engineering Education. The development of this program establishes a firm foundation for an expansion of our research, which will position the EED as a department where undergraduate and graduate education complement research and practice in the development of diverse career pathways for our engineering students.

Overview of EED Programs

The First-Year Engineering Course Sequence

A prerequisite for declaring most engineering majors at OSU, incoming first year students take a two-semester series that broadly introduces the topics of

- technical graphics,
- computer-aided design,
- programming in MATLAB,
- engineering design and analysis,
- project management,
- ethics in engineering,
- teamwork, and
- oral and written technical communication.

These courses offer an unparalleled engineering experience due to their

- Broad introduction to engineering. Students can take engineering courses beginning their first semester. Labs and projects given throughout the sequence are designed to provide a broad introduction to engineering.
- Team work experience. Prospective employers greatly favor candidates who demonstrate the ability to work in teams. By the end of these fundamental courses, students will have had many valuable group work experiences.
- Presentation practice. Presentation and communication skills are enhanced, and students will learn the importance of documentation in engineering. These are valuable assets when looking for an internship or post-graduation position.

The First-Year Engineering Program consists of four different course sequences, designed to give students a broad understanding of the principles and practices of engineering:

- Standard Sequence: Engineering 1181 and 1182,
- Honors Sequence: Engineering 1281 and 1282,

- Scholars Sequence: Engineering 1181.02 and 1182.02, and
- Transfer Sequence: Engineering 1186, 1187, and 1188.

The two-semester, Standard and Scholars sequences teach basic engineering skills to prepare students for advanced courses, internships and careers in engineering. The Honors sequence accomplishes the same objectives but in a more accelerated fashion with a programming course built into the series.

All three-program options entail a major, design-build project. The continuously updated curriculum, taught by faculty and professional engineers, exposes students to different engineering disciplines and helps develop the most up-to-date and practically relevant skills.

The Transfer Sequence assists students who may already have elements of the program from other universities and allows them to progress more quickly.

Each version of the Fundamentals of Engineering program is associated with a competition held during the last course of the sequence:

- FE Standard - Advanced Energy Vehicle or Nanotechnology competition,
- FEH Honors – Robot or Nanotechnology competition,
- FE Scholars - Advanced Energy Vehicle or Nanotechnology competition, and
- FE Transfers - Advanced Energy Vehicle or Nanotechnology competition.

(<https://eed.osu.edu/first-year-engineering-program>)

The EED also offers six main courses for Graphics: 1121 (Graphic Presentation), 1180 (Spatial Visualization Practice and Development), 1221 (Intro to MATLAB), 1222 (Intro to C++), 4410.01 (Computer Graphics using AutoCad), and 4410.02 (Computer Graphics using SolidWorks)

To meet the needs of engineering and non-engineering students, the goals of these courses are

- graphics communication and visualization (ENGR 1121, 1180, 4410.01, and 4410.02), and
- problem solving through programming (ENGR 1221 and 1222).

Multidisciplinary Engineering Capstone Design

The EED Multidisciplinary Engineering Capstone program provides a broad range of opportunities for engineering and non-engineering students. Authentic, industry-sponsored projects provide students the opportunity to apply their education and develop professional skills in real-world problem solving.

We should note, however, that this capstone design course is not entirely appropriate for BS-CSE majors since the primary focus tends not to be on software design and development. Hence, we omit full details of the course from the self-study.

Enrichment Programs and Courses

In response to recent reports from the National Academy of Engineering, the National Research Council, the National Science Foundation, and the OSU studies of general education, it is clear that the College has a responsibility and opportunity to contribute further to the general education of both engineering and non-engineering students, primarily in the area of

technological literacy. The EED meets this responsibility through courses and services in several key areas:

- Engineering Science minor. The Engineering Sciences minor is geared towards students who are looking for a professional future working closely with engineers.
- Technical Writing (ENGR 2367). This course helps improve students' writing, reading, and thinking skills within the context of technology and engineering.
- Technical writing assistance. Engineering Technical Communications (ETC)
The role of ETC within the Department of Engineering Education is to assist engineering students in strengthening their technical communication skills, with a particular focus on the types of communication specific to their academic and career needs.
- Leadership and teamwork - The Student Instructional Leadership Team (SILT) (<https://eed.osu.edu/student-instructional-leadership-team-silt>)
- Service-Learning – A variety of opportunities are available for those students who are looking to make a difference in the world through community service. Courses include an experience in Honduras offering technological assistance to an orphanage, an experience in India working empower women in impoverished rural communities through training and sustainable solutions, and an experience in Ghana working to create engineering solutions to meet the needs determined by the local communities.
- Humanitarian Engineering (ENGR 5050); Computational Humanitarianism (ECE 5550); Appropriate Technology for Developing Countries (FABE 5200)
- Humanitarian Engineering Minor (<https://osuhe.engineering.osu.edu/education/humanitarian-engineering-minor>)

Professional Development and Support

The Student Instructional Leadership Team (SILT) was created in 2009 for the purpose of professional development of students in an instructional role. The team consists of five student leadership positions that work across the Department of Engineering Education. SILT supports student employees through a group of peers and a faculty mentor. It strives to help further the development of teaching assistants in many aspects of teaching and professional and personal development.

Technical Communication Resources and Consulting (TCRC): Mary Faure, Manager
In addition to offering ENGR 2367 (see *Enrichment Programs and Courses* section above), a 3 semester credit course providing instruction on various thematic issues of America and Technology and on technical communications techniques, TCRC also

- Offers consultation on writing techniques and on delivering oral presentations,
- collaborates with engineering faculty and teaching assistants to provide consistent information to students about technical communications techniques, and
- helps undergraduate and graduate engineering students, teaching assistants, and engineering faculty to improve writing and to solve writing problems.

(<https://eed.osu.edu/technical-communications-resources-and-consulting>)

The faculty and staff of the EED support a number of student organizations through advising. These include the ASEE Student Chapter (<https://asee.osu.edu/>); Tau Beta Pi (<http://tbp.org.ohio-state.edu/index.php>); and Engineers for Community Service (ECOS) (<http://ecos.osu.edu/>)

5. Non-Academic Support Units

College of Engineering

Academic Advising: Suzanne Dantuono, Director

Undergraduate students in the The College of Engineering, work with a dedicated team of academic advisors from the first day on campus. From exploring majors to connecting with resources and opportunities on campus, these professionals are here to help students make the most of their academic experience at Ohio State.

(<https://engineering.osu.edu/academics/undergraduate-academic-advising>)

Committee on Academic Affairs (CCAA): Dr. Carolyn Sommerich, Chair

The College Committee on Academic Affairs is responsible for reviewing and approving or disapproving proposals for changes in courses and curricula which are recommended by departments and reporting its decisions to the University's Council on Academic Affairs. CCAA created three subcommittees to review all semester curriculum, course, and policy proposals. Once a proposal had been reviewed and approved by a subcommittee it was presented to the full committee for its approval. After the full committee approved a proposal it was forwarded to the University's Council on Academic Affairs (CAA) for its approval. CAA was the last level of approval needed for all curriculum, course, and policy proposals.

Academic Standards and Progress (ASAP) Subcommittee of CCAA: Dr. Barbara Wyslouzil, Chair

ASAP has the responsibility to recommend policies and rules relative to academic standards controlling warning, probation, and dismissal of undergraduate students in the Engineering College, to implement appropriate actions in these areas, and to monitor the progress of students in academic difficulty. ASAP does not consider or regulate program admission requirement, except as they interact with warning, probation, and dismissal.

Committee on Core Curriculum Teaching and Learning: Dr. Rick Freuhler, Chair

This committee has the responsibility for the on-going development of the common elements of engineering curricula, the engineering general education curriculum, college listed courses not offered by the Department of Engineering Education (EED), undergraduate student services, and providing a forum for the dissemination of engineering education research and effective teaching practices.

Humanitarian Engineering Center, Dr. Kevin Passino, Director

The center aims to educate global humanitarian engineers who can team with communities to create innovative and cost-effective technical solutions to worldwide problems. It coordinates multiple initiatives, including courses, service projects, the humanitarian engineering minor, the Humanitarian Engineering Scholars program, and study abroad experiences, as well as provide oversight to student humanitarian engineering organizations.

(<https://engineering.osu.edu/outreach/humanitarian-engineering>)

International Initiatives in Engineering Programs, Don Hempson Manager

These initiatives include

- sending more than 200 engineering students abroad to nearly 40 countries to enhance their understanding of the world and the international aspects of engineering;
- infusing global perspectives into the undergraduate curriculum and educating students on the impact of global cultural diversity on engineering decisions;

- building upon 23 international agreements with universities and research centers in 11 countries and supporting a global network of learning partners and collaborators;
- expanding the number of Dual Degree Programs with foreign universities.
(<https://global.engineering.osu.edu/about>)

Outcomes & Assessment Committee: Dave Tomasko, Associate Dean and Committee Chair
The Outcomes Assessment Committee is a college-wide, standing committee formed in 1998 and has the responsibility to

- serve as a vehicle for programs to exchange experience and coordinate activities directed towards continuous program improvement;
- recommend activities and support innovations in curriculum assessment;
- work in concert with other committees of the College, in particular the Core Curriculum and College Services Committee and College Committee on Academic Affairs;
- coordinate program Self Studies in preparation for ABET reviews; and
- provide representation from each ABET accredited program in the College.

Engineering Career Services (ECS): Amy Thaci, Director

ECS is the primary resource connecting Ohio State engineering students and employers. ECS helps graduating students at the BS, MS, and PhD levels to connect with employers seeking career candidates, as well as undergraduates starting as early as the sophomore year to develop the skills needed to successfully connect with employers who want to hire co-ops and interns.
(<https://ecs.osu.edu> and <https://ecs.osu.edu/about-us/mission-vision>)

Office of Diversity Outreach and Inclusion, Dr. Donnie Perkins, Chief Diversity Officer

Engineering diversity programs at Ohio State work closely with some of the country's largest and most active engineering professional organization student chapters to build a strong supportive community. Programs include

- **K-12 Outreach,** Dr. Howard Greene, Director
Outreach activities encourage all students from kindergarten through 12th grade to explore the exciting world of engineering.
(<https://engineering.osu.edu/programs/k-12>)
 - **Engineering Hometown Ambassadors**
Undergraduate junior and senior engineering students volunteer to return as a team to their hometown high schools to relate their engineering experiences. Students give presentations, run demonstrations and participate in Q&A panels as they share their experiences on a variety of topics, including engineering classes, life as an engineering student, undergraduate research, internships/co-ops and how to prepare for a college engineering curriculum.
- **Minority Engineering Program (MEP):** Lisa Barclay, Senior Director
The Minority Engineering program is a comprehensive, multi-faceted program that assists the College of Engineering with the recruitment, retention, motivation and graduation of African American, Hispanic and Native American students. The Minority Engineering Program builds tomorrow's future through offering students academic support, professional development, technical skill-building, education and mentoring while supplying the nation's top employers with diverse, experienced engineers. MEP works with industry and community partners to develop our domestic engineering talent; creates targeted programs that engage underrepresented students, educators, alumni and

the community, and inspires the next generation of engineers by fostering an engineering culture to increase the number of underrepresented minority students in engineering.

(<https://mep.engineering.osu.edu/>)

- **Women in Engineering Program (WiE):** Lisa Barclay, Senior Director
WiE at The Ohio State University was established in 1979 to increase the participation of women within the engineering profession. The program concentrates on recruiting, retaining and advising women, as well as establishing close relationships with industry. The Women in Engineering Program offers many special services designed for both prospective and enrolled women engineering students.
(<https://wie.osu.edu/about-wie/mission-and-vision>)

Undgraduate Honors Committee, Dr. David Tomasko, Chair

The College's Honors Committee has the responsibility for assuring an active program for the support and recognition of undergraduate honors students to include determining policy for attaining and retaining of honors status in the College of Engineering.

University Non-Academic Support Units

General Chemistry Learning Resource Center, Dr. Tom Pruitt, Coordinator

The Learning Resource Center (LRC) is available for assistance to General Chemistry students. The LRC is staffed with teaching assistants of Chemistry courses 1110, 1210, 1220, 1250, 1610, and 1620. TAs are able to answer questions about any General Chemistry course.
(<https://chemistry.osu.edu/undergrad/resources/tutoring>)

Addition tutoring services can be found at the

- Younkin Success Center
(<http://younkinsuccess.osu.edu/tutoring/>), and
- Residence Halls
(<https://housing.osu.edu/resources/tutoring-in-the-residence-halls1/>)

Honors & Scholars Center: Linn Van Woerkom, Associate Vice Provost and Director

The center serves high-ability, motivated undergraduate students in a multitude of ways through our three core initiatives: the University Honors Program, the Ohio State Scholars Program, and the Undergraduate Fellowship Office. Through these programs, the University Honors & Scholars Center facilitate impactful, rigorous, and unique opportunities that further student success and involvement through our G.O.A.L.S.: Global Awareness, Original Inquiry, Academic Enrichment, Leadership Development, and Service Engagement. Whether an incoming student chooses to be involved in the curricular-focused Honors Program, or the experiential-based Scholars Program, all of our students are encouraged to seek out and reach whatever their goals might be.

(<https://honors-scholars.osu.edu/future-students>)

Math & Statistics Learning Center (MSLC): Dr. Darry Andrews, Director

The Mathematics and Statistics Learning Center provides free support to students of many undergraduate Mathematics and Statistics courses at The Ohio State University. The center provides trained tutors available to help students with difficulties they are experiencing in class or with homework. In addition, the center provides online resources, practice exams and workshops to help students achieve their potential as a student.

<https://mslc.osu.edu/mathematics-and-statistics-learning-center>

Addition tutoring services can be found at the

- Younkin Success Center
(<http://younkinsuccess.osu.edu/tutoring/>), and
- Residence Halls
(<https://housing.osu.edu/resources/tutoring-in-the-residence-halls1/>).

Office of Student Life: Javaune Adams-Gaston, Senior Vice President for Student Life

The more than 30 departments within the Office of Student Life are dedicated to helping students achieve success. Each student's needs and background are unique, and each department offers a variety of support and services to help them be successful. Student Life programs and services foster student learning and development, enhance the educational experience, and prepare students for their chosen professions and to be contributing members of a diverse global society. The office operates many of the programs and services of daily life, including on- and off-campus housing, dining, recreation, diversity, inclusion, equity, student involvement and engagement, health care, counseling, career development, and multiple opportunities to develop leadership and citizenship skills and experiences.

(<https://studentlife.osu.edu/about/>)

The following departments in Student Life are often used by engineering students:

- Disability Services Lois J. Harris, Director
Student Life Disability Services collaborates with and empowers students who have disabilities in order to coordinate support services and programs that enable equal access to an education and university life.
(<http://www.ods.ohio-state.edu/about-us/our-mission-history/>)
- Younkin Success Center
The Younkin Success Center functions as a hub for services related to student success. The following departments in Younkin are frequently used by engineering students:
 - Counseling and Consultations Services (CCS), Micky M. Sharma, Director
CCS provides comprehensive individual and group mental health services, psychoeducational prevention and outreach programming to currently enrolled undergraduate, graduate and professional students. CCS also works with spouses/partner of students who are covered by the Comprehensive Student Health Insurance.
(<https://ccs.osu.edu/about-us-and-our-services/>)
 - Dennis Learning Center (DLC), Christopher Wolters, Professor and Director
The DLC supports students so that they can enter, excel in, and successfully complete academic programs at The Ohio State University. DLC applies expertise in education, psychology, instruction, and technology to provide outreach that includes elective courses, workshops, and individual academic coaching. DLC helps students flourish by providing assistance in areas that include motivation,

academic stress, procrastination, study skills, time management, test taking, learning from text, note taking, and self-regulation. DLC is also devoted to the advancement of research that promotes greater knowledge and understanding of college students' academic success.

(<http://dennislearningcenter.osu.edu/about-dlc/>)

➤ **Student Advocacy Center, Karen Kyle, Director**

The Student Advocacy Center is committed to helping students navigate Ohio State's structure and to resolving issues that they encounter at the university. The center's purpose is to empower students to overcome obstacles to their growth both inside and outside the classroom. Students are encouraged to maximize their educational experience and prepare them for involvement in the larger community and for life beyond college.

(<http://advocacy.osu.edu/>)

Office of International Affairs (OIA): Gifty Ako-Adounvo, Assistant Vice Provost

The Office of International Affairs helps facilitate the development and growth of the Global Gateways and oversees Education Abroad, International Students and Scholars, the Mershon Center for International Security Studies, and five Area Studies Centers. OIA sponsors and administers grants and scholarships for faculty, graduate and undergraduate student research, education abroad and independent study. OIA develops agreements with international academic institutions, hosts international delegations, and initiates and coordinates international education outreach activities and special events. Additionally OIA supports the International Affairs Scholars Program, which provides opportunities for students from all majors who are interested in global themes.

(<https://oia.osu.edu/>)

Office of the Chief Information Officer (OCIO): Michael Hofherr, Chief Information Officer

The OCIO provides services to help Ohio State faculty, students and staff use technologies in learning, teaching, research and administrative settings. The primary role of the OCIO is to serve as a catalyst in working with the campus community to leverage technology to advance and support the mission and goals of the university.

(<https://ocio.osu.edu/about-ocio>)

Office of Distance Education and eLearning (ODEE): Michael Hofherr, Chief Information Officer

ODEE is charged with providing students, both on and off campus, with an enriched educational experience through technology-ready classrooms, centralized learning systems, innovations in technological pedagogy and distance education opportunities.

(<https://odee.osu.edu/about>)

Physics Tutoring

- Department of Physics
(<https://physics.osu.edu/tutoring>)
- Younkin Success Center
(<http://younkinsuccess.osu.edu/tutoring/>)
- Residence Halls
(<https://housing.osu.edu/resources/tutoring-in-the-residence-halls1/>)

University Center for the Advancement of Teaching (UCAT): Dr. Alan Kalish, Director
UCAT's mission is to support and advocate for all who teach at Ohio State. UCAT aims to help Ohio State's teachers approach their work in a scholarly and reflective way, engaging with the research on effective pedagogies, thus promoting continuous improvement of student learning. The center likewise strives to create a community wherein student-focused teaching principles and practices are valued and in which teachers feel connected to each other. Taken together, UCAT believes these things engender a campus culture where teachers have access to the tools, support, and recognition they need to be confident, fulfilled, and effective in their pedagogical roles at Ohio State.

Undergraduate Research Office (URO): Dr. Lorraine Silver Wallace

The Office of Undergraduate Research and Creative Inquiry strives to nurture and support mentored research pursuits of all undergraduate students to proactively transform and enrich their academic experience by providing inclusive and innovative research engagement opportunities and fostering collaborative partnerships in the world beyond the classroom. (<https://ugresearch.osu.edu/Pages/mission.aspx>)

University Libraries: Damon E. Jaggars, Vice Provost and Director

The Ohio State University Libraries support the research, teaching and learning needs of students and scholars. University Libraries provide access to deep research collections, an extensive offering of online resources available anytime anywhere, and special collections of exceptional quality and distinction. Its facilities offer work spaces designed to enable a variety of learning styles and research methods (<https://library.osu.edu/about/locations/>)

Primary libraries used by COE students:

- Thompson Library (Main Library) - The Thompson Library provides a variety of study spaces, an extensive collection, and faculty and staff to help with research. There are more than 230 computers available, OSU Wireless service is throughout the building, and a wide variety of places to study. (<https://library.osu.edu/about/locations/thompson-library/>)
- 18th Avenue Library - Collections include Science & Engineering and Music & Dance. Public computers, group and individual study tables, and copiers may be found throughout the building, with the largest number of computers on the 1st floor. (<https://library.osu.edu/about/locations/18th-avenue-library/>)

6. Credit Unit

The Ohio State University is on a semester system and follows the Ohio Board of Regents rule for semester credits that states that one semester credit hour is awarded for a minimum of 750 minutes of formalized instruction that typically requires students to work on out-of-class assignments an average of two hours for every hour of formalized instruction.

The university year is divided into two semesters of approximately 70 instructional day each. The summer term is the beginning of the university year and has multiple sessions that include

- one 12-week term,
- two 6-weeks sessions,
- three 4-week sessions, and

- two 8-week overlapping (first and second 4-week, or second and third 4-week) sessions.

All courses are assigned a number in accordance with Faculty Rules (<https://trustees.osu.edu/index.php?q=university/facultyrules>) and credit hours in accordance with the procedure outlined in the faculty rules (rule 3335-8-24). This rule states:

(A) All courses shall be assigned a number of credit hours in accordance with the procedure outlined in rules 3335-8-02 to 3335-8-04 of the Administrative Code. This may be any number from zero on up; however, in determining the credit hours assigned, the department, school, college and council on academic affairs should use as a guide the following suggested standards:

(1) One credit hour shall be assigned for each three hours per week of the average student's time, including class hours, required to earn the average grade of "C" in this course.

(2) One credit hour shall be assigned for each two consecutive hours of practical or experimental work per week in any department or school.

(3) One credit hour shall be assigned for each three hours of laboratory work per week, when no additional outside work is required. When outside work is required, then the standard in paragraph (A)(1) of this rule shall be applied.

(B) In determining the hours per week required by the course or work, the council on academic affairs may, in appropriate cases, consider the average weekly hours spent during a semester, summer term, or session on the course or work. It should be remembered that the above are guides only and may be deviated from for good cause.

(C) When comparing or combining semester credit hours with quarter credit hours, one semester credit hour shall be the equivalent of one and one-half quarter credit hours. (B/T 7/9/2004, 6/22/2012)

7. Tables

Complete the following tables for the program undergoing evaluation.

Table D-1. Program Enrollment and Degree Data
Computer Science and Engineering

	Academic Year	Enrollment Year					Total Undergrad	Total Grad	Degrees Awarded			
		1st	2nd	3rd	4th	5th			Associates	Bachelors	Masters	Doctorates
2016	FT	181	286	294	463		1224	299		268	75	31
	PT	1	3	18	64		86					
2015	FT	153	239	264	444		1100	305		228	94	32
	PT	0	6	6	47		59					
2014	FT	144	258	261	373		1036	341		192	111	28
	PT	1	3	6	49		59					
2013	FT	198	245	209	309		961	327		158	92	26
	PT	0	4	16	42		62					
2012	FT	165	183	174	262		784	305		149	74	19
	PT	0	8	10	45		63					

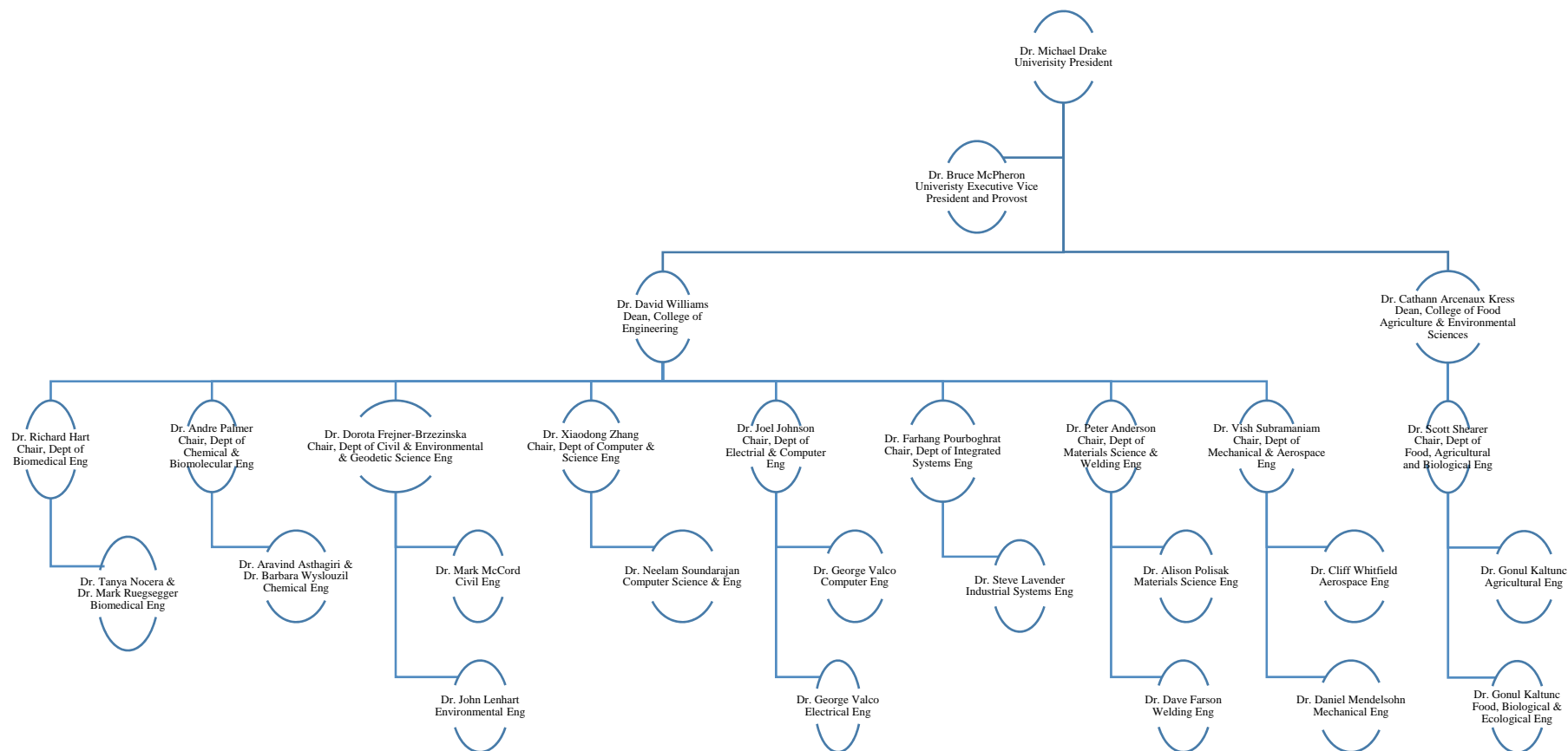
Table D-2. Personnel
Computer Science and Engineering
Year: 2016

	HEAD COUNT		FTE
	FT	PT	
Administrative	7	0	7
CSE Advising Office	3	1	3.5
Faculty (tenure-track)	39	2	37.66
Faculty (clinical track)	2	0	2
Other Faculty (Lecturers, Senior Lecturers)	18	37	30.25
Graduate Teaching Associates (GTAs)	0	97	64
Student Teaching Assistants ¹	0	81	41.98
Student Research Assistants ¹	0	10	9.35
Technicians/Specialists ²	8	1	8.75
Student Technicians	0	25	10.88
Office/Clerical Employees	1	0	1

¹These are undergraduate teaching assistants; graduate teaching associates are included in the previous row; and graduate research associates are not included since they do not contribute to the CSE program.

²These are IT specialists who are part of the Engineering Technology Services group of the College of Engineering; they are delegated to the CSE Department to maintain our computing facilities.

Table D-3 Organizational Chart
The Ohio State University Engineering Programs



Signature Attesting to Compliance

By signing below, I attest to the following:

That Computer Science & Engineering (BSCSE) has conducted an honest assessment of compliance and has provided a complete and accurate disclosure of timely information regarding compliance with *ABET's Criteria for Accrediting Computing Programs* and *ABET's Criteria for Accrediting Engineering Programs* to include the General Criteria and any applicable Program Criteria, and the *ABET Accreditation Policy and Procedure Manual*.

David Williams
Dean's Name (As indicated on the RFE)


Signature

26 June 2017
Date