COURSE OVERVIEW

Instructors
See section pages at http://web.cse.ohio-state.edu/software/2231/web-sw2/.

Course 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.

Levels and credits
U 4 (two one-hour lectures, two one-hour labs)

Prerequisites
CSE 2221; co-req: CSE 2321

General information, exclusions, etc.
Java is used
Course learning 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
Course topics

- Layered data representation concepts; representation invariants and abstraction functions; NaturalNumber representation using a Stack; Sequence/Queue/Stack representation using a List
- Set and Map representations using an array of Queues with hashing
- BinaryTree components; Set and Map representations using a BinaryTree with binary search tree algorithms
- SortingMachine components; sorting algorithms and their embeddings into SortingMachine implementations
- Tree components; 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

HOW THIS COURSE WORKS

Mode of delivery: This course will hold regular Zoom sessions at the scheduled class time Tuesday through Friday. Recording of lectures may be provided in advance and some Zoom sessions may be recorded and made available after the meeting. Contact your section’s instructor for details on requirements and expectations including attendance requirements.

Pace of online activities: This course follows the schedule posted at http://web.cse.ohio-state.edu/software/2231/web-sw2/schedule.html. Students are expected to keep pace with all lecture topics, and lab, homework, and project assignments.

Credit hours and work expectations: This is a 4-credit-hour course. According to Ohio State policy, students should expect around 4 hours per week of time spent on direct instruction (daily Zoom sessions) in addition to 8 hours of homework (reading, homework, and project assignment preparation) to receive a grade of (C) average.

Attendance and participation requirements: Because this is an online course, your attendance is based on your online activity and participation. The following is a summary of everyone’s expected participation:

- Participating in online activities for attendance: AT LEAST ONCE PER CLASS DAY

Contact your section’s instructor for details on attendance requirements and expectations. In general, for "lecture" days, you may be required to watch a recorded lecture before a Zoom meeting, attend a Zoom meeting, and/or watch a recording of a
Zoom meeting. In any case, you must complete the requirements for each lecture day before the next lab day. For “lab” days, you may be required to attend the live “lab” Zoom session and complete the lab activity during the session or complete the lab activity on your own before the next lecture day (and, if needed, get feedback or ask questions during an instructor’s office hours). You should also log in to the course in Carmen every day. (During most weeks you will probably need to log in many times.) If you have a situation that might cause you to miss several days of class, discuss it with me as soon as possible.

• **Office hours and live sessions: SPECIFIC TO EACH SECTION**
  Contact your section’s instructor for details on office hours and requirements for live session attendance.

• **Participation activities: MULTIPLE TIMES PER WEEK (AS PER SCHEDULE)**
  As part of your participation, you are required to submit homework and project assignments by their due dates.

## COURSE MATERIALS AND TECHNOLOGIES

### Textbooks

All course materials are provided on-line for free.

### Baseline technical skills for online courses

- Basic computer and web-browsing skills
- Navigating Carmen: for questions about specific functionality, see the [Canvas Student Guide](#).

### Required Technology skills specific to this course

- [Zoom](#) for live sessions (lectures, labs, office hours)
- [Piazza](#) class discussion group for “anytime” Q&A

### Required equipment

- Computer: current Linux, Mac (macOS 10.13+), or PC (Windows 8+) system with high-speed internet connection.
- Authentication device: a mobile device (smartphone or tablet), or landline, or security key (e.g., YubiKey, Feitian) to use for BuckeyePass authentication.
- Scanner: a camera, smartphone, tablet, or document scanner for scanning and uploading hand-written documents such as homeworks and exams.
- Webcam: built-in or external webcam, fully installed and tested.
- Microphone: built-in laptop or tablet mic or external microphone.

**Required software**

- Lab activities and project assignments will require the use of a [Java SE JDK](http://web.cse.ohio-state.edu/software/2221/web-sw1/extras/instructions/environment-setup/home-setup.html) and of [Eclipse IDE for Java Developers](http://web.cse.ohio-state.edu/software/2221/web-sw1/extras/instructions/environment-setup/home-setup.html) with appropriate plugins; instructions on downloading and setting up these tools on your own computer are available at [http://web.cse.ohio-state.edu/software/2221/web-sw1/extras/instructions/environment-setup/home-setup.html](http://web.cse.ohio-state.edu/software/2221/web-sw1/extras/instructions/environment-setup/home-setup.html).
- Current [Chrome browser](http://web.cse.ohio-state.edu/software/2221/web-sw1/extras/instructions/environment-setup/home-setup.html) with [Proctorio extension](http://web.cse.ohio-state.edu/software/2221/web-sw1/extras/instructions/environment-setup/home-setup.html) installed. Exams will be online on Carmen (possibly using the Proctorio online proctoring platform supported by OSU and Carmen).
- Recommended: [Microsoft Office 365](http://web.cse.ohio-state.edu/software/2221/web-sw1/extras/instructions/environment-setup/home-setup.html). All Ohio State students are eligible for free Microsoft Office 365 ProPlus through Microsoft’s Student Advantage program. Full instructions for downloading and installation can be found at [go.osu.edu/office365help](http://go.osu.edu/office365help).

**GRADING AND FACULTY RESPONSE**

**How your grade is calculated**

<table>
<thead>
<tr>
<th>ASSIGNMENT CATEGORY</th>
<th>POINTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework Assignments (many)</td>
<td>6%</td>
</tr>
<tr>
<td>Project Assignments (several)</td>
<td>30%</td>
</tr>
<tr>
<td>Quizzes/Exams (instructor-dependent)</td>
<td>60%</td>
</tr>
<tr>
<td>Class Participation (instructor-dependent)</td>
<td>4%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
</tr>
</tbody>
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Late assignments

Homework assignments are due by the start of class on the due date. Late homework submissions will not be accepted and will not receive any credit.

Project assignments are due one hour before the start of class on the due date. Maximum credit of 10 points is reduced by 2 points for each day (24 hours), or part thereof, the assignment is late. After a project assignment is 48 hours late, no credit is given.

Please refer to the schedule for due dates.

Grading scale

93–100: A
90–92.9: A-
87–89.9: B+
83–86.9: B
80–82.9: B-
77–79.9: C+
73–76.9: C
70 –72.9: C-
67 –69.9: D+
60 –66.9: D
Below 60: E

Faculty feedback and response time

I am providing the following list to give you an idea of my intended availability throughout the course. (Remember that you can call 614-688-HELP at any time if you have a technical problem.)

• **Grading and feedback:** For homework assignments, you can expect feedback within a few days. For project assignments, you can generally expect feedback within 5-6 days.
• **Email:** I will reply to emails within 24 hours on days when class is in session at the university.
• **Discussion board:** I will check and reply to messages in the discussion boards every 24 hours on school days.
COURSE POLICIES
See http://web.cse.ohio-state.edu/software/web/policies.html for course official policies.

Cooperation, Collaboration, and Professional Ethics
See http://web.cse.ohio-state.edu/software/web/policies.html#ccpe.

ACCESSIBILITY ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES

Requesting accommodations
The university strives to make all learning experiences as accessible as possible. In light of the current pandemic, students seeking to request COVID-related accommodations may do so through the university’s request process, managed by Student Life Disability Services. If you anticipate or experience academic barriers based on your disability including mental health, chronic or temporary medical conditions, please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. **SLDS contact information:** slds@osu.edu; 614-292-3307; 098 Baker Hall, 113 W. 12th Avenue. Go to [https://slds.osu.edu/](https://slds.osu.edu/) for more information.

Accessibility of course technology
This online course requires use of Carmen (Ohio State’s learning management system) and Zoom (academic audio and web conferencing tool at Ohio State) and possibly other online communication and multimedia tools. If you need additional services to use these technologies, please request accommodations with your instructor.

- Carmen (Canvas) accessibility
- Zoom accessibility
- Piazza accessibility
- Proctorio accessibility

ADDITIONAL INFORMATION
See http://web.cse.ohio-state.edu/software/web/other.pdf for additional information.