PURPOSE OF THIS COURSE

This course focuses on software development techniques in support of large-scale software projects and maintenance.

Specific topics include various programming paradigms and techniques, approaches to testing and automation, debugging, refactoring, and inheriting code.

Individual and team assignments are required, including programming assignments.

Specific project topics include (low-level) text processing, building a full-scale search engine, and the like.

Prerequisite: CSCI 2300 Introduction to Algorithms.
LEARNING OUTCOMES

At the conclusion of this course, you will be able to:

- Efficiently **identify defects** in software systems, in particular in functions, modules, classes, interfaces, designs, code, etc.
- Demonstrate the ability to scale up, i.e., to **refactor** and effectively maintain increasingly large-scale code bases
- Design and implement **repeatable test plans** that ensure high levels of quality
- Identify (and avoid) **anti-patterns** in software design, development, and testing

In addition, for students registered in CSCI 6460:

- Effectively **coordinate** one or more software development teams to facilitate successful communication, organization, and progress toward demonstrable goals

COMMUNICATION-INTENSIVE

For undergraduate students, this course serves as a CSCI in-major communication intensive (CI) course. Therefore, expect a lot of writing (not just code!), a lot of communication with your classmates, and multiple presentations.

Given that this course is online, all presentations that you make will need to be pre-recorded:

- We will try to use WebEx for this…
- …or feel free to make use of other presentation recording software if you’d like
- This online format should take some of the pressure off and allow you to hone your presentation skills!
**COURSE TA AND MENTOR**

**Graduate TA:**  
- Vaishnavi Neema

**Undergrad mentor:**  
- Angelina Martineau

TA and mentor office hours will be posted in Submitty

We will randomly and periodically visit you during your team meetings!

Please do not email Vaishnavi or Angelina

- Instead, please communicate using the Discussion Forum (and the Grade Inquiry interface), or if more urgent or personal in nature, email me directly

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**RECOMMENDED TEXTBOOKS**

**The C Programming Language, 2nd ed.** by Kernighan and Ritchie, 1988

**AntiPatterns: Refactoring Software, Architectures, and Projects in Crisis** by Brown, Malveau, McCormick, and Mowbray, 1998

**The Mythical Man-Month, Anniversary ed.** by Brooks, 1995

**Search Engines: Information Retrieval in Practice** by Croft, Metzler, and Strohman, 2009

**Automating Inequality: How High-Tech Tools Profile, Police, and Punish the Poor** by Eubanks, 2018

**Algorithms of Oppression: How Search Engines Reinforce Racism** by Noble, 2018
COURSE LMS

All course materials will be available via Submitty:
- https://submitty.cs.rpi.edu/courses/f20/csci4460
- Log in using your RCS ID (e.g., “goldsd3”)

The course schedule will be posted there (and will likely change)

We will use Submitty’s Discussion Forum
- Watch for course announcements (typically also auto-emailed)
- Post questions; also answer questions

Check your RPI email at least once per day for announcements

It is your responsibility to stay up-to-date with announcements posted on the Discussion Forum

REQUIRED SOFTWARE AND OS

We will use numerous programming languages, all of which have compilers, interpreters, and IDEs available for free via the Web

We will focus on C (not C++) for individual homeworks

We will use Submitty for all assignments, which will include auto-grading to the extent possible
- Therefore, it is highly recommended that you use Ubuntu 18.04.5 LTS (or newer)

We will also have server space within the CSCI department for implementing and integrating our team-based projects

C != C++
C > C++
CONTENT DELIVERY

Some lectures will be pre-recorded using WebEx and Mediasite, with URLs published in Submitty.

Our scheduled lecture block is Tuesdays and Fridays 10:10AM-12:00PM EDT
- We will hold live WebEx meetings in a majority of these timeblocks
- You will also use these timeblocks to meet with your project teams

Our scheduled “recitation” block is Wednesdays 10:10AM-12:00PM EDT
- We will hold live WebEx meetings in some of these timeblocks for group exercises
- You will primarily use these timeblocks to meet with your project teams

All of these will be recorded and made available (within ~24 hours)

Attendance is required based on timezones, i.e., you must meet with your project teams (once established) at least twice per week (except for Thanksgiving week)

USING WEBEX MEETINGS

We will use WebEx: https://rensselaer.webex.com/
- RPI-specific WebEx information can be found here: https://info.rpi.edu/multimedia-services/webex-meetings-webex-teams

Live lectures will be via WebEx with URLs to join published in our Discussion Forum
- All live lectures will be recorded for later viewing
- During live lecture, please ask questions via Chat (audio and video will be turned off for everyone)

For all scheduled lab/office hours:
- Set up your WebEx meeting space: https://rensselaer.webex.com/meet/<your-RCS-userid>
- We will use Submitty’s Office Hours Queue to run labs and office hours
- Be sure you add yourself to the correct queue
- Be sure to include your WebEx meeting space URL when you join a queue
GRADING CRITERIA

Grading breakdown is as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homeworks (3)</td>
<td>30%</td>
</tr>
<tr>
<td>Exam (1)</td>
<td>15%</td>
</tr>
<tr>
<td>Class Participation</td>
<td>10%</td>
</tr>
<tr>
<td>Team Participation</td>
<td>10%</td>
</tr>
<tr>
<td>Team Project Deliverables</td>
<td>25%</td>
</tr>
<tr>
<td>Team Presentations</td>
<td>10%</td>
</tr>
</tbody>
</table>

Late days in Submittly:
- Only for homeworks, some participation grades, and some team project deliverables
- Late days are intended to cover minor illnesses, hardware malfunctions, WiFi issues, conflicts with other assignments, and other minor (or absurd) mishaps
- Each student will initially be given six late days for the semester
- No more than two late days may be used for any one assignment
- If used on a team assignment, each team member must use a late day
- To use a late day, simply submit the assignment as per usual via Submittly

It is your responsibility to stay up-to-date with assignments, especially group assignments

ABSENCES AND EXTENSIONS

Attendance is required at your project team meetings, which will be scheduled to occur at least twice per week

For prescheduled and unforeseen absences for which you would like to obtain an extension on a deadline, see http://bit.ly/rpiabsence

Do not ask for an extension without first obtaining an excused absence via the above URL
- If possible, please suggest a new due date for the affected assignment(s)
- Extensions will not be given because you forgot or you had too many other assignments to do, etc.

For every meeting you attend, please silence or turn off cellphones and other non-classroom electronic devices to avoid any distractions
INDIVIDUAL ASSIGNMENTS

There will be three individual homework assignments focused on C (30%)

- Homeworks will be submitted and auto-graded via Submitty, which is running Ubuntu 18.04.5 LTS and uses gcc 7.5.0
- Homeworks will also be manually evaluated and graded

There will be one comprehensive exam in early November (15%)

- The exam primarily covers programming in C, software architecture, design approaches, debugging techniques, methodologies for scaling up, etc.
- There is no final exam in this course!

There will be a few smaller assignments that will count as your participation grade (10%)

- Think of these as lecture exercises or hands-on individual/group mini-assignments

There will be a “team participation” grade for your individual contributions toward your team project (10%)

PROJECT TEAM ASSIGNMENTS

Project teams will be formed at the end of Week 3

- Each team will have a designated team coordinator
- Team meetings will occur at least twice per week (schedules TBD based on timezone)

For each team, there will be numerous team deliverables (25%) that will cover your design, key architectural divisions, interfaces, test plans, coding standards, meeting minutes, etc.

For each team, there will be two team presentations (10%)

- The first presentation will be due by the end of Week 9
- The second presentation will be due by the end of Week 12
- All team members will participate in the presentation
- Each student must then watch and critique two team presentations
GRADING POLICIES AND CSCI 6460

You may appeal a grade by submitting a grade inquiry (via Submitty)
* Grade inquiries must be submitted within seven days of grades being announced
* Smaller assignments will not have grade inquiries enabled (in rare cases, email me)

Course grades are determined by applying the following ranges:
* 93-100 A; 90-92 A-; 87-89 B+; 83-86 B; 80-82 B-; 77-79 C+; 73-76 C;
  70-72 C-; 67-69 D+; 60-66 D; 0-59 F; (a curve might be applied after all grades are in)
* For students registered for CSCI 6460, the D+ and D grades are replaced with an F

Students registered for CSCI 6460 have the additional responsibilities of coordinating their team
* Both the team and class participation grades will include additional questions/assignments
* There will also be additional questions to answer on the individual homework assignments

DISABILITY SERVICES FOR STUDENTS

From http://studenthealth.rpi.edu/disabilityservices:
* “The Office of Disability Services for Students (DSS) assists Rensselaer students with disabilities in gaining equal access to academic programs, extracurricular activities, and physical facilities on campus. DSS is the designated office at Rensselaer that obtains and files disability-related documentation, assesses for eligibility of services, and determines reasonable accommodations in consultation with students.”

Contact: dss@rpi.edu or 518-276-8197 or Academy Hall 4226

Please take care of your accommodations by Friday 9/4
* (You must renew your accommodations each academic year)
ACADEMIC INTEGRITY

Rensselaer Handbook of Student Rights and Responsibilities:
* “Intellectual integrity and credibility are the foundation of all academic work. A violation of the Academic Integrity policy is, by definition, considered a flagrant offense to the educational process. It is taken seriously by students, faculty, and Rensselaer and will be addressed in an effective manner.”
* “If found responsible for committing academic dishonesty, a student may be subject to one or both types of penalties: an academic (grade) penalty administered by the professor and/or disciplinary action through the Rensselaer judicial process described in this handbook.”

https://info.rpi.edu/dean-students/student-rights-responsibilities-and-judicial-affairs

ACADEMIC INTEGRITY POLICY

Individual assignments in this course must be the sole work of each individual student; for group projects, submitted work must be the sole work of the team members.

If found in violation of the academic dishonesty policy:
* You will receive a grade of zero on the given assignment
* For a second offense, you will receive an F in the course
* Team offenses will follow the above policy for all team members
* Each incident will be reported to the Dean of Students or Graduate Dean, as applicable, as well as the Department Head
* Cheating may cause you to be ineligible to mentor for the department, participate in departmental organizations, etc.