Course Syllabus

CSCE 361: Software Engineering Section 1 MWF 1130 am -1220 pm AVH 115.

Spring 2022

Schedule

Lecture

Section 001: Monday, Wednesday, Friday 11:30am-12:20pm.

- AVH 115
- Final exam: 10:00 to noon
  Monday, May 9th

Instructor

Prof. Bhuvana Gopal (bhuvana.gopal@unl.edu)

Office Hours: All office hours will be conducted over Zoom.

W-F 10:30 am-11:15 am and by appointment.

Office Hours sign up

Students must sign up for office hours using this google doc:

https://docs.google.com/spreadsheets/d/1_ZzPM0rS2e7AkomaTp1dFUxJ8uvSTLyOjmng-eZbAys/edit#gid=0 (Links to an external site.)

This is to ensure transparency to all students regarding office hours availability.

Office Hours Zoom Link: https://unl.zoom.us/j/7730548719 (Links to an external site.)

If you need additional office hours please email me at bhuvana.gopal@unl.edu

TAs:

The TAs are available to help students with labs and the course project.
They will also help me grade the quizzes and exams.
In addition, they will host technical walkthroughs at the beginning of the semester to help you learn fundamental technology concepts.

Name	General Office Hours	email
Pranav Palli	W 3-5 PM https://unl.zoom.us/j/95065005804 (Links to an external site.)	ppalli2@huskers.unl.edu
Andrea McGrane	M 5 - 7 PM https://us02web.zoom.us/j/4986655791?pwd=N2loa28wT0FBam1USlo3VVMrSkVLQT09 (Links to an external site.)	amcgrane2@huskers.unl.edu
Divith Rajagopal	M W 2-3 PM https://unl.zoom.us/j/97933257174 (Links to an external site.)	drajagopal2@huskers.unl.edu
Katie Gerot	T R 6:30-7:30 PM https://unl.zoom.us/j/91319541914 (Links to an external site.)	katie.gerot@huskers.unl.edu

General TA office hours are in the Student Resource Center (SRC) in Avery 012 or in the Computer Lab in Avery 015 or in the specific zoom links for specific TAs in table above. In addition to general TA office hours, each project team will have a dedicated TA office hour every week starting in the fourth week.

Virtual and In-Person Classroom Policies:

1. All course materials are considered intellectual property. No videos, photos, screen shots, or audio recordings are allowed without the instructor's (or student's) permission.
2. Please be courteous during discussions. Please do not use phones, work online, or otherwise be distracting.
3. Remember that all communications with faculty are business communications and write emails accordingly. Please consult this Article on business communications in Higher Ed (Links to an external site.) (Links to an external site.)article for formatting guidelines.

Catalog Description

Computer Systems Engineering (3 cr). Techniques used in the disciplined development of large software projects. Software requirements analysis and specifications, program design, coding and integration testing, and software maintenance. Software estimation techniques, design tools, and complexity metrics. *Requires participation in a group design and implementation of a software project.*

Software development and practical application of software engineering is a significant component of this course. Industry best practices for software engineering will be emphasized during lectures and there will be labs, assignments and a course project that involve a significant amount of programming.

Prerequisites

Grade of "P" or "C" or better in CSCE 310, CSCE 310H, CSCE 311, SOFT 260, SOFT 260H, or RAIK 283H.

Prerequisites by Topic

- *Mastery of* A high-level programming language
- *Mastery of* Basic data structures and algorithm design
- *Familiarity with* Two or more programming languages

Course Objectives

Mastery of Concepts and techniques for large-scale software development.
Familiarity with: Design techniques, such as structured and object-oriented analysis

- *Familiarity with* The software life cycle and the software development process
- *Familiarity with* Pragmatic aspects of developing software systems
- *Exposure to* Software testing techniques
- *Exposure to* Developing and maintaining large-scale software systems

Exposure to Using existing software systems or legacy code when developing a software system

- *Exposure to* Working in a team of software developers
- *Exposure to* Communication of technical results (done in context of projects)
- *Exposure to* Ethical issues in computing

ABET Objectives

- By the time of graduation, *Computer Engineering* majors must have
    - an ability to design and conduct experiments, as well as to analyze and interpret data
    - an ability to function on multidisciplinary teams

    - an ability to identify, formulate, and solve engineering problems
    - an understanding of professional and ethical responsibility
    - an ability to communicate effectively
    - the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
    - a recognition of the need for, and an ability to engage in life-long learning
    - a knowledge of contemporary issues
    - an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice
- By the time of graduation, *Computer Science* majors must have
    - an ability to analyze a problem, and identify and define the computing requirements appropriate to its solution
    - an ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs
    - an ability to function effectively on teams to accomplish a common goal
    - an understanding of professional, ethical, legal, security and social issues and responsibilities
    - an ability to communicate effectively with a range of audiences
    - an ability to analyze the local and global impact of computing on individuals, organizations, and society
    - recognition of the need for and an ability to engage in continuing professional development
    - an ability to use current techniques, skills, and tools necessary for computing practice
    - 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 trade-offs involved in design choices
    - an ability to apply design and development principles in the construction of software systems of varying complexity

Topics Covered

1. Programming large-scale software development
2. Software process and life cycle models
3. Requirements engineering
4. Specification techniques
5. Structured analysis and design
6. Object-oriented design techniques
7. Software testing (black box and white box; unit and integration)

8. System maintenance issues and techniques
9. Software architecture
10. Software Design
11. Accessibility
12. Code smells
13. Static code analysis
14. Ethics
15. Diversity
16. DevOps (continuous integration)
17. Cloud computing

Again, a significant component of this course will be practical programming assignments required to build software according to sound software engineering principles.

Grading

Your grade will be calculated based on your performance in the following areas:

***Assignments and Labs* (25% total – Assignments – 10%, Labs – 15%)** There will be a small number of individual homework assignments to help cement the concepts from the lecture and the textbook that may not be directly applicable to your project. Because group study is an effective learning technique, I encourage you to work with your peers to discuss the homework, but be sure to write your own solutions and indicate whom you worked with.

***Quizzes* (20%)** There will be quizzes on most of the topics covered in class. All quizzes will be open book, and take home.

***Midterm Exam*(15%)** We will have one midterm exam, scheduled for 3/11; if there are changes, I will announce them at least a week in advance. The midterm exam, like all the quizzes, will be open book, open notes and take home.

***Group Project* (15%)** This course contains a group project. You will have the opportunity to practice most of what you learn by preparing the artifacts for a small software system that you and your team will develop. You will have deliverables scheduled at the end of the semester. In addition to code, you will demonstrate your ability to work on a team and your ability to communicate in both written and oral forms.

***Final Exam (Group project presentations)* (10%)** Your group project presentations will be the final exam and it has been scheduled for 10:00 to noon
May 9.

***Survey participation* (5%)** There will be a concepts based survey at the beginning and end of the semester. This will be the pre-test and post-test. Your participation in both (not correctness but participation) will earn you 5% of your grade.

***Instructor Individual Assessment* (10%).** Based on your participation (attendance, class participation including asking and answering relevant questions) and timely communication with instructor/TAs to keep up with the course demands, as well as your work ethic (as evidenced by your professionalism with sprint review meetings) you will be assigned a score of your individual performance this semester.

***Extra Credit* (5%)** There will be extra credit opportunities throughout the semester, and will be announced as the topics come up, and can account for up to 5% of your grade.

- Final grades will be assigned based on the following cutoff

Grade	A+	A	A-	B+	B	B-	C+	C	C-	D	F
Score	98	93	90	87	83	80	77	73	67	60	<60

Course Schedule: Sequence of lectures, quizzes, labs, assignments, exams and presentations

Subject to minor modifications based on guest lecture schedule etc.

***All assignments and quizzes will be due at 11:59pm**

Date	**Lecture**	**Assignments and Labs**	**Quizzes and Tests**
1/19	Course Intro	C# Intro Email App, Start of Semester Survey assigned	
1/21	Configuration management	Reading Presentations	
1/24	Requirements Engineering	Pre-POGIL Industry Perspectives Questionnaire	

1/26	Software Process Models	Planning poker lab assigned, C# Intro Email App due	
1/28	Agile in detail	Start of Semester Survey due	
1/31	UX and UI		
2/2	Software Architecture and Design and SOLID principles part 1	Planning poker lab due, Architecture assignment and extra credit lab - MVC assigned	UI Design Quiz
2/4	SOLID principles part 2	Extra credit lab – DI assigned	
2/7	Software Design with iDesign		
2/9	Database concepts part 1 and 2	Architecture assignment and extra credit lab- MVC due, Database design lab assigned	Architecture Quiz
2/11	DB Connection strings		
2/14	ORMs and Model generation	Extra credit lab – DI due	

2/16	Dependency management – Merge conflicts and merge hell;	Database design lab due	
2/18	Accessibility	HTML and CSS tutorial Lab assigned	
2/21	Scheduled Review Day		
2/23	Code smells and refactoring		
2/25	Application Security	SQLi and Parameterized Queries Lab assigned	
2/28	Unit testing part 1		Database Concepts Quiz
3/2	Unit testing part 2		
3/3	Thursday (No class)	Software Testing Pre-Pogil Questionnaire Due	
3/4	Diversity+Ethics	SQLi and Parameterized Queries Lab due, Unit tests assignment assigned	

3/7	Scheduled review day, no class.	HTML and CSS tutorial Lab due Pre-POGIL Industry Perspectives questionnaire Due	
3/9	Scheduled Review day- no class.		Software Testing Quiz
3/11	Cloud computing basics + Midterm Day (Midterm is open book, open notes, untimed, and take home)		Midterm exam
3/14	NO CLASS - SPRING BREAK		
3/16	NO CLASS - SPRING BREAK		
3/18	NO CLASS - SPRING BREAK		
3/21	Integration testing		
3/23	DevOps and Continuous integration	Unit tests assignment due Travis CI lab assigned	
3/25	Fill the gaps- unit testing and integration testing		Project and team preferences due at midnight 3/28
3/28	Static Code Analysis + Code Review Basics		

3/30	Fill in the gaps from POGIL for Unit testing, integration testing and CI		
4/1	**Capstone introduction**	Cloud computing lab assigned, project groups assigned Travis CI lab due	
4/4	AMA with Bhuvana - attendance mandatory.		
4/6	Capstone project work day - instructor available by appointment		
4/8	Capstone project work day - instructor available by appointment	Cloud computing lab due	CI and Cloud Concepts Quiz POGIL experience quiz due

		Kickoff meeting minutes due at midnight
4/11	**Sprint review – every team reports progress in class to instructor.**	Software Testing Post POGIL questionnaire due Industry Perspectives Post POGIL questionnaire due
4/13	Concepts review date	
4/15	Capstone project work day - instructor available by appointment	
4/18	**Sprint review – every team reports progress in class to instructor.**	
4/20	Capstone project work day - instructor available by appointment	
4/22	Capstone project work day - instructor available by appointment	

4/25	**Sprint review – every team reports progress in class to instructor.**	
4/27	Capstone project work day - instructor available by appointment	
4/28	Thursday (NO CLASS)	Course Evaluation Survey due;
4/29	Capstone project work day - instructor available by appointment	
5/2	**Sprint review – every team reports progress in class to instructor.**	
5/4	Capstone project work day - instructor available by appointment	
5/6	Capstone project work day - instructor available by appointment	End of Semester Survey due
5/8	Final Project Due	Capstone Project Due

5/9	**Final Project presentations @ due date / time**	Release presentations due

Policies and Resources

1) It is CSE Department policy that all students in CSE courses are expected to regularly check their email so they do not miss important announcements. In addition, for this course, all students will be required to check canvas announcements and postings for regular updates.

2) Course specifications on the department website:

https://cse-apps.unl.edu/crspec/course_specifications/23/viewLinks to an external site.

Please remember that all the elements described in the course specifications will have a practical, programming implementation oriented focus during this course.

3) The CSE Department has an anonymous contact form that you may use to voice your concerns about any problems in the course or department if you do not wish to be identified.

http://cse.unl.edu/contact-formLinks to an external site.Links to an external site.

4) **Academic Integrity Policy:**

All homework assignments, quizzes, exams, etc. must be your own work. No direct collaboration with fellow students, past or current, is allowed unless otherwise stated. The Computer Science & Engineering department has an Academic Integrity Policy.

http://cse.unl.edu/academic-integrity-policyLinks to an external site.Links to an external site.

All students enrolled in any computer science course are bound by this policy. You are expected to read, understand, and follow this policy. Violations will be dealt with on a case by case basis and may result in a failing assignment or a failing grade for the course itself. All students enrolled in any CSE course are bound by this policy. You are expected to read, understand, and follow this policy. Cheating is a very serious offense, and the CSE Department has laid down strict guidelines for dealing with this problem. The penalty for cheating may include an automatic F grade for the course and expulsion from the program. The Department requires me to report every offense to the Chair for further consideration. The key to avoiding cheating is to be totally open and transparent about any and all collaborations, noting that appropriate teamwork and collaboration will be highly encouraged. See

http://cse.unl.edu/ugrad/resources/academic_integrity.phpLinks to an external site.

Here is some elaboration on the examples listed on the department's academic integrity webpage:

- I encourage discussions of *what* and *why*, but discussions of specific solutions or implementations are
- Being in possession of a worked or partially-worked solution to an assignment (whether from a fellow student, from the internet, or from another source) before you have completed the assignment is unauthorized collaboration on the
- If another student has a copy of your worked solution to an assignment before s/he has completed the assignment, I will assume that you facilitated their cheating unless it can be demonstrated that they obtained the copy despite your reasonable precautions to prevent them from doing Students who share a computer should protect their files either by using separate accounts or by placing their coursework in password-protected folders.
- If we detect academic misconduct on group assignments, I will hold the full group responsible unless there is compelling evidence that only a proper subset of the group committed the misconduct and that the remainder of the group was unaware of the

5) **About the CSE Student Resource Center (SRC):**

The Computer Science Resource Center (SRC) is committed to continuing to provide support for students enrolled in Computer Science and Software engineering courses.

The SRC will be staffed M-F from 9:00 a.m. – 9:00 p.m.

All students enrolled in CSCE/SOFT courses will be enrolled in the Virtual SRC via Canvas. Students will have access to the SRC via Canvas and can access the SRC via this Zoom link above.

Students must be logged into Canvas.

- SRC front-desk tutors will do their best to help students in the order in which they join the Zoom room.
- SRC tutors can help with some content questions, general questions and CSE account questions
    - SRC tutors will direct students to the appropriate Zoom rooms or breakout rooms for specific courses when those course TAs are available for office hours.

***6) Accommodation*:** I encourage students with disabilities to contact me for a confidential discussion of their individual needs for academic accommodation. This includes students with mental health disabilities like depression and anxiety. The University of Nebraska-

Lincoln policy is to provide individualized accommodations to students with documented disabilities that may affect their ability to fully participate in course activities or to meet course requirements. To receive accommodation services, students must be registered with the Services for Students with Disabilities (SSD) office, 232 Canfield Administration, 472-3787. **Any student in this course who has a disability that necessitates accommodation should contact the instructor as soon as possible to discuss the appropriate accommodations necessary to complete the course requirements.**

7) ***Counseling Services*** UNL offers a variety of options to students to aid them in dealing with stress and adversity. Counseling and Psychological Services (CAPS, https://caps.unl.edu/Links to an external site.) is a multidisciplinary team of psychologists and counselors that works collaboratively with Nebraska students to help them explore their feelings and thoughts and learn helpful ways to improve their mental, psychological and emotional well-being when issues arise. CAPS can be reached by calling

402-472-7450. Big Red Resilience & Well-Being

(https://resilience.unl.edu/big-red-resilience-well-beingLinks to an external site.)

This resource provides fun events, innovative education, and dynamic services to help students understand emotions, manage stress, build strength, connect with others, develop grit and navigate transitions.

IMPORTANT INFORMATION SPECIFIC TO THIS COURSE:

Technology Stack

1) The technology stack for the **labs and assignments** on this course is C# .NET and SQL Server.

https://dotnet.microsoft.com/learn/dotnet/hello-world-tutorial/intro (Links to an external site.) (Links to an external site.)

gives you clear details on set up and getting started, and

https://dotnet.microsoft.com/apps/aspnet/web-apps (Links to an external site.) (Links to an external site.)

gives you details on how to develop a simple, full-stack web application.

2) **Every assignment and lab will have clear instructions to walk through them as well as resources to follow for every step, so if you are unfamiliar with this stack at the beginning of the course, you will have a step by step introduction to various aspects of this stack by the end of the course through the labs and assignments.** This stack is WIDELY used in the software industry.

3) The course project is worth a total of 25% of your total grade – 15% for the project and 10% for the final exam- group presentations. **THE COURSE PROJECT CAN BE DEVELOPED IN ANY TECHNOLOGY STACK OF YOUR CHOICE. Some suggestions are C#.NET, Angular/Knockout/Any other lightweight JavaScript framework with SQL Server, Java with MySQL etc.**

Textbook

The recommended (NOT REQUIRED) textbook for this course will be

Software Engineering (10th Edition)

by Ian Sommerville

ISBN-13: 978-0133943030

ISBN-10: 0133943038

THE TEXTBOOK IS OPTIONAL. We will provide you with all the reading material and links needed to be successful in this course. If you keep up with the required readings, attend class, do your labs, assignments and participate in class and be active in seeking out help when you need it from the instructor/TAs, you will set yourself up for success in this course.

COMMUNICATION WITH INSTRUCTOR/TAs

1) Please use your @huskers.unl.edu email address for EVERYTHING related to this course. We will have several tools including Canvas, Travis-CI, and possibly more. We need you to use ONLY YOUR @HUSKERS.UNL.EDU EMAIL ADDRESS.

2) Canvas announcements will be an important mode of communication from the instructor and TAs to the students. Please stay up to date with announcements.

3) Please email the instructor at bhuvana.gopal@unl.edu if you need to communicate immediately or one on one with the instructor. The same goes for TAs.

4) **Canvas DISCUSSIONS will be the mode of discussion for students, instructor and TAs. Please utilize this feature extensively.**

3) Attendance: We will cover all the material in class. Your quiz and exam questions will be based on that material. In particular, many of the details necessary to complete assignments will be presented in class. It is to your benefit to attend class. Because late arrivals are distracting, I also ask that you arrive to class on time.

4) Class Preparation and Participation: I expect you to be prepared for class, participate in discussions, and ask and answer questions.

5) Office hours: Please sign up for office hours in advance if you need to talk to the instructor about anything. Email the instructor to sign up for office hours. Instructor's office hours are typically completely booked, so signing up helps ensure that you have a slot. If you need additional time, please email the instructor at bhuvana.gopal@unl.edu