The University of Texas at El Paso
Department of Computer Science
CS 4311 – Software Engineering: Design and Implementation
Fall 2023 Syllabus

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General Information

Instructor Information:

Name:	Bhanukiran Gurijala, Ph.D.
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Office Hours:	TR 3:00 – 4:00 PM Or By appointment
Dates:	August 28, 2023 – December 7, 2023

Course Information:

CS 4311:	Software Engineering II	
Term:	Fall 2023	
Delivery Method	In-person	
CRN:	11631	
Meeting Day and Time:	MW 3:00 PM – 4:20 PM	
Location:	QUIN 212	
TA:	TBA	TBA

Important Dates:

August 28, 2023 – First Day of Classes
September 13, 2023 – Census Day
November 3, 2023 – Drop/Withdraw Deadline (Automatic W)
December 7, 2023 – Last day of Classes
December 11, 2023 – Final Exam (1:00 PM – 3:45 PM)

Please communicate with the instructor or TA anytime you have questions, concerns, or wish to discuss anything. Reach out as often and frequently as necessary so that you may succeed.

NOTE: When emailing the instructor or TA please use [CS 4311 FA23] in the subject.

Prerequisites:

CS 4310 with a grade of C or better. You should be in your last two semesters as an undergraduate.

Textbook:

Wirfs-Brock, R. Wilkerson, and L. Wiener, Designing Object-Oriented Software, Prentice Hall, 1990.

Other Recommended Books:

Shari Lawrence Pfleeger, Joanne Atlee, Software Engineering: Theory and Practice, 4th Edition, Prentice Hall, 2009.

Objectives & Outcomes

Course Objectives:

This course will provide students with the fundamentals of the design and implementation of software systems, emphasizing the principles and methods used to develop and verify software systems. On completion of CS4311, students should be able to discuss and demonstrate approaches, techniques, or methods for creating high-level and detailed designs, hierarchical factoring of object systems, develop verification plans, be familiar with IEEE standards, and have experience in planning and implementing a large project.

Course Description:

Methodologies, approaches, and techniques associated with software design, implementation, and testing of a software system; other topics include cooperative teamwork, project management, and documentation; second semester of a two-semester capstone project in which students design and implement a real-world application specified in CS4310.

Goals:

To provide computer science students with software analysis and design techniques that result in the development of maintainable and reliable software that meets the customer's needs. In practical terms, this course is meant to provide students with an approximation of a real-world experience of software development.

Course materials:

All the course materials will be available through **Blackboard**. Please check Blackboard regularly to stay updated with the class.

Topics:

- Configuration management
- Software design analysis techniques
- High-level software design
- Software design specification
- Software implementation
- Software validation and verification
- Software process improvement

Learning Outcomes

Level 1: Knowledge and Comprehension:

Level 1 outcomes are those in which the student has been exposed to the terms and concepts at a basic level and can supply basic definitions. Upon successful completion of this course, students will able to:

a. Articulate design principles, including cohesion and coupling, encapsulation, and information hiding.
b. Describe software design concerns related to maintenance.
c. Describe different software architectural styles, such as blackboard, event systems, layered system, and pipe and filters

Level 2: Application and Analysis:
Level 2 outcomes are those in which the student can apply the material in familiar situations, e.g., can work a problem of familiar structure with minor changes in the details. Upon successful completion of this course, students will be able to:

a. Apply different diagramming techniques for an architectural design.
b. Apply different textual and diagramming techniques for producing a detailed design of a system.
c. Relate general strategies to identify and implement appropriate software architecture styles (including distributed and cloud) for the system under development.
d. Relate general strategies for creating a design of a system.
e. Distinguish between the different levels of cohesion and coupling.
f. Use software development and maintenance tools, such as software documents creation and editing tools, GUI generators, comprehension and analysis tools, supporting activities tools (configuration management tools), verification and validation tools, and security vulnerability analysis tools.
g. Describe differences between unit, integration, system, and acceptance testing.
h. Apply black testing techniques to develop test cases for a variety of test coverages.
i. Apply white-box testing techniques to develop test cases for a variety of test coverages.
j. Apply static and dynamic techniques to analyze non-functional properties, including common security vulnerabilities such as password weakness, over/underflows, and race conditions.
k. Engage in self-directed study to learn new techniques and tools for software design, implementation, and/or testing.

Level 3: Synthesis and Evaluation
Level 3 outcomes are those in which the student can apply the material in new situations. This is the highest level of mastery. Upon successful completion of this course, students will be able to:

a. Conduct a technical review of software design, implementation, and V&V.
b. Create and implement a software configuration management plan.
c. Create an architecture design and a detailed design for a software system.
d. Construct software from a detailed design.
e. Develop a test plan for a software system.
f. Demonstrate an ability to orally present a software design and implementation.
g. Compose software design-related documents that are grammatically correct and technically sound.
h. Apply effective techniques for collaboration and problem-solving within a team.

Policies & General Information

Course Objectives:

This course will provide students with the fundamentals of the design and implementation of software systems, emphasizing the principles and methods used to develop and verify software systems. On completion of CS4311, students should be able to discuss and

demonstrate approaches, techniques, or methods for creating high-level and detailed designs, hierarchical factoring of object systems, develop verification plans, be familiar with IEEE standards, and have experience in planning and implementing a large project.

Teams:

We believe that the ability to work with other software developers is essential. Therefore, students will be required to work effectively in teams throughout the semester. Students will be assigned to lead teams for particular assignments. The lead is responsible for: coordinating meetings and completing the meeting records; assigning tasks and recording task assignments; collecting documentation of individual work, including rough drafts; ensuring the team meets the deadlines; organizing the team notebook; maintaining back-up copies of work; and binding deliverables.

Class Attendance and Participation:

As a college student, you have the freedom to choose whether or not to attend class. However, in this course we are committed to cooperative techniques, which can only work if students attend regularly and on-time. Part of what we are encouraging in this course is the establishment of professional behavior. Therefore, we will take attendance. **Your final grade will be lowered by one point for each unexcused absence above three.** For the purposes of this class, you will be counted as absent if you are not present when we take attendance. If you feel that you must interact with people using cell phones, PDAs, Blackberries, email, twitter, chat, or any other electronic means, you are free to do so outside of class. If we find you doing these things in the classroom, we will ask you to leave, and to avoid disturbing the rest of your classmates, you should not return until the start of the next class.

Grading:

Final grades in this course will be determined by combining grades for two components: individual exams, homework assignments, quizzes, participation, and your contributions to the team projects. The sequence described below will be used to determine your final grade.

1. The exam average will be computed by summing 30% of midterm 1, 30% of midterm 2, and 40% of the comprehensive final.
2. The project grade will be computed by combining the grades for the Class, Responsibility, Collaboration, Hierarchy, High-level Design, Protocols, Subsystem design, Test Plan, Configuration Management Plan, Implementation, Testing Report, and Final Presentation. **Project grades may be strongly influenced by the Guidance Team's assessment of a student's contribution to his/her team.**
3. For each student whose grade has not yet been assigned, a final score will be computed by summing 45% of the exam grades, 45% of the project grade and 10% of the class participation, homework, and quizzes.

The project grade weights 45% of the final SE II grade. Here is the breakdown of how the project grade is being calculated.

	Deliverables	Weights
1.	Software Configuration Management Plan	10%
2.	Client Demos	10%
3.	CRC	5%
4.	Subsystem	5%
5.	Protocol	5%
6.	SDD	25%
7.	Implementation	15%
8.	Test Plan	10%
9.	Final Presentation	15%
	Total:	**100%**

The nominal percentage-score-to-letter-grade conversion is as follows:

- 90% or higher is an A
- 80-89% is a B
- 70-79% is a C
- 60-69% is a D
- below 60% is an F

The instructor reserves the right to adjust these criteria downward, e.g., so that 88% or higher represents an A, based on overall class performance. The criteria will not be adjusted upward, however.

Grading Errors:

We are only humans. We can and will make mistakes. You have one week after graded material is returned to the class to rectify any grading errors or to argue for additional credit. After the week has passed, no changes in grades will be made.

Exams:

Examinations are assumed to be closed book, closed notes, in class, unless otherwise specified. Make-up examinations are not given. **If you have to miss an examination for a legitimate reason (such as illness, death in the family, participation in a college sponsored activity), then arrangements, prior to the exam, may be made with the course instructor. If you miss an examination without a legitimate reason, a grade of 0 will be recorded for that examination.** If you know you will be missing an exam date due to a college sponsored activity, you may arrange to take the exam in advance.

There will be two (2) exams and one (1) final exam. Exams may be posted and submitted through Blackboard with appropriate due dates listed. The purpose of the exams is to allow you to demonstrate mastery of course concepts. Make-up exams will be given only in extremely unusual circumstances, and at the discretion of the instructor.

The purpose of the midterm exams is to allow you to demonstrate mastery of course concepts covered thus far during the semester. Mid-term exams will take place during the

regular lecture session. You will receive an announcement (i.e., in-class, email, Blackboard, etc.) at least one week prior to an exam. Make-up exams will be given only in extremely unusual circumstances. If you must miss an exam, please meet with the instructor, BEFORE the exam. Unless for extreme circumstances and at the discretion of the instructor, students who miss an exam will not be able to make-up the exam.

The final exam will be comprehensive. You must take the final exam during the time shown in the schedule for the lecture section that you normally attend. If you have a scheduling conflict (e.g., if you are taking a final at EPCC) or if you are scheduled for three final exams in one day, see your instructor in advance for accommodations.

Exams may make use of test proctoring software such as, Respondus Lockdown Browser and Respondus Monitor inside of Blackboard to promote academic integrity. You are encouraged to learn more about how to use these programs prior to the first exam. You may be required to provide a photo ID (i.e., Miner Gold card, Drivers License, etc.) to your exam. You may also be required to have an assigned seat during the exam. Students should avoid leaving the classroom during exams – you may be requested to submit your exam prior to leaving.

Course Communication:

Here are the ways we can keep the communication channels open:

- Office Hours: I will have office hours for your questions and comments about the course. My office hours are in-person; however, you can request a virtual meeting and I will send you a Teams/Zoom link. Please see the days and times at the top of this syllabus. You can reach out to anyone on the instructional team for questions and comments.
- Email: UTEP e-mail is the best way to contact me. I will make every attempt to respond to your e-mail within 24 hours of receipt. When e-mailing me, be sure to e-mail from your UTEP e-mail account and please put the course number in the subject line. In the body of your e-mail, clearly state your question. At the end of your e-mail, be sure to put your first and last name, and your university identification number.
- Announcements: Announcements will be made in class and most of them will be posted on Blackboard as well. In case a student misses a class, the student is responsible to obtain any missed announcements. Check the Blackboard announcements frequently for any updates, deadlines, or other important messages.

Incomplete Policy:

Incomplete grades may be requested only in exceptional circumstances after you have completed at least half of the course requirements. Talk to me immediately if you believe an incomplete is warranted. If granted, we will establish a contract of work to be completed with deadlines. Legitimate reasons include severe illnesses and debilitating accidents. **Class or workloads that are too demanding are NOT legitimate reasons.**

Excused Absences and/or Drop Policy:

I will not drop you from the course. However, if you feel that you are unable to complete the course successfully, please let me know and then contact the Registrar's Office to initiate the drop process. If you do not, you are at risk of receiving an "F" for the course.

Accommodations Policy:

The University is committed to providing reasonable accommodations and auxiliary services to students, staff, faculty, job applicants, applicants for admissions, and other beneficiaries of University programs, services and activities with documented disabilities in order to provide them with equal opportunities to participate in programs, services, and activities in compliance with sections 503 and 504 of the Rehabilitation Act of 1973, as amended, and the Americans with Disabilities Act (ADA) of 1990 and the Americans with Disabilities Act Amendments Act (ADAAA) of 2008. Reasonable accommodations will be made unless it is determined that doing so would cause undue hardship on the University. Students requesting an accommodation based on a disability must register with the UTEP Center for Accommodations and Support Services (CASS). Contact the Center for Accommodations and Support Services at 915-747-5148, email them at cass@utep.edu, or apply for accommodations online via the CASS portal. Students are required to discuss their accommodations with the instructor for a proper plan to be made.

General Policies:

Time: This course is time intensive. You must start assignments early and work steadily to be successful.

Let us make one more point here: we are available to ***assist*** you in solving problems, **not to *think or do*** work for you. Office meetings are for helping you by clarifying material and for assisting you with problems you are encountering. It is not for repeating things you missed when you skipped class. You should come to office appointments prepared. The harder you work at it, the harder we will work to help you.

Use of Technology:

Use of electronics in class: UTEP supports the use of technology for learning. Laptops can be an asset to some students and help them in their notetaking and learning. Students will be allowed to use laptops in this class provided they follow the rules described below. Failure to follow these guidelines will result in suspension of laptop privileges in class.

- Charge your laptop batteries fully before coming to class.
- Set your laptop volume control to mute or off before coming to class.
- Keep your laptop closed during presentations and other specific in-class activities.
- Do not engage in unauthorized communication or entertainment (web surfing, instant messaging, chat room chatting, DVD viewing, music playing, game playing, etc.) during class unless it is part of the lesson.

Cell Phones are nearly universal in our modern culture. Under normal circumstances, however, you are expected to refrain from using cell phones during class time. Your cell phone should be set to silent mode or turned off before class. Under no circumstance will you be allowed to use text messaging (sending or receiving) or web browsing features of your phone while you are in class. In an emergency, there may be a genuine, rare need for you to use a cell phone during class time. In this case, you will excuse yourself from class and leave the classroom to answer an incoming call. **It is never permissible to place an outgoing call while you are in class.**

Other Wireless Communications Devices are not allowed in class.

Course Resources

Technology Resources:

- Help Desk: Students experiencing technological challenges (email, Blackboard, software, etc.) can submit a ticket to the UTEP Helpdesk for assistance. Contact the Helpdesk via phone, email, chat, website, or in person if on campus.

Academic Resources:

- UTEP Library: Access a wide range of resources including online, full-text access to thousands of journals and eBooks plus reference service and librarian assistance for enrolled students.
- University Writing Center (UWC): Submit papers here for assistance with writing style and formatting, ask a tutor for help and explore other writing resources.
- Math Tutoring Center (MaRCS): Ask a tutor for help and explore other available math resources.
- History Tutoring Center (HTC): Receive assistance with writing history papers, get help from a tutor and explore other history resources.
- RefWorks: A bibliographic citation tool; check out the RefWorks tutorial and Fact Sheet and Quick-Start Guide.
- The Miner Learning Center: Join peer-led study sessions in person or online to review content and discover study strategies in core curriculum courses.
- UTEP Edge: UTEP's cross-campus framework for student success and empowerment – develops students' assets through high-impact experiences made possible by the expertise and dedication of faculty, staff, alumni, and community partners.

Individual Resources:

- Student Success Help Desk (SSHD): Students experiencing challenges or obstacles to academic success including registration, financial, food, housing, and transposition resources my submit a ticket request assistance to studentsuccess@utep.edu
- Military Student Success Center: Assists personnel in any branch of service to reach their educational goals.
- Center for Accommodations and Support Services: Assists students with ADA-related accommodations for coursework, housing, and internships.
- Counseling and Psychological Services: Provides a variety of counseling services including individual, couples, and group sessions as well as career and disability assessments.
- UTEP Food Pantry: Non-perishable food items are available to students who are currently enrolled in classes. Bring a Miner Gold Card to Memorial Gym, Room 105, Monday through Friday, 10 a.m. to 2 p.m.

Standards of Conduct, Academic Dishonesty, and Other Information

Scholastic Integrity:

Academic dishonesty is prohibited and is considered a violation of the UTEP Handbook of Operating Procedures. It includes, but is not limited to, cheating, plagiarism, and collusion.

Cheating may involve copying from or providing information to another student, possessing unauthorized materials during a test, or falsifying research data on laboratory reports. Plagiarism occurs when someone intentionally or knowingly represents the words or ideas of another as one's own. Collusion involves collaborating with another person to commit any academically dishonest act. Any act of academic dishonesty attempted by a UTEP student is unacceptable and will not be tolerated. All suspected violations of academic integrity at The University of Texas at El Paso must be reported to the Office of Student Conduct and Conflict Resolution (OSCCR) for possible disciplinary action. To learn more, please visit HOOP: Student Conduct and Discipline.

Copyright Statement for Course Materials:

All materials used in this course are protected by copyright law. The course materials are only for the use of students currently enrolled in this course and only for the purpose of this course. It is not permitted to share, reproduce, or alter any assignment for any purpose. Students are not permitted from sharing code, uploading assignments online in any form, or viewing/receiving/modifying code written from anyone else. Assignments are part of an academic course at The University of Texas at El Paso and a grade will be assigned for the work produced individually by the student.

Class Recordings:

Course lectures may be recorded by the instructor/department. Students are not permitted to record the course (i.e., video, audio, etc.) without expressed permission from the instructor.

The use of recordings will enable you to have access to class lectures, group discussions, and so on in the event you miss a synchronous or in-person class meeting due to illness or other extenuating circumstance. Our use of such technology is governed by the Federal Educational Rights and Privacy Act (FERPA) and UTEP's acceptable-use policy. A recording of class sessions will be kept and stored by UTEP, in accordance with FERPA and UTEP policies. Your instructor will not share the recordings of your class activities outside of course participants, which include your fellow students, teaching assistants, or graduate assistants, and any guest faculty or community-based learning partners with whom we may engage during a class session. **You may not share recordings outside of this course.** Doing so may result in disciplinary action.

Illness Precautions:

Please stay at home if you have symptoms of a communicable illness. If you are feeling unwell, please let me and the instructional team as soon as possible, so that we can work on appropriate accommodation.

Please stay home if you have been diagnosed with COVID-19 or are experiencing COVID-19 symptoms. If you are feeling unwell, please let the instructor know as soon as possible, so that appropriate accommodations can be made. If you have tested positive for COVID-19, you are encouraged to report your results to covidaction@utep.edu, so that the Dean of Students Office can provide you with

support and help with communication with your professors. The Student Health Center is equipped to provide COVID 19 testing.

The Center for Disease Control and Prevention recommends that people in areas of substantial or high COVID-19 transmission wear face masks when indoors in groups of people. The best way that Miners can take care of Miners is to get the vaccine. If you still need the vaccine, it is widely available in the El Paso area. For more information about the current rates, testing, and vaccinations, please visit epstrong.org.

Netiquette:

Always consider audience. Remember that members of the class and the instructor will be reading any postings. Respect and courtesy must be always provided to classmates and to instructor. No harassment or inappropriate postings will be tolerated. When reacting to someone else's message, address the ideas, not the person. Post only what anyone would comfortably state in a F2F situation. Blackboard is not a public internet venue; all postings to it should be considered private and confidential. Whatever is posted on in these online spaces is intended for classmates and professor only. Please do not copy documents and paste them to a publicly accessible website, blog, or other space. If students wish to do so, they have the ethical obligation to first request the permission of the writer(s).

Plagiarism Detection:

All coursework and assignments are subject to be submitted to plagiarism detection software including, but not limited to SafeAssign.

Guidance on Artificial Intelligence:

The use of generative AI tools such as Chat GPT is permitted in this course for the following activities, which must be noted or cited:

- Reinforce understanding of concepts discussed in the course.

However, you may not use AI tools to complete any of the assessment items used to compute the grade for the course.

Students must cite any borrowed content sources to comply with all applicable citation guidelines, copyright law, and avoid plagiarism. Instances that violate these guidelines will be referred to the Office of Student Conduct and Conflict Resolution.

Standards of Conduct:

You are expected to conduct yourself in a professional and courteous manner, as prescribed by the UTEP Standards of Conduct.

A fundamental principle for any educational institution, academic integrity is highly valued and seriously regarded at The University of Texas at El Paso. More specifically, students are expected to maintain absolute integrity and a high standard of individual honor in scholastic work undertaken at the University. At a minimum, you should complete any

assignments, exams, and other scholastic endeavors with the utmost honesty, which requires you to:

- Acknowledge the contributions of other sources to your scholastic efforts.
- Complete your assignments independently unless expressly authorized to seek or obtain assistance in preparing them.
- Follow instructions for assignments and exams, and observe the standards of your academic discipline; and
- Avoid engaging in any form of academic dishonesty on behalf of yourself or another student.

Graded work, e.g., homework and tests, is to be completed independently and should be unmistakably your own work (or, in the case of group work, your team's work), although you may discuss your project with other students in a general way. You may not represent as your own work material that is transcribed or copied from another person, book, or any other source, e.g., a web page.

Any student who commits an act of scholastic dishonesty is subject to discipline. Scholastic dishonesty includes, but not limited to cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable to another person.

- **Cheating**
  - Copying from the test paper of another student
  - Communicating with another student during a test
  - Giving or seeking aid from another student during a test
  - Possession and/or use of unauthorized materials during tests without authorization (i.e., Crib notes, class notes, books, etc.)
  - Substituting for another person to take a test
  - Falsifying research data, reports, academic work offered for credit
- **Plagiarism**
  - Using someone’s work in your assignments without the proper citations
  - Submitting the same paper or assignment from a different course, without direct permission of instructors
- **Collusion**
  - Unauthorized collaboration with another person in preparing academic assignments

Collaboration:
Collaboration among students is strongly encouraged.
It is acceptable to:

- Talk with other students about approaches and ideas.
- Get ideas and extra information from the internet, books, etc.

However, it is not acceptable to:

- Share code with another student (if a piece of code is submitted by two or more students, both students are guilty of cheating, regardless of who wrote the original code).
- Use code acquired from an outside source (the internet, a friend, etc.)

- Look at another student's code
- Debug another student's code

Software to detect plagiarized programs are used; appropriate disciplinary actions will be taken as necessary. A full description of the University Standards of Conduct and Academic Dishonesty can be found in the Handbook of Operating Procedures. Professors are required to -- and will -- report academic dishonesty and any other violation of the Standards of Conduct to the Dean of Students and OSCCR.