

## CS 5386 – Software Design and Architecture Course Information Sheet

**Instructor:** Dr. Oscar A Mondragon  
**Classroom:** Chemistry and Computer Science G.0208  
**Classtime:** Wednesday 6:00 to 8:50

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**Office Hours:** Wednesday 5:00 – 6:20 pm or by appointment

### Course Description:

This course is concerned with the principles and concepts of engineering large software systems and programs. Software architecture is an abstraction of system details that helps in managing the inherent complexity of software systems development. Software architecture provides opportunities for early evaluation of user needs, analysis of requirements and design, and prediction of system properties. Architectural styles, views, notations, and description languages provide systematic frameworks for engineering decisions and design practices. The focus of the course is on advanced topics related to software architecture practices, technologies, and artifacts. Students participate in individual or group projects related to developing architectural representations of software systems.

### Prerequisites:

- Knowledge of software development life cycles
- experience in the development of software-reliant systems
- some familiarity with modern software engineering concept

### Course Purpose

Provide students with knowledge and understanding of issues related to developing the architecture of large-scale software systems. Students are exposed to all elements of architectural design and implementation of software systems; this includes architecture specifications, analysis, patterns, representations, methodologies, tools, and programming environments that are employed.

### Learning Objectives:

Upon completion of this course, students should be able to:

- describe the essential elements of software architecture;
- discuss the issues related to architecting a large-scale software system
- describe and understand different software architecture views and styles
- describe, understand, and be able to use the Siemens four-views approach for developing and documenting software architectures
- describe, understand, and be able to use the AADL (Architecture Analysis & Design Language)
- working as part of a team, developing, analyzing, and critiquing the architecture of a software system

### Topic Outline:

1. Introduction to Software Architecture
2. Review and discussion of notations
3. Review of Architectural Styles
4. Designing, Describing, and Using Software Architectures
5. Software Architecture Practices and Techniques
6. Software Architecture Examples
7. Architecture Description Languages

### Supporting Text Material:

- [Bass 2003] Len Bass, et al., *Software Architecture in Practice*, Addison-Wesley, 2<sup>nd</sup>. Edition 2003.
- [Hofmeister 2000] Christine Hofmeister, et al., *Applied Software Architecture*, Addison-Wesley, 2000.
- [Clements 2003] Clements, P., et al., *Documenting Software Architectures: Views and Beyond*, Addison- Wesley, 2003.
- [Gluch 2006] Gluch, D., Feiler. P., and Hudak. J., *The Architecture Analysis & Design Language*

(AADL): *An Introduction*, CMU/SEI-2006-TN-011, Carnegie Mellon University, February 2006.

- [SAE 2004] *Architecture Analysis & Design Language (AADL)*, SAE AS5506 (Draft), The Society of Automotive Engineers, 2004.
- [Shaw 1996] Shaw, M. and Garlan, D., *Software Architecture: Perspectives on an Emerging Discipline*, Prentice-Hall, 1996.

### Assignments:

Assignments consist of assigned reading, exercises, special reports, and working as part of a team developing a software product.

### Grading Procedures:

1. Each student will work on a team project to gain hands-on experience in the development and documentation of software architecture. Each team will be required to deliver a set of artifacts associated with the product (e.g., project process and associated documents, and artifacts related to the four-view Sieman approach). The individual student grade on the project will be a combination of an evaluation of the overall completeness and quality of the product deliverables, project presentations and reviews, and the contribution of the individual to the team effort.
2. Individual and team in-class exercises, covering recent assignments and classroom work, will be given weekly.
3. Two full-period exams will be given during the term.
4. Individual and team homework will be assigned as necessary.
5. Participation in class discussions and attending classes is a must in this course
6. Points will be distributed as follows:

Team Project	25%
Exercises, Homework, Discussions, Assignments	20%
Module 1 Quiz	05%
Exam 1	20%
Exam 2	20%
Participation	10%

7. Anyone found cheating on an exam will receive an automatic F in the course.
8. There are no make-ups on in-class exercises. Absence from an exam is excused only in a medical emergency.

**COVID-19 Precautions.** Please stay home if you have been diagnosed with COVID-19 or are experiencing COVID-19 symptoms. If you are feeling unwell, please let me know as soon as possible, so that we can work on appropriate accommodations. 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 support you 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 and will be available at no charge on campus during the first week of classes. For more information about the current rates, testing, and vaccinations, please visit epstrong.org

**Since this is a highly interactive class with a large amount of group work and proximity to your classmates, I highly encourage everyone to wear a mask during our in-person classes.**

**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 management roles within teams for particular project development support activities and/or work products. The role manager is responsible for identifying tasks to either support specific project support activity or build assigned work product; facilitating the assignment of tasks, and integrating the work product. The team leader and planning manager ensure the team meets the deadlines; monitor work progress; verify and validate work products, and provide project status to management. The quality manager is responsible for planning and executing peer reviews and making sure defects get fixed before submitting work to customers and management.

### Empowering self-directed teams (policy):

Students will work in teams. Students should develop soft skills to properly and effectively work as team members. Team members are expected to have a positive attitude, deliver quality work on time, participate in peer reviews, and support other team members. Because you are working in a self-managed team, your team has empowerment and it is expected that the team should use it professionally and ethically. **If a team member starts not working, performing poorly,** breaking ground rules, or being irresponsible, the team must let the member know about the problem and acknowledge **a warning** as soon as possible (verbally during a meeting or by sending an email). **If the team member is continuously breaking ground rules and negatively affecting the team,** the team must let the member know about the problem and acknowledge a **yellow card** by sending him/her an email and copying the instructor (show a yellow card). The team member should let the team know a strategy to improve performance and request help from the team and instructor if needed. **If the team member continues performing poorly, irresponsibly, or negatively affecting the team,** the team has the empowerment to remove him/her from the team by showing him/her a **red card** (show a red card). A student can only receive credit for the team project work if he/she is a contributing member of a team. Yellow and red cards are designated by consensus by all the team members but the affected party. The team leader shall send an e-mail to the instructor and all team members including the affected team member with a brief explanation of the circumstances.

### Important Dates.

<b>Jan 16th</b>	Spring classes begin
<b>Jan 16th-19th</b>	Late Registration (Fees are incurred)
<b>Jan 31st</b>	Spring Census Day
<b>Feb 16th</b>	Graduation application deadline for degree conferral
<b>Mar 11th-15th</b>	Spring Break
<b>Mar 20th</b>	Freshman midterm grades are due
<b>Mar 28th</b>	Spring Drop/Withdrawal Deadline
<b>Mar 29th</b>	Cesar Chavez Holiday - No classes; Spring Study Day
<b>Apr 12th</b>	Deadline to submit candidates' names for commencement program
<b>May 2nd</b>	Spring – Last day of classes
<b>May 3rd</b>	Dead day
<b>May 6-10th</b>	Spring Final Exams
<b>May 11-12th</b>	Spring Commencement
<b>May 15th</b>	Grades are Due
<b>May 16th</b>	Grades are posted to student records; students are notified

### TECHNOLOGY REQUIREMENTS

Course content is delivered via the Internet through the Blackboard learning management system. Ensure your UTEP e-mail account is working and that you have access to the Web and a stable web browser. Google Chrome and Mozilla Firefox are the best browsers for Blackboard; other browsers may cause complications. When having technical difficulties, update your browser, clear your cache, or try switching to another browser. You will need to have access to a computer/laptop, scanner, webcam, and microphone. You will need to download or update the following software: Microsoft Office, Adobe Acrobat Reader, Windows Media Player, QuickTime, and Java. Check that your computer hardware and software are up-to-date and able to access all parts of the course.

If you do not have word-processing software, you can download Word and other Microsoft Office programs (including Excel, PowerPoint, Outlook, and more) for free via UTEP's Microsoft Office Portal. Click the following link for more information about Microsoft Office 365 and follow the instructions.

**IMPORTANT:** If you encounter technical difficulties beyond your scope of troubleshooting, please contact the UTEP Help Desk as they are trained specifically in assisting with the technological needs of students. Please do not contact me for this type of assistance. The Help Desk is much better equipped than I am to assist you!

### **INCOMPLETE GRADE 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 within the deadlines.

### **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 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 for the University. Students requesting 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](mailto:cass@utep.edu), or apply for accommodations online via the CASS portal.

COVID-19 Accommodations Students are not permitted on campus when they have a positive COVID-19 test, exposure, or symptoms. If you are not permitted on campus, you should contact me as soon as possible so we can arrange necessary and appropriate accommodations.

### **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.

### **TEST PROCTORING SOFTWARE**

Exams make use of the 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 before the first test. Please review the following guidelines for the start of the class quiz:

- It is only available at the beginning of the class.
  - It is based on the assigned readings for that class so do your readings before the class starts.
  - You only have ONE attempt to take the test. You shall not take it multiple times. Only the first attempt is recorded.

**Note:** if there are technical problems and you are kicked out of the exam, then you should retake the exam from the start. A log of the technical issue is recorded by BB.

- Respondus Lockdown Browser will require that all internet tabs are closed before the start of the test.
- Handwritten notes are permitted only for this quiz and not allowed for a midterm or final.
- You should not have conversations with other people and/or leave and return to the area during the test.

### **PLAGIARISM DETECTING SOFTWARE**

Some of your coursework and assessments may be submitted to SafeAssign, plagiarism-detecting software. SafeAssign has used review assignment submissions for originality and will help you

learn how to properly attribute sources rather than paraphrase.

**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 this course. They may not be further disseminated