CSE446 / CSE598*

Software Integration and Engineering

Syllabus and Course Information

*CSE598 is available for GOEE online program only. It is not available for any SCAI program.

Course Coordinator and Instructor

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Office and Office Hours

Office: BYENG M1-06 (Brickyard Engineering, Mezzanine floor, entrance from S. 7th street)
Office hours (Fall and Spring):   Monday, 2:30 to 5:15pm
                                                      Friday: 9:15 to 11:30am
Course discussion board and Canvas mail will be the primary tools for communication.

Course Description

Software development using architecture design, composition, workflow, services, data resources, data representations, data management, and development tools.

Official Textbook

Y. Chen and G. De Luca, Service-Oriented Computing and System Integration, Kendall Hunt Publishing, 8th edition, 2022. It is acceptable to use the 7th edition.
PAK ISBN: 978-1-7924-9417-8. Text alone ISBN: 978-1-7924-9416-1
Part I (Chapters 1 through 6) of the book will be used for CSE445/598
Part II (Chapters 7 through 13) of the book will be used for CSE446/598
Available at: http://www.kendallhunt.com/store-product.aspx?id=302160

Course Objectives and Outcomes

1. To understand software architecture and software process
   - Students understand the requirement and specification process in problem solving.
   - Students understand software life cycle and process management
   - Students can identify advantages and disadvantages of software architectures and their trade-offs in different applications.
2. To understand and apply composition approach in software development
   - Students can apply software architecture to guide software development in the problem solving process.
   - Students understand interface requirement of software services.
   - Students can compose software based on interfaces of services and components.
   - Students can develop software system using different composition methods and tools.
3. To understand and apply data and information integration in software development
   - Students can compose software systems using different data resources in different data formats.
   - Students can integrate application logic with different databases.
   - Students can apply the entire software life cycle to develop working software systems.

Assignments and Projects:

Five programming projects will be given. Each project can consists of a number of assignments.

Project 1: Advanced service development, including RESTful service, synchronous service and self-hosting service.

Project 2: Architecture-driven software development and workflow-based web application integration.

Project 3: Message-based Web application integration and workflow-based IoT system integration.

Project 4: Web application and data integration through language integrated query, including object data and XML data.

Project 5: Big data processing. Through automated parallel computing

Prerequisites by Topics

For CSE 446: CSE445 Multithreading, service-oriented architecture, service development, XML processing, Web application development, security and reliability of Web applications.

For CSE598: No official prerequisite. However, I expect the students to read a few lectures from CSE445/598 on basic concepts in service-oriented computing and XML. These lecture will be given in CSE446 course website.

Class/Laboratory Schedule

Lecture: 3 hours per week; Laboratory: none scheduled

Contribution to EC 2000 Professional Component

Engineering Topics: 100%

Major Topics Covered in the Course

The course will be delivered in 27 lectures, with 75 minutes each lecture (tentative)

1. Unit 1 - Advance SOA and REST Architecture (5 lectures)
   - Introduction
   - Advanced Web Services
   - RESTful Services and Applications

2. Unit 2 - Software Development by Composition and Integration (4 lectures)
   - Advanced Web Application Architecture
   - Enterprise Application Architecture and Architecture Driven Approach
   - Workflow-based Software Development
   - Other Composition Languages

3. Unit 3 - Software Development by Composition and Integration (4 lectures)
   - BPEL
   - Message-based Integration
   - Web Caching and Recommendation

4. Unit 4 - Internet of Things and Device Integration (4 lectures)
   - Internet of Things
   - Device Integration
   - Workflow-based Robotics Applications Development
   - Mobile/Phone App Development

5. Unit 5 - Application and Data Integration (5 lectures)
   - ADO
   - LINQ: Language Integrated Queries
   - XML Database

6. Unit 6 - Big Data, AI, and Cloud Computing (4 lectures)
   - Big Data Essentials
   - Big Data Analytics and Applications
   - Artificial Intelligence and Machine Learning
   - RDF and OWL Ontology

7. Unit 7 - Cloud Computing (2 lectures)
   - Cloud Computing
   - Software as a Service

Required Software

This course will use Microsoft Visual Studio as the main programming environment for doing assignments. For developing Web services and Web applications, students need to have a computer with the Windows that runs IIS (Internet Information Service) and Workflow Foundation. Visual Studio running on Mac OS does not have sufficient functions to support the assignments in this course. Students registered to a CSE course at ASU can download Visual Studio and other tools from MyASU and My Apps. Students can also use ASU lab computers for doing some of the assignments.

Grade Policies

The performance will be assessed by programming assignments, quizzes, unit tests, a mid-term and a final exam. Their weights are:

Assignments	30%
Quizzes	11% (Test what is covered in the week)
Unit Tests	12%
Mid-Term Exam	22%
Final Exam	25%
Total	100%

The final letter grade is decided according to the percentage points obtained as follows:

A-, A, A+	89.5-92.4, 92.5-96.4, 96.5-100%
B-, B, B+	79.5-82.4, 82.5-86.4, 86.5-89.4%
C, C+	69.5-75.4, 75.5-79.4%
D	59.4-69.4%
E	less than 59.4%

The grade of "I" (incomplete) can be given ONLY when a student, who is doing otherwise acceptable work (passing grade), is unable to complete a part of work (e.g., the final exam) because of documented illness or other conditions beyond the student's control. In the latter case, the student must discuss with the instructor and complete an application form from the department before the part of work is due or as soon as the circumstances are known. Please see ASU grading policies at: http://students.asu.edu/grades-grading-policies
"Y" grade option: Not offered.

Extra Credit and Alternative Activity

Missing a graded activity will be given zero credit. Exams and tests may not be made up. One chapter test and two quizzes will be dropped.
Extra credits can be given to the entire class, for example, through dropping the lowest scores of a quiz and a chapter test. No extra credit-activities will be given to any individual. An alternative to the assignment and exam may be arranged if a student misses the activity and the absence is caused by documented illness or personal emergency that made the completion/attending impossible. A written explanation (including supporting documentation) must be submitted to the instructor before the part of work is due or as soon as the circumstances are known.
Any inquires or appeals on grades of homework, projects, or tests must be done in writing by completing the "Grade Inquiry Form" within a week from the day the assignment was returned

or comments were published on-line. State the problem and the rationale for any change in grade in your appeal.

Academic Integrity and Honor Code

You are encouraged to cooperate in study group on learning the course materials. However, you may not cooperate on preparing the individual assignments. Anything that you turn in must be your own work: You must write up your own solution with your own understanding. If you use an idea that is found in a book or from other sources, or that was developed by someone else or jointly with some group, make sure you acknowledge the source and/or the names of the persons in the write-up for each problem. When you help your peers, you should never show your work to them. All assignment questions must be asked in the course discussion board. Asking assignment questions or making your assignment available in the public websites before the assignment due will be considered cheating. All individual tests must be done independently. Working together during tests is not permitted.

The instructor and the TA will **CAREFULLY** check any possible proliferation or plagiarism by comparing among the student submissions, previous student submissions, and the publications in the public Web sites. We will use the document/program comparison tools like MOSS (Measure Of Software Similarity: http://moss.stanford.edu/) to check all assignments and tests that you submitted for grading.

Students in this class must adhere to ASU's academic integrity policy, which can be found at https://provost.asu.edu/academic-integrity/policy). Students must review this policy and become familiar with each of the areas in which academic dishonesty can occur. All academic integrity violations will be reported to the Fulton Schools of Engineering Academic Integrity Office. The Academic Integrity Office (AIO) maintains record of all violations and has access to academic integrity violations committed in all other ASU college/schools. Course content, including lecture slides, lecture videos, assignments, and tests, are copyrighted materials. In addition to ASU's academic integrity policy, students may not share outside the class, upload, sell, or distribute course content or notes taken during the conduct of the course (see ACD 304–06, "Commercial Note Taking Services" for more information).
Students must refrain from uploading to any course shell, discussion board, or website used by the course instructor or other course forum, material that is not the student's original work, unless the student first complies with all applicable copyright laws; faculty members reserve the right to delete materials on the grounds of suspected copyright infringement.

Fulton Schools of Engineering Honor Code (http://engineering.asu.edu/integrity/honor-code/)

1. Seek out, acquaint myself with, and obey the instructor's rules concerning the materials I am allowed to use and the types of collaboration in which I am permitted to engage in each of my courses.
2. Help my fellow engineering students to succeed both academically and professionally, while both following the instructor's guidelines on collaboration and encouraging my classmates to behave ethically.

3. Ensure that all of my individual work products reflect my own abilities and not those of someone else. I will never copy the work of others or give others the opportunity to copy mine.
4. Contribute a fair share of work to all teamwork in which I participate, and acknowledge the contributions of others. I will accept responsibility for the integrity of all work submitted by my team.
5. Use only aids authorized by the instructor during all examinations, quizzes, projects, assignments and other evaluations.
6. Provide aid to, or receive aid from other students only as permitted by the instructor.
7. Give full credit to others for their words and ideas, whether directly quoted or paraphrased, using proper citation practices in all of my work, including text, figures and computer code, and all materials obtained from the Internet.
8. Never act dishonestly including lying, cheating, stealing, or attempting to corrupt the academic enterprise in any way.
9. Ensure that all data I record or report are objective, true, accurate and properly documented.
10. Treat all students, faculty and staff with respect, courtesy and dignity, the way I would like to be treated myself.
11. Recognize that it is how I act when no one else is watching that defines my true character.
12. Act at all times with integrity, as the true professional that I am to become.

Policy against threatening behavior, per Student Services Manual, SSM 104–02

Students, faculty, staff, and other individuals do not have an unqualified right of access to university grounds, property, or services. Interfering with the peaceful conduct of university-related business or activities or remaining on campus grounds after a request to leave may be considered a crime. All incidents and allegations of violent or threatening conduct by an ASU student (whether on- or off-campus) must be reported to the ASU Police Department (ASU PD) and the Office of the Dean of Students.

Disability Accommodations.

Suitable accommodations will be made for students having disabilities. Students needing accommodations must register with the ASU disabilities resource Center and provide documentation of that registration to the instructor. Students should communicate the need for an accommodation in sufficient time for it to be properly arranged.

Harassment and Sexual Discrimination

Arizona State University is committed to providing an environment free of discrimination, harassment, or retaliation for the entire university community, including all students, faculty members, staff employees, and guests. ASU expressly prohibits discrimination, harassment, and retaliation by employees, students, contractors, or agents of the university based on any protected status: race, color, religion, sex, national origin, age, disability, veteran status, sexual orientation, gender identity, and genetic information.

Title IX is a federal law that provides that no person be excluded on the basis of sex from participation in, be denied benefits of, or be subjected to discrimination under any education program or activity. Both Title IX and university policy make clear that sexual violence and harassment based on sex is prohibited. An individual who believes they have been subjected to sexual violence or harassed on the basis of sex can seek support, including counseling and academic support, from the university. If you or someone you know has been harassed on the basis of sex or sexually assaulted, you can find information and resources at https://sexualviolenceprevention.asu.edu/faqs.

Mandated sexual harassment reporter: As an employee of the University I am considered a mandated reporter and therefore obligated to report any information regarding alleged acts of sexual discrimination that I am informed of or have a reasonable basis to believe occurred.

ASU Counseling Services, https://eoss.asu.edu/counseling, is available if you wish to discuss any concerns confidentially and privately.