SE 430 Object-Oriented Modeling

Instructor

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Course Information

SE 430 Section 701/710
Class time: Thursday, 5:45-9:00 PM
Class Room: Lewis 1516
Campus: Loop
Course homepage:
http://condor.depaul.edu/dmumaugh/classes/SE430F17

Summary

The course objective is to show how to produce analysis and design documents that can be used to develop object-oriented software systems.

This course will cover

- Object-oriented analysis/design concepts
- UML notation
- Approaches to transforming a problem into an object oriented analysis model and
- Object oriented design and pattern guidelines that lead toward more flexible designs.

Students will acquire the background needed to solve complex, real-world software engineering problems in an object-oriented manner, using the most effective elements of a standard development process, the Unified Process. In addition, the course will use the essential artifacts and notation of the Unified Modeling Language (UML), the standard notation for object-oriented analysis and design.

The course will consist of lectures, reading and homework assignments, a team project and associated activities, and on-line mid-term and final exams. Students will focus on a common domain throughout all assignments, perform object-oriented analysis on various aspects of that domain, and develop object-oriented design solutions suited to these various aspects of the domain.

Working cooperatively within a team is an important part of the software engineering discipline. The team project allows students to explore the analysis and design process in small teams and receive feedback from other students and the instructor. Teams decide upon their own project problem, within some constraints. There is no option for individual final projects. After the project has been submitted, all students must submit (by email) a peer review of their fellow team members.

The course consists of:
- Lectures
- Reading
- Individual homework assignments including a critique,
- Mid-term exam
- A final exam
- A team project.

Online students work remotely on the team project with in-class students and/or other online students. Both exams are delivered electronically online.

Learning Objectives (LO)

- Students will demonstrate understanding of the vocabulary and concepts of object-oriented modeling.
- Students will implement the essential elements of the Unified Process and a hybrid iterative/incremental adaptive software development process in a series of activities and artifacts.
- Students will create a product overview document in a team project.
- Students will create a use-case model in a team project.
- Students will perform domain modeling in a team project and document their results.
- Students will create a use-case realization and corresponding sequence and design class diagrams in a team project.

Required Texts

- Arlow, Jim and Neustadt, Ila (2005). *UML 2 and the Unified Process, Second Edition: Practical Object-Oriented Analysis and Design.* Addison-Wesley, ISBN 0-321-32127-8. <http://www.pearsonhighered.com/educator/product/UML-2-and-the-Unified-Process-Practical-ObjectOriented-Analysis-and-Design/9780321321275.page>
- Deemer, Pete, Benefield, Gabrielle, Larman, Craig, and Vodde, Bas (2012). *The Scrum Primer: A Lightweight Guide to the Theory and Practice of Scrum, Version 2.0.* Download available free at http://www.scrumprimer.org/.

Recommended texts or supplemental readings

The following resource may be of interest. It is provided for reference only. You need not purchase it! See also the reading list.

UML Distilled: A Brief Guide to the Standard Object Modeling Language, Third Edition, Martin Fowler (with Kendall Scott), Addison-Wesley Prof./Pearson, 2003. ISBN: 978-0321193681

In addition, there is a **reading list/reference web page** with material cited there: **http://condor.depaul.edu/dmumaugh/readings/SE430readings.html**

Prerequisites

The following course is listed as a prerequisite.

- CSC 403 Data Structures II

Familiarity with an object-oriented programming language such as Java, C++, C#, or Smalltalk is needed only to understand in-class, practical code examples. The student should understand basic object-oriented concepts: class, instance, polymorphism, encapsulation and inheritance. There are no programming assignments in this course. Please contact the instructor if you have any questions or concerns about the prerequisite requirement.

Assignments, Team Project and Exams

Coursework includes both individual and team assignments. Work will consist of periodic assignments that reflect the topics just covered. In addition there will be a project consisting of the analysis and design of a small system.

Homework There will be a number of homework assignments during the quarter. Homework is intended as a means for you to learn and practice the material discussed in class. A sample solution for the assignment will be posted after the assignment deadline. In addition to the assignment itself, students must write and submit a brief critique of their own work on some of the assignments after reviewing the sample solution. The critique is due at the end of the term. The assignment critique(s) taken together will count as one homework assignment.

Team project You should plan on additional time for working on the team project. The team project allows students to explore the analysis and design process in small teams. Teams decide upon their own project problem, within some constraints. There is no option for individual final projects. The Team project is done as part of a team consisting of three to five students. All students on each team are expected to contribute equally. After the project has been submitted, all students must submit (by email) a peer review of their fellow team members. The peer review assesses the participation, quality of work, and cooperation of all members of the team. The review is used, in part, in determining each student's team project grade component, which constitutes a significant portion of the overall grade. Team project work is in addition to the regular weekly class assignments.

Examinations There will be a mid-term examination and a final examination. The midterm and final examinations will be administered using the Desire2Learn on-line system. The exams are taken online via Desire2Learn (https://d2l.depaul.edu/). The final exam will concentrate on the last five weeks of the course but will also cover the rest of the course to a lesser degree. The final exam is online via Desire2Learn during the regular final exam week for the quarter.

Submissions All assignments must be submitted electronically through Desire2Learn (D2L) and are due at the close of business on the due date. Unless otherwise specified, all assignments must be submitted via Desire2Learn (D2L) (https://d2l.depaul.edu/) and are due by 11:59 PM CT, on the assignment due date. The documents may be in Microsoft Word (.doc) format, HTML, or Adobe PDF. Any included figures must be embedded directly within the document, not bundled separately.

Time Budget. Students should allow approximately 3-4 hours of work outside of class for each scheduled hour of class; this works out to 10-12 hours each week (on average) for most students. Team meetings and project collaboration may increase the amount of time required.

Grading

Your grade will be computed based on your scores on homework assignments, project, and the mid-term and final exams. The following weights will be assigned:

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Homework                  30%
Mid-term exam             20%
Term project activities   30%
Final Examination         20%
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Grading will be done on the usual 60/70/80/90 bands but will be adjusted to account for clustering and banding of scores. Bands may be adjusted if there seems to be a systemic bias to the scores.

Important note: No extra-credit assignments are offered; it is a far more effective use of time to put the effort that would be expended on extra-credit work into the regular homework assignments instead.

Other Course Information

Software: The software needed for this class includes:

Word processing software. I accept submissions in MicroSoft Word, PDF and plain text formats.

Examinations: examinations will be administered using Desire2Learn (https://d2l.depaul.edu/).

Learning Management System: We will be using Desire2Learn https://d2l.depaul.edu for everything**:** assignments, submissions, lecture recordings, etc.

Student Support: Support for both in-class and online students is provided through weekly office hours dedicated to the course and through a mailing list. Students in the Chicago area may come to the instructor's posted office hours. Most questions should be directed to the mailing list. Email should be used only for personal issues or for student-specific coursework questions. Make all questions clear, concise, and specific.

Please include the course number and section (e.g., SE 430 - OL) in the email *Subject:* field and include your full name in the *body* of the email.

Note: The instructor does not preview homework assignments. However, the instructor does answer specific questions about assignments.

Exceptional Circumstances: Every effort is made to accommodate students who encounter exceptional personal circumstances during the quarter. Students who experience unanticipated personal, work, health, or family emergencies should notify the instructor by email or phone as soon as possible with a brief explanation of the circumstances and any anticipated impact these might have on coursework. Students who have anticipated exceptional circumstances such as secular or religious holiday observances, medical treatment, or work-mandated travel should notify the instructor as early as possible of these circumstances and any anticipated impact these might have on coursework. In both unanticipated and anticipated cases, a suitable plan for dealing with the coursework impact is agreed upon by the student and instructor. In some cases, the instructor may request suitable documentation of the exceptional circumstances.

Schedule

About the Week-by-Week Schedule
Although this schedule represents the course's anticipated order and list of topics, some additions, deletions, or rearrangement of the topics may occur. PLEASE NOTE: Recommended readings are intended to provide you with an alternate view of the topics that we cover. You are not required to do the reading for the class; indeed, you can do all the coursework without reading the book at all (but I wouldn't recommend it). The course notes and instructor will present some material differently from the text; in all coursework, the course notes (not the text) should be considered the standard approach for student work.

Week 1 – Introduction and Overview: Course Logistics and Administrivia, Important Object-Oriented Concepts (Inheritance, polymorphism, etc.); Overview of Software Development Methodology and Software Development Life Cycle; UML: O-O A & D

Week 2 – Defining the Problem: The *Vision*, Requirements Analysis: Communicating Design: Problem Statement, Defining Requirements; Business Rules; Activity Diagrams; Team project discussion and assignment.

Week 3 – Use cases: High-level use cases; Use Case Diagrams, Ranking Use Cases. Detailed use cases. System Sequence Diagrams.

Week 4 – Static Structure: Requirements Traceability. Building a Beginning Conceptual Model: System Sequence Diagrams; Class Diagram; CRC cards; Domain model basic principles; Domain model associations; Domain model attributes; System Glossary.

Week 5 – Transition to design: Software Architecture, Architectural Planning; **Tools and Techniques for Transition to Design:** Design scenarios; The Human Computer Interface: Tiered Architecture; Robustness Analysis; Function-Class Decomposition. Midterm exam (Covers classes 1-5)

Week 6 – System Behavior Modeling: Object behavior: Object relationships; Operation contracts; Contracts: Assigning Responsibilities, System Contracts and Dependencies. Object interaction diagram -- Collaboration Diagrams and Message Sequence Diagrams; Object visibility; Object state charts -- State Diagrams, State Space and Behavior;

Week 7 – Start of Design: Patterns and Frameworks: Packages; Overview of patterns; Architectural patterns; Coupling and Cohesion; GRASP patterns; Responsibility-Based Modeling and Responsibility-Driven Design; Design Scenarios

Week 8 – System Organization and Architecture: Real Use Cases; Design Scenarios; Use case realizations; Object interaction diagram case study; More on Design

Week 9 – Putting it all together: Design model: Design class diagrams, package and deployment diagrams; Architecture patterns

Week 10 – Overview of Systems Development Life Cycle Methodologies: Sequential Methodologies, Evolutionary Methodologies; Agile Methodologies; **Wrap-up:** Best practices; **Review**

School policies:

Changes to Syllabus

This syllabus is subject to change as necessary during the quarter. If a change occurs, it will be thoroughly addressed during class, posted under Announcements in D2L and sent via email.

Online Course Evaluations

Evaluations are a way for students to provide valuable feedback regarding their instructor and the course. Detailed feedback will enable the instructor to continuously tailor teaching methods and course content to meet the learning goals of the course and the academic needs of the students. They are a requirement of the course and are key to continue to provide you with the highest quality of teaching. The evaluations are anonymous; the instructor and administration do not track who entered what responses. A program is used to check if the student completed the evaluations, but the evaluation is completely separate from the student's identity. Since 100% participation is our goal, students are sent periodic reminders over three weeks. Students do not receive reminders once they complete the evaluation. Students complete the evaluation online in CampusConnect.

Academic Integrity and Plagiarism

This course will be subject to the university's academic integrity policy. More information can be found at http://academicintegrity.depaul.edu/ If you have any questions be sure to consult with your professor.

Academic Policies

All students are required to manage their class schedules each term in accordance with the deadlines for enrolling and withdrawing as indicated in the University Academic Calendar. Information on enrollment, withdrawal, grading and incompletes can be found at http://www.cdm.depaul.edu/Current%20Students/Pages/PoliciesandProcedures.aspx.

Students with Disabilities

Students who feel they may need an accommodation based on the impact of a disability should contact the instructor privately to discuss their specific needs. All discussions will remain confidential.
To ensure that you receive the most appropriate accommodation based on your needs, contact the instructor as early as possible in the quarter (preferably within the first week of class), and make sure that that you have contacted the Center for Students with Disabilities (CSD) at: csd@depaul.edu.

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Phone number: (312) 362-8002
Fax: (312) 362-6544
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