CSCI-3612: Object Oriented Analysis & Design

Basic Information

- **ADA University, Spring Semester, 2026**
- **Course name and CRN: CSCI 3612: Object Oriented Analysis & Design (6 credits)**
- **Course meeting times and location:**
  - CRN 20965: Tuesday and Thursday, 08:30 – 09:45
  - CRN 20968: Tuesday and Thursday, 10:00 – 11:15
- **Instructor:** Minura Hajisoy
- **How to contact the Instructor:**
  - Office hours: Tuesday/Thursday, 11:30 – 13:00 (should e-mail beforehand)
  - E-mail addresses: mhajisoy@ada.edu.az
  - Preferred mode of communication: **E-mail**
- **Course Web page URL:**
  - Students are expected to check the Blackboard course page and email regularly for getting timely updates.

Course Description

- **Technology requirements:**

- Equipment: Students are encouraged to use their laptops to install required software, do appropriate platform settings, implement the class assignments and hands-on implementations.
- All codding and implementation will be done on Java programming language, so it is recommended to install: Java SDK and IDE (IntelliJ IDEA or any other).
- For Unified Modeling Language (UML): StarUML or IBM Rational Rose Data Modeler 7.0

- **Overview of the course:**

This course is designed to provide to students in depth understanding and knowledge in Object Oriented approach to software development. The methodology intends application of Object-Oriented concept to Analysis and Design phases of System Development Life-cycle.

In contrast with traditional programming paradigms (procedural and structured), Object-Oriented paradigm provides additional flexibility, extensibility and maintainability thanks to main concepts of the approach: abstraction, encapsulation, inheritance and polymorphism. This course is not dedicated to Object-Oriented programming, but many real software development projects will be examined and passed through the cycle of Object-Oriented Analysis and Design using Java and UML-modeling tools.

By the end of course, students are expected to develop own group project using the knowledge obtained during the study.

- **Student learning outcomes**:
1. Understand in depth the Phases of SDLC
2. Understand and apply Object-Oriented concept to Analysis and Design
3. Understand Structural Diagrams and Behavioral Diagrams
4. Ability to deal with large software projects using OOAD
5. Ability to UML modeling in right/efficient way

- **Methods of instruction:**
The class will be taught through lectures, including discussion around class examples/case studies, laboratory assignments and homework. Discussions based on student contributions add a vital and dynamic element to the class. Students are expected to come to the class with comments or questions from the course readings and actively participate in in-class discussions. Final project that will be assigned to student-groups of 3-4 students and their presentation will help to students to get experience of solving real data-driven problems of cross-sectoral business and share the experience they acquired to classmates.

- **Workload:**
It is estimated that the students will need to spend 3-5 hours of study and preparation for the classes every week. Estimated amount of time to spend on course homework is additional 3-5 hours per week.

Materials

- **Primary or required books/readings for the course:**
    - Alan Dennis, Barbara Haley Wixom, David Tegarden, System Analysis & Design: An Object-Oriented Approach with UML, Fifth Edition, ISBN-978-1118804674, 2015
    - Object Oriented Analysis and Design with Application, 3rd Ed., G. Booch, et. al, Addison, Wesley, 2007
- **Supplemental or optional books/readings:**
- The Unified Modeling Language User Guide, Grady Booch, James Rumbaugh, Ivar Jacobson, 1998, Addison Wesley
- The Unified Modeling Language Reference Manual, Second edition, James Rumbaugh, Ivar Jacobson, Grady Booch, Addison-Wesley, 2005
- Head First Object-Oriented Analysis and Design, Brett D. McLaughlin, 2007, O'Reilly

- **Additional materials:**
    - Throughout the course additional materials in a form or white papers and articles might be provided by course instructor.

Requirements

- **Exams and quizzes:** Students will take 2 exams (midterm and final). These will be closed book (no books, no laptops or other devices) tests consisting of very limited number multiple-choice, open-ended test questions, problem solving using codding and understanding UML diagrams and ability to transform them to code and vice-versa. Time and place will be communicated during the term.
- **Assignment/problem sets/projects/reports/research papers:**

Homework(s) in a form of weekly/monthly written team assignments will be given during the term. These will be software development documents for a hypothetical project. Each homework assignment will be based on the previous assignments, reflecting subsequent phases of the project. Homework and (or) Final Projects will be assigned to teams of 3-4 students. Detailed information and the exact dates will be communicated during the term. The students will submit the homework assignments online and in hard copy. The homework will be graded based on clarity, technical soundness, thoroughness and coverage, relevance to provided standards and utilization of resources.

- **Other requirement:** Academic honesty is required in all stages of exams, assignments, labs and projects.

Policies

- **Grading procedures:**
  - The students will be graded on an absolute scale.
  - The course grade will be calculated from the following components:

Midterm Exam – 20%
Homework(s) – 35%
Final Project – 15%
Final Exam – 25%
Participation – 5%

  - Students, who contend that their grade is not an accurate reflection of their accomplishments in the class, should first discuss their grade assessment with the instructor. For further steps please refer to the university procedures.
- **Attendance and tardiness**: Attendance is an indispensable element of the educational process. In compliance with Azerbaijani legislation, instructors are required to monitor attendance and inform the Registrar and the Dean of the respective School when students miss significant amounts of class time. Azerbaijani legislation mandates that students who fail to attend at least 75% of classes will fail the course.

- ADA attendance policy excuses two (2) student absences of all classes, though these should reflect a serious need on the student's part to be away from class.

In case of involuntary and unpredictable serious disruption of normal life, students may appeal to a grievance procedure through Office of the Dean of the School of Education.

- **Classroom decorum:** To avoid distractions late students are asked NOT to enter the class after the doors are closed. Cell phones should beplaced on silent mode or

switched OFF, and shall NOT be used in the classroom during class sessions. As an exception, students may be allowed to leave or enter the room with the instructor's permission.

- **Class participation:** Students are encouraged to contribute to class discussion. Certain percent of the course grade will depend upon contributions to class sessions. Class participation provides the opportunity to practice speaking and persuasive skills, as well as the ability to listen. What matters is the quality of one's contributions, not the number of times one speaks.
- **Missed or late assignments/extensions:**
  - All assignments must be submitted on time. Late submission of any assignment will be penalized by **25%** every day of a delay duration.
- **Standards for academic honesty and penalties for infractions:** If student found guilty of academic dishonesty first time, he or she would fail the course. If the case repeats again, student will be expelled. For more information please read the Honor Code.

Schedule

- **Tentative calendar of topics and readings:** The course is organized in 15 weeks.

Week#	Lecture#	Topics (tentative)	Readings
1	Introduction to OOAD/History and Motivations	System Development Life-cycle and its Importance / History / System Development Methodologies / Understanding of Unified Process/ Unified Modeling Language	Book1-Ch1
2	Object-Oriented Development	Modular Design and Encapsulation /Inheritance / Polymorphism / Elements of the Object Model	Slides Book2-Ch2, Ch3, Ch4
3	The Requirements Workflow / **Homework 1**	Determining What the Client Needs / Gathering the Requirements / Requirements Analysis / Functional requirements / Non-functional requirements	Slides, Book1-Ch4,
4	Analysis Modeling: Functional Modeling	Functional Modeling: UML Use Case Diagrams	Book2- Ch5, Book1 -Ch5
5	Analysis Modeling: Static (Structural) Modelling	Structural Models / UML Static Modeling Diagrams	Slides Book2 – Ch5

	Homework 2		
6	Static Analysis Modeling	Extracting the Conceptual / Analysis Entity Classes / CRC Cards / Class Diagrams	Book1-Ch6, Book2-Ch5
7	Dynamic Analysis Modeling	The Specification Document / Dynamic Modeling: UML Sequence Diagrams	Book1-Ch6, Book2-Ch5
8	**Midterm exam** Design Modeling	Design Phase / Verifying and Validating the Analysis Models / Analysis Model to Design Model	Book1 –Ch8
9	**Spring Break**	No Classes	
10	Class and Method Design **Homework 3**	Creating Software/Design Classes / Metrics for Design / Constraints and Contracts / Object Design Activities	Book1 – Ch9
11	Data Management Layer Design	Data Management Layer Design / Designing Data Access and Manipulation Classes	Book1 – Ch10
12	Human-Computer Interaction Layer Design **Homework 4**	Human-Computer Interaction Layer Design / UI Structure and Standards	Book1 – Ch11
13	The Implementation Workflow	Managing Programming / Unit Testing / Integration Testing / Acceptance Testing / Developing Documentation	Book1 – Ch13
14	**Final Projects Presentations**	Final project presentations / Presentations	
15	**Final exam**		

Disclaimer

- This syllabus, including the course schedule is subject to change as necessary and students will be notified accordingly.