ESOF 422 Spring 2020
Advanced Software Engineering

Lecture Time and Location: M,W,F 14:10 – 15:00 in REID 101

Instructor: Dr. Clem Izurieta
Contact: clemente.izurieta@montana.edu
Office Hours: MWF 13:00 – 14:00
Office Location: NAH 253D

Course and Lab Assistant: XXX
Contact email: XXX
Office Hours: XXX
Office Location: XXX

Textbook:
Warmer and Kleppe, "The Object Constraint Language Second Edition," Addison Wesley 2003. ISBN 0-321-17936-6

Ammann and Offutt, "Introduction to Software Testing," Edition 2, ISBN-13: 978-1107172012

Any text book or resource that will help you with UML. This is your choice.

Prerequisites:
ESOF 322 – Software Engineering

Course Description:
This course focuses on the early phases of the software lifecycle, extending the knowledge developed in ESOF 322 around UML specifications to formulate precise requirements. We rely heavily on UML and Design Patterns. We specifically focus on the design and architectural specifications of software. We will focus on advanced software modeling and specification techniques. We will discuss model-driven engineering through model driven software development and its support tools such as UML, USE and OCL. We then turn our attention to different types of software testing techniques, and finally we will discuss cloud computing, focusing on AWS software.

Course Objectives:
- Build expertise in modeling techniques
- Introduce software design through the use of rigorous UML
- Introduce constraint based modeling.
- Software Testing
- Cloud Computing

Course Outcomes
- Articulate what formal methods are.
- Be able to read and write formal specifications written in UML and OCL.
- Write and analyze specification constraints using OCL.
- Write SOIL to extend UML diagrams.
- Form informed opinions about model-driven techniques.
- Use a constraint solving tool –USE, Eclipse OCL.
- Describe different and apply criteria for software testing
- Concepts in AWS cloud services such as lambda functions, EC2 instances, load balancing, etc.

Software and Additional Reference Material

The following is a list of the software and relevant downloads that we will use throughout this course:

- USE: A tool for analyzing OCL constraints USE 5.0
    - https://sourceforge.net/projects/useocl/
- Any tool you are comfortable using for UML modeling: ArgoUML, PlantUML, Visio, Rational, Altova, etc.

Grading Policy:
TBD

Instruction:
New HW is assigned every fortnight. I will typically load the HW to D2L on Mondays and they will be due on Fridays of the subsequent week. The TA will be available during his office hours. There will be **no makeup Labs.**

Attendance and Participation:
Class attendance and participation is highly encouraged. You are responsible for all the material covered in class. Prepare in advance for class by reading and studying the assigned text, and by making sure you understand the previous lecture.

Students with Disabilities:
A student who desires accommodation for a disability needs to speak to the instructor prior to the graded event.

Academic Integrity:
Honesty and integrity is expected in all class work. The standards set by MSU's academic integrity and student conduct guidelines apply to this class. Academic misconduct is unacceptable. It is the responsibility of all students to adhere to strict standards of integrity in their professional and scholarly activities. **Misconduct will be treated swiftly and harshly**. It is a breach of academic integrity to present the ideas or works of another as one's own work, or to permit another to present one's work without customary and proper acknowledgment of authorship. Students may collaborate with other students in their team.

Students are responsible for the honest completion and representation of their work, the appropriate citation of sources and the respect and recognition of others' academic endeavors. According to MSU's Conduct Guidelines and Grievance Procedures for Students, academic misconduct includes cheating, plagiarism, forgery, falsification, facilitation or aiding academic dishonesty; multiple submission, theft of instructional materials or tests; unauthorized access to, manipulation of or tampering with laboratory equipment, experiments, or computer programs, without proper authorization; alteration of grades or scores; misuse of research data in reporting results; use of personal relationships to gain grades or favors, or otherwise attempting to obtain grades or credit through fraudulent means.

Advanced Software Engineering – Lectures
Spring 2020

Wk	Date	Topic	Slide set	Events
1	Jan 13, 15, 17	Introduction, UML review	IntroToUML, mdse	Start of classes
2	Jan 20, 22, 24	Model driven development	Handout	**Jan 20**: No Classes MLK day

3	Jan 27, 29, 31	OCL	OCL	OCL Book (Ch. 2)
4	Feb 3, 5, 7	SOIL: http://useocl.sourceforge.net/w/index.php/SOIL Aggregation, Composition, Inheritance Liskov's rules	ac	
5	Feb 10, 12, 14	UML State diagrams Protocol State Machines		
6	Feb 17, 19, 21	Advanced OCL constructs	comp	**Feb 17:** No Classes President's day OCL Book (Ch. 3)
7	Feb 24, 26, 28	Testing Introduction		Testing Book (Ch. 1)
8	Mar 2, 4, 6	Graph Coverage Criteria		Testing Book (Ch. 2.1, 2.2)
9	Mar 9, 11, 13	Graph coverage with paths		Testing Book (Ch. 2.3)
10	Mar 16, 18, 20			**Spring Break**
11	Mar 23, 25, 27	Graph coverage for design elements		**Mar 26-28:** No Classes, NCUR Testing Book (Ch. 2.4)
12	Mar 30, Apr 1, 3	Logic coverage		Testing Book (Ch. 3.1, 3.2, 3.3)
13	Apr 6, 8, 10	Input space partitioning		**Apr 10:** No Classes University day Testing Book (Ch. 4)
14	Apr 13, 15, 17	Architectural Design and the Cloud		
15	Apr 20, 22, 24	Amazon Cloud (AWS) Class Survey Open https://www.cs.montana.edu/survey/		Please fill out the survey
16	Apr 27, 29, May 1	AWS		
17	May 4, 6, 8	You can bring a **cheat sheet** (both sides) **Regular classroom**		**Final Exam **TBD****