Systems Architecture

ESI 6552 Section: 1FE2/ 1HYB/2FED/ CAMP/ OVER
Class Periods: M, W, F | Period 2 (8:30 AM - 9:20 AM)
Location: Online/CSE E107
Academic Term: Spring 2021

Instructor:
Dr. Mengyu Li
mengyu.li@ufl.edu (Please contact through the Canvas website)
(352)-294-6391
Office location: 379 Weil Hall
Office Hours (Starting Mar 8, 2021): Tuesdays 3 – 5pm (online via Canvas Zoom Conferences)

Teaching Assistants:
Farnaz Babaie Sarijaloo
farnazbs@ufl.edu
Office Hours: (starting Jan 18, 2021): Mondays, 11 am – 12 pm (online via Canvas Zoom Conferences)

Course Description
System architecture is an abstract description of the entities of a system and the relationship between those entities. This course will acquaint students with concepts of systems architecture and the application of related methods to real-world systems. It provides foundations for developing and evaluating architectures for systems of systems, as well as process for generating functional, physical, and operational architecture from a top-level operations concept. This is a 3 credit hours project course.

Course Pre-Requisites / Co-Requisites
Prerequisite: calculus, linear algebra.

Course Objectives
Upon completion of this course, students will obtain foundational knowledge of the entities of a system and relationships among the entities from a system architecture perspective. Students will understand foundational knowledge of principles, processes, and tools of system architecting. Students will be able to analyze and critique the architecture of existing systems and structures and lead the early, conceptual phases of the system development process.

Special Emphasis:
- Understanding of basic principles
- Applications to system architecture analysis and development
- This is a course in **how** to think, not **what** to think

Materials and Supply Fees
This class is based primarily on lectures. Students may attend lectures in person or watch the lectures on video. Any additional supplemental material will be provided. Supply fees is not applicable in this course.

<u>Recommended</u> Textbooks and Software
Textbooks:
- E. Crawley, B. Cameron, and D. Selva, *System Architecture: Strategy and Product Development for Complex Systems,* 1st edition, 2006, Pearson. ISBN: 9780133975345.

- Maier, *The Art of Systems Architecting*, 3rd edition, 2009, CRC Press. ISBN: 781420079135.

Software:
- Microsoft® Excel, Word, and PowerPoint
- Any video recording/editing program

Course Schedule
This is a *tentative* outline. The instructor reserves the right to make changes as she sees necessary.

PART 1: Introduction to systems architecture (Week 1-4)
Introduction to systems architecture, complex systems, and system thinking.
- Week 1: System Review, Forms and Functions & **Assignment 1**
- Week 2: System Emergence
- Week 3-4: Thinking about Complex Systems

PART 2: System Thinking and System Dynamics (Week 5-9)
Showcase methods and ideas of architecture in a context of fully represented systems.
- Week 5: System Thinking & **Quiz 1**
- Week 6: Causal Loop Diagrams
- Week 7-8: Structure and Behavior of Dynamic Systems & **Midterm**
- Week 9: Midterm Project Review & **Assignment 2**

PART 3: Analysis of System Architecture (Week 10-15)
Apply the concepts of system architecture to create a new or improved system.
- Week 10: Analysis of Formal Relationships
- Week 11: External/Internal Functions
- Week 12: Solution-Neural Functions and Concepts & **Assignment 3**
- Week 13: From Concept to Architecture
- Week 14: System Reliability & **Quiz 2**
- Week 15: Product Development Process & Upstream/Downstream Influences & **Final**

Attendance Policy, Class Expectations, and Make-Up Policy

Attendance is required for any live session offered throughout the semester. The date/time for any live session will be announced via Canvas course website. The live sessions will be recorded. To ensure the quality of learning, students should visit the course website and watch lecture videos on a regular basis. Participation is highly valued in this course. Therefore, students are required to participate in online discussions. Discussion in the course e-learning website (Canvas) will be posted within 24 hours of the in-class activity occurs. Students will be given 7 days (1 week) to participate from the time the discussion is posted. This also encourages you to visit the course website and watch lecture videos on a regular basis.

Attendance will be checked via discussion participations in Canvas as well as live sessions when offered. Attendance is considered in the calculation of the student's final grade. If a student misses 20% or more of the live class sessions (an absence), there will be grade penalties, and the instructor reserves the right to issue a failing grade for lack of attendance/participation. Excused absences must be consistent with university policies in the Graduate Catalog (http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#attendance) and require appropriate documentation. Additional information can be found here:
https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx

The assignments are to be submitted on or before the posted due date. Students are responsible for all material presented in each session. <u>Late submission penalty of 25% per day (4 days maximum allowance) will be applied to late submissions.</u> If the grades have been released/assignments have been evaluated, your assignment is excessively late, a zero will be given. **It is your responsibility to visit the course website regularly, read the posted announcements and be aware of assignment submission deadlines and procedures.**

Makeup quizzes or exams are **not** offered. Exceptions are made for extreme emergencies. Excused absences must be consistent with university policies in the Graduate Catalog (http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#attendance) and require appropriate documentation. Additional information can be found here:
https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx
Contact the instructor as soon as possible to make arrangements. However, in no case will a makeup test be offered unless the instructor has been notified **within 48 hours** of the original test date and/or documentation of the circumstance is made available upon the instructor's request.

Evaluation of Grades
Each assignment/quiz /project/exam will be graded on a 100-point scale. If there are concern regarding assigned grade, it is required that they are brought forth to the instructor **no later than 7 days after the solutions are made available**.

Grade based on:

Assignment	Total Points	Percentage of Final Grade
Assignments	100 each	15%
Attendance & Discussions	100 each	5%
Quizzes	100 each	20%
Midterm	100	25%
Final	100	35%
		100%

Grading Policy

Percent	Grade	Grade Points
93.0 - 100.0	A	4.00
90.0 - 92.9	A-	3.67
87.0 - 89.9	B+	3.33
83.0 – 86.9	B	3.00
80.0 – 82.9	B-	2.67
77.0 - 79.9	C+	2.33
73.0 – 76.9	C	2.00
70.0 - 72.9	C-	1.67
67.0 - 69.9	D+	1.33
63.0 - 66.9	D	1.00
60.0 - 62.9	D-	0.67
0 - 59.9	E	0.00

More information on UF grading policy may be found at:
http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#grades
https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

Students Requiring Accommodations

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting https://disability.ufl.edu/students/get-started/. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

Course Evaluation

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at https://gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/.

University Honesty Policy

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Software Use

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html

Campus Resources:
<u>Health and Wellness</u>

> **U Matter, We Care:**
> If you or a friend is in distress, please contact umatter@ufl.edu or 352 392-1575 so that a team member can reach out to the student.
>
> **Counseling and Wellness Center:** http://www.counseling.ufl.edu/cwc, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.
>
> **Sexual Assault Recovery Services (SARS)**
> Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or http://www.police.ufl.edu/.

Disclaimer

The instructor reserves the right, when necessary, to alter the grading policy, change examination dates, and modify the syllabus and course content. Modifications will be announced on the course website. Students are responsible for announced changes.