COMS 309
Software Development Practices
2021 Spring

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IOWA STATE UNIVERSITY

Com S 309. Software Development Practices. (3-1) Cr. 3. F.S.
Prereq: Com S 228 with C- or better..
A practical introduction to methods for managing software development. *Process models, requirements analysis, structured and object-oriented design, coding, testing, maintenance, cost and schedule estimation, metrics*. Programming projects.

Teaching Staff Information

Simanta Mitra, smitra@iastate.edu

Urgent help: 515-650-2255 (text only)

Teaching Assistants

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IMPORTANT DIRECTIVE

1. Each student **must** RESERVE adequate time and energy for working with your team on the class project. Block times on calendar TODAY!
2. For UG courses, each credit requires 3 hrs outside class work – i.e. reserve **at least 9 hours total outside class for this course per week**.

This class is a LOT of work. You MUST put in the time otherwise it affects your entire team.

Suggestion: do not take multiple hard courses together (examples 309+311 or 309+342 or 309+327 or 309+319)

COURSE GOALS

#1. Major Goal

To transition from programmer to Software Engineer and become **knowledgeable** about (and practice) common software engineering techniques and concepts.

#1. Design/Code for maintainability (i.e. modular design)

#2. Major Goal

To learn how to work effectively with a team and to hold each other accountable for contributing to the project.

Major Learning Outcomes

1. Learn/practice good teamwork behaviors.
2. Learn/practice GIT/GITLAB flow behaviors.
3. Learn/practice SDLC (reqs/design/coding/testing)
4. Learn/Practice Modular Design
5. Learn/use Continuous Integration, Testing & Deployment.
6. Learn/use Mockito for Mock Testing.

Achieving Course Goals

To achieve course goals, students will work on development of a reasonably sized project from concept to release.

- have followed **good practices** for the different stages of the development process
- **used software engineering tools** for development and design including IDE, Source-Control, Modeling, Test execution, and coverage.

ABET COM S Outcomes

1. An ability to analyze a complex computing problem, and to apply principles of computing and other relevant disciplines to identify solutions.
2. An ability to design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
3. An ability to communicate effectively in a variety of professional contexts.
4. An ability to recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
5. An ability to function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
6. An ability to apply computer science theory and software development fundamentals to produce computing-based solutions.

This class addresses the first five (marked in green) outcomes prescribed by ABET for the entire class (i.e. all teams).

However, the sixth outcome is not addressed for all teams.

309 applied to ABET outcomes

To introduce the students to the major software engineering topics and position them to lead medium-sized software projects in industry.

- Students will learn to work as a team and to focus on getting a working project done on time with each student being held accountable for their part of the project. Students will communicate the team project both within the team framework and to the class. (3, 5)
- Students will learn about risk management and quick prototyping to de-risk projects.
- Students will learn about and go through the software development cycle with emphasis on different processes - requirements, design, and implementation phases. (1)
- Students will learn details about different artifacts produced during software development.
- Students will learn about different software development process models and how to choose an appropriate one for a project. (2)
- Students will gain confidence at having conceptualized, designed, and implemented a working system.
- Student will learn about professional ethics and how to apply it in the discipline. (4)

ABET: Specific outcomes

	1	2	3	4	5	6
COM S 309 Outcomes	X	X	X	X	X	

COURSE ORGANIZATION

Mode of Delivery

This is a WWW course.

Delivery will be completely online.

Class: @2:15-3:05 MWF.

Zoom Link: https://iastate.zoom.us/j/5710253576

Class will be RECORDED and posted on Canvas.

Meetings with TAs and with Teams will be via **WEBEX Teams**. Discussions can be via discord. We will send details later.

Course Organization-1

Note that the reasons for course being organized this way can be found in the 309 Orientation FAQ. This includes how the course fits into the overall curriculum.

1. **Team formation**
   - ❑ Course is organized around a 4-member team project.
   - ❑ Teams will be formed first day of class.
   - ❑ Teams will propose projects – subject to course constraints. Most problems manifest themselves only on larger/complex projects - we require the projects be somewhat complex.
   - ❑ Teams will be assigned Tas during the second week of class.
2. **Team Meetings**
   - ❑ Teams will reserve times to meet (ONLINE) with each other
   - ❑ Teams with also reserve times to meet (ONLINE) with their TAs for weekly project status and for four project demos.

Course Organization-2

1. Individual Work for Project

- ❑ Students will **work on experiments and tutorials** to learn how to use tools, libraries, technologies, frameworks etc.
- ❑ Students will work on developing parts of code for their team project and interact with team members to make the pieces of code work together.

2. Individual Work for Class Assignments

- ❑ The class materials are not very difficult – so readings will be assigned. There is no assigned textbook for the class.
- ❑ Students will do weekly class readings as assigned.
- ❑ Students will do pre- and post- quizzes (plus frequent surveys)

3. Class Time (online 2:15-3:05pm MWF)

Materials will be posted on canvas to be worked on by students.

- ❑ Discussion of technologies/tools.
- ❑ Clarification of difficult parts.
- ❑ Working on worksheets to learn the more difficult parts.
- ❑ Help sessions for struggling teams.

Course Organization-3

1. **Help (out-of-class and in-class)**
   - ❑ Technical questions – ask on Piazza/discord
   - ❑ Urgent help – text 515-650-2255
   - ❑ Some of class sessions will be devoted to helping out on topical issues.
   - ❑ On an as-needed basis, there will be at least twice-a-week sessions (voice/text) to help out on issues faced by the class.
   - ❑ All "people" issues with teams – talk directly to the instructor (from day one).
   - ❑ It may not be possible to provide help right before demonstrations (particularly if you start coding really late).

Course Organization-4

Class-work

- Zoom: https://iastate.zoom.us/j/5710253576
- Canvas: https://canvas.iastate.edu/courses/79179
- Piazza: (access from Canvas)

Team-work

- Gitlab: https://git.linux.iastate.edu
- Webex Teams: (download Webex Teams)
  - https://www.webex.com/downloads.html
- Discord: https://discord.gg/HGVa97kPmj
- Peer Evaluations: https://www.catme.org/login/index

Tentative Schedule

		COM S 309 SPRING 2021 TENTATIVE SCHEDULE			
WK	Mon Week	MONDAY	MAJOR DEADLINES	Mon Week	WK
1	25-Jan		1/26 T teams crt 1/27 W teams freeze	25-Jan	1
2	1-Feb			1-Feb	2
3	8-Feb	DEMO-1: SET UP DEMO, NO CLASS 1) Git usage, 2) Client Side Exp, 3) Server Exp	2/12 F freeze proposals	8-Feb	3
4	15-Feb		2/21 U screensketches due	15-Feb	4
5	22-Feb			22-Feb	5
6	1-Mar			1-Mar	6
7	8-Mar	DEMO-2: BASELINE DEMO NO CLASS Use of Merge Requests, Basic. Commn betwn Server/Client/DB	3/14 U R Block Diagrams + API (Version-1)	8-Mar	7
8	15-Mar			15-Mar	8
9	22-Mar			22-Mar	9
10	29-Mar			29-Mar	10
11	5-Apr	DEMO-3: NO CLASS MAJOR use cases, Use of CI/CD, Use of Mockito	4/11 U Block Diagram + API (Version-2)	5-Apr	11
12	12-Apr		4/18 U Posters Due	12-Apr	12
13	19-Apr			19-Apr	13
14	26-Apr	DEMO-4: NO CLASS MAJOR use cases. Use of websockets	4/30 F Video due 4/30 F Final report	26-Apr	14
15	3-May	EXAM WEEK TILL 6th		3-May	15

Brief List of Topics

- Intimate familiarity with various software artifacts (documents/code) produced during a software development project
- Top Issues in Software Engineering
- Project Management: Process Models, Planning, Scheduling, Cost Estimation, Risk Management, Metrics, Project execution, Project termination.
- Software Requirements: Elicitation, Specification, Verification, Validation.
- Software Architecture: Decomposition, Modularity, Specification of Interfaces, Design tradeoffs, Design Evaluation.
- Exposure to information management techniques (via Lectures and using the concepts in a semester-long group Project)
  - Demonstrate uses of stored metadata schema
  - Concepts in modeling notation and how they are used
  - Basic principles and application of relational data model
  - Use of the Object-oriented model
  - Creating a schema in SQL and using it to create tables and retrieve information
  - Creating non-procedural queries by filling in templates of relations
  - Embedding object-oriented queries into languages such as Java/C++
- Exposure to basics of networking and communication (via Lectures and using the concepts in a semester-long group Project)
  - DNS, IP, URI
  - Introduction to the client/server model
  - Http
  - Socket APIs
  - Client/server APIs are used throughout the semester in the group Project
- Legal and ethical principles in computing
- Configuration Management: Use of source control tools, change management.
- Testing techniques, Inspections/Reviews.

GRADING POLICY

Tentative grading policy-1

1. **Grading Scale (we first give letter grade and THEN number grade)**
   1. Excellent: >= 90 **A-** >=93 **A**
   2. Good: >= 80 **B-** >= 83 **B** >= 87 **B+**
   3. Average: >= 70 **C-** >= 73 **C** >= 77 **C+**
   4. Poor: >= 60 **D-** >= 63 **D** >= 67 **D+**
   5. **F: 0 to < 60**

2. Quizzes and other assignments are worth 30%

3. Project is worth 70%.
   - 15% Documents for project
   - 55% Code <Note not all demos are equally weighted>

   Demo-1 05% Demo-2 20% Demo-3 15% Demo-4 15%

Tentative grading policy-2

Grade Restrictions

1. **To pass class, MUST pass demos 2,3, and 4 (**at least C- in each)
2. Getting a grade below A/A- in any TWO demos will LIMIT your overall grade to below A/A- (regardless of total points obtained in the course). Rationale: If you did not excel in your project work – you did not excel in the class.
3. B grade means good work. No one can get a B grade if they have ***repeatedly*** exhibited poor team-work. Additional penalties will apply based on situation. This includes (but is not limited to):
   - ❑ regularly missing/late at team meetings (incl. mtgs with TA).
   - ❑ starting late on coding work.
   - ❑ keeping TA/team in the dark about work (i.e. not pushing code weekly basis).
   - ❑ being rude or disrespectful or contributing to a toxic team environment.

OTHER POLICIES

Project Code

- Your team must come up with your own idea and implement it from scratch. If you use ANY libraries and frameworks, you must get it approved by us AHEAD of time.
- When you show code to TA – make sure it is code that YOU wrote (and not libraries or what others wrote). **No credit for non-code work (like css, html, image creation etc)**

COVID-19 health and safety requirements Students are responsible for abiding by the university's COVID-19 health and safety expectations. All students attending this class in-person

are required to follow

university policy regarding health, safety, and face coverings.

RULES

- **wear a cloth face covering in all university classrooms**, laboratories, studios, and other in-person instructional settings and learning spaces. **Cloth face coverings are additionally required to be worn indoors** in all university buildings, and outdoors when other people are or may be present where physical distancing of at least 6 feet from others is not possible. Students with a documented health or medical condition that prevents them from wearing a cloth face covering should consult with Student Accessibility Services in the Dean of Students Office.
- **ensure that the cloth face covering completely covers the nose and mouth and fits snugly against the side of the face.**
- **practice physical distancing to the extent possible.**
- assist in maintaining a clean and sanitary environment.
- not attend class if you are sick or experiencing symptoms of COVID-19.
- not attend class if you have been told to self-isolate or quarantine by a health official.
- follow the instructor's guidance with respect to these requirements. Failure to comply constitutes disruptive classroom conduct. Faculty and teaching assistants have the authority to deny a non-compliant student entry into a classroom, laboratory, studio, conference room, office, or other learning space.

- These requirements extend outside of scheduled class time, including coursework in laboratories, studios, and other learning spaces, and to field trips. These requirements may be revised by the university at any time during the semester.
- In accordance with university policy, instructors may use a face shield while they are teaching as long as they are able to maintain 8 feet of physical distance between themselves and students during the entire instructional period. Some form of face covering must be worn at all times in learning spaces regardless of the amount of physical distancing.
- Faculty may refer matters of non-compliance to the Dean of Students Office for disciplinary action, which can include restrictions on access to, or use of, university facilities; removal from university housing; required transition to remote-only instruction; involuntary disenrollment from one or more in-person courses; and other such measures as necessary to promote the health and safety of campus.

Cyclones Care Campaign

- **It is important for students to recognize their responsibility in promoting the health and safety of the Iowa State University community**, through actions both on- and off-campus.
- The university's faculty asks that you personally demonstrate a commitment to our Cyclones Care campaign. Iowa State University's faculty support the Cyclones Care campaign and ask you personally to demonstrate a commitment to our campaign. Your dedication and contribution to the campaign will also protect your family, classmates, and friends, as well as their friends and families. Our best opportunity for a successful fall semester with in-person learning and extramural activities requires all of us to collaborate and fully participate in the Cyclones Care campaign.

Academic Dishonesty

- The class will follow Iowa State University's policy on academic dishonesty. Anyone suspected of academic dishonesty will be reported to the Dean of Students Office.
- Code/documents that you submit as your own – must have been created by you.
- http://www.dso.iastate.edu/ja/academic/misconduct.html

Disability Accommodation

- Iowa State University complies with the Americans with Disabilities Act and Sect 504 of the Rehabilitation Act. If you have a disability and anticipate needing accommodations in this course, please contact me to set up a meeting within the first two weeks of the semester or as soon as you become aware of your need. Before meeting with (instructor name), you will need to obtain a SAAR form with recommendations for accommodations from the Disability Resources Office, located in Room 1076 on the main floor of the Student Services Building. Their telephone number is 515-294-7220 or email disabilityresources@iastate.edu . Retroactive requests for accommodations will not be honored.

Harassment and Discrimination

- Iowa State University strives to maintain our campus as a place of work and study for faculty, staff, and students that is free of all forms of prohibited discrimination and harassment based upon race, ethnicity, sex (including sexual assault), pregnancy, color, religion, national origin, physical or mental disability, age, marital status, sexual orientation, gender identity, genetic information, or status as a U.S. veteran. Any student who has concerns about such behavior should contact his/her instructor, Student Assistance at 515-294-1020 or email dso-sas@iastate.edu, or the Office of Equal Opportunity and Compliance at 515-294-7612.

Religious Accommodation

- If an academic or work requirement conflicts with your religious practices and/or observances, you may request reasonable accommodations. Your request must be in writing, and your instructor or supervisor will review the request. You or your instructor may also seek assistance from the Dean of Students Office or the Office of Equal Opportunity and Compliance.