NAU NORTHERN ARIZONA UNIVERSITY

School of Informatics, Computing, and Cyber Systems

Course Syllabus

CS 476 – Requirements Engineering		Fall 2021
Class #: 3312, 8849 **Credits:** 2 cr. Lecture + 1 cr. lab	**Pre-reqs:** CS386, with C or better ** CS476 must be taken in the semester exactly before your graduation semester!	**Co-Reqs:** CS476 lab
Section#: 1	**Co-convened/Cross-listed with:** N/A	**Mode:** in-person, face-to-face

Academic Catalog Description: Covers all aspects of professional project initiation, including elicitation and validation of requirements, risk and feasibility analysis, resource estimation, and formal representation of final requirements. Must be taken immediately before you take CS 486C, and in the semester immediately preceding the one in which you graduate (as CS486 must be taken exactly in the semester your graduate). Letter grade only. Course fee required.

Course Purpose: This course is part of the two-semester CS Capstone sequence. In this first course, we focus on project preparation, including requirements acquisition, feasibility analyses, and preliminary software design. As this course finishes, projects should be fully specified and designed, leaving them ready for intensive implementation, testing, and refinement during the subsequent CS486c Capstone Design course.

Upon successful completion of this course, students will have gained experience in the context of a significant and realistic development project for an industry sponsor, understand systematic software engineering methodologies, have gained experience with technical tools and methods in software engineering, develop team building and team management skills, and develop oral and written communication skills.

ABET Program Learning Outcomes supported

Outcomes	Achievement Assessments
Outcome 2. Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline. **Outcome 6.** Apply computer science theory and software development fundamentals to produce computing-based solutions.	Team and individual project deliverables Weekly meetings, task reports, and mentor's meeting notes Design Review Presentations Confidential peer evaluations Sponsor evaluations of team and individual members

Detailed Information for this offering

Time and Location:

Section 1: 2:20-4:50 Fridays, Forestry rm. 017
Section 2: 12:45-3:15 Fridays, EGR rm. 321

Course Website: https://www.ceias.nau.edu/~edo/Classes/CS_Capstone/CS476.html

Readings and Materials:

Course Textbook: There are no *required* textbooks for this course. The following are highly recommended texts that many practicing computer scientists have on their bookshelves:

- Code Complete: A Practical Handbook of Software Construction, Second Edition, by Steve McConnell
- The Mythical Man-Month: Essays on Software Engineering, Anniversary Edition, by Frederick P. Brooks
- Difficult Conversations: How To Discuss What Matters Most, by D. Stone, B. Patton, and S. Heen

Instructor Names: **Dr. Eck Doerry, Dr. Michael Leverington**
Office Building/Room Number: **Doerry: 90-217 (SICCS); Leverington: 69-243 (EGR)**
Email: **Eck.Doerry@nau.edu**; **Michael.Leverington@nau.edu**
Instructor Availability:

Office hours: **Doerry**	**Mon 2:00 – 3:00, Online** **Thurs 11:30-12:30 Online** • **All office hours will be held online, at the times shown above. See email and website for access details.**
Office hours: **Leverington**	**Mon/Wed 10:00-12:00 Online** **Wed 2:30-4:30 Online** • **All office hours will be held online, at the times shown above. See email and website for access details.**
Other:	• We sometimes change office hours by class vote during the term to accommodate your schedules better. Check the course website for latest! • Although you should try hard to make it to scheduled office hours, we are also available at other times by appointment. To schedule, send email. • Email is appropriate for **short** questions; longer questions/discussions should be handled in person.

Course Structure and Evaluation Mechanisms:

Course Structure: The primary purpose of this course is to embody the "Requirements acquisition and initial design" phase of a realistic software project. Thus, time outside of class will be allotted (with appropriate expectations of productivity) for development of the projects assigned to each team. In parallel, class sessions will focus around lectures and discussions related to best practices in software engineering, team collaboration, project management, and conflict resolution, i.e., critical skills that you will need as a professional software engineer. Deliverables will include electronic and hardcopy deliverables, as well as in-class presentations and demonstrations. All team-based deliverables will result in a team grade, which will then be mapped to individual grades based on peer evaluations. See the link on peer evaluations in the course policies folder for more detail.

Evaluation Mechanisms: Your course grade will be determined by performance in three general areas, into which all deliverables will be placed:

Project Work: The bulk of the work in this class will revolve around working as a software consulting team to move your project forward. There are numerous deliverables in the category, including various feasibility studies, drafts and final requirements document, a design review, and a technical prototype demonstration. Team deliverables will be graded by your team mentor, with team score modified by peer evals for each member.

Homeworks, Quizzes, Final: There may be some individual homeworks during the term. These may involve turned in written reviews and/or BBlearn exercises. A final exam will be given at the end.

Mentor and Client Evaluation: In the real software consulting world, essentially 100% of your "grade" is based on whether you satisfy your client. To reflect this, a substantial part of your class grade is determined by mentor and client evaluations. A team only works well with the active participation of all participants, and team mentors will use various mechanisms (task reports, peer evals, team meetings) to gain insight into the participation, engagement and contributions of all team members. A formal client evaluation of the team at semester's end provides an objective external perspective on team performance.

Grading System:

Weighting of Deliverables:	**Grading Scale**:
The following percentages are used in weighting total points earned on programming, exams, and participation: • Team docs & website (except Req. Doc) = 25% • Requirements Doc (drafts and final) = 15% • Technical Presentations (DR, video, updates) = 15% • Technical Prototypes Demo = 15% • Individual Work, incl. Final exam = 5% • Mentor and Client Evaluations = 25%	90-100% = A 80-89% = B 70-79% = C 60-69% = D under 60% = F

Notes:

- Simply completing the minimum viable product may just be enough to earn a "C". To get an "A" or a "B" you must show additional (i.e., above average or outstanding, respectively) analytic insight, creativity and of course implementation productivity. For more detail on what is expected for each grade level, refer to the ASEE's Guidelines for Engineering Grading and Written Presentation Evaluation Rubric linked on the course website.
- **Peer Evaluations:** Effective teams develop strong internal communication to distribute project load efficiently and effectively. Peer evaluations are an effective mechanism for documenting distribution of team effort and dynamics, and will be filled out for all major phases/deliverables of the semester. **The computed outcome is used as a *weighting factor*, applied to the overall team score** on presentations and deliverables to arrive at individual grades. In this way, it is quite possible for teammates to get very different grade outcomes, depending on the effort they invested and displayed to their teammates. Thus, just as in the real world, it is critical that you impress your teammates with your reliability and quality!

Class Outline or Tentative Schedule:

Topics center around Team Management, Client Communication, and various aspects of Requirements Acquisition. See online Course Schedule for details, including links to deliverables and specs.

Class Policies:

Attendance: Attendance is required. We will usually meet once a week for lecture for organizational updates and discussion, lectures on SE topics, Design Reviews, and other in-class activities. See the online course schedule for details. In addition, teams meet individually once a week with their team mentor, at a time negotiated between team and mentor; this represents the "lab" portion of the course.

Electronic Device usage: All cell phones, PDAs, music players and other electronic devices must be turned off (or in silent mode) during lecture, and may not be used at any time. Laptops are allowed for note-taking only during lectures; please devote 100% of your attention to listening and participating.

Late work and Make-ups: Unless otherwise noted, all assigned work is due at the beginning of class on the date they are due! The following specific policies apply:

- **Quizzes and Homeworks:** These will usually be in BBlearn, and are due as marked there, with no late work accepted. Homeworks with hardcopy submissions when and where indicated on the online schedule, and no late work will be accepted.
- **Team Deliverables:** As a default policy, late submissions will degrade at a rate of roughly 10% points off per 12 hours late (see Late work Policy on course website for details). Your team mentor is the ultimate arbiter of due date. In some cases, mentors may slightly postpone due dates for reasons related to specific team/projects at their discretion. Without explicit permission by team mentor, due dates will be as stated in the online class schedule.
- **Design Reviews and Demos:** These are scheduled tightly and must be presented in the designated time slot.

Grade Challenges: Although every effort is made to grade as accurately and fairly, disputes can happen. If you feel that you and your team are owed some points, or would like to discuss an evaluation, begin by discussing the matter with your team mentor. If you can't find satisfaction there, check the course instructor office hours and

contact one of us. To avoid loss of context, any grade disputes must be raised no later than 5 business days after the assignment was returned.

Deliverable Submission and Format: The entire focus of the CS476/486c sequence is to provide a realistic, professional design/build software engineering experience. Thus, professional comportment is required at all times, and all deliverables should be professionally formatted and presented. This means deliverable documents that are clear, well-organized, and **bound in a professional jacket of some sort. Where electronic deliverables are allowed, these should be clean, professional PDFs.**

Academic Dishonesty: As a professional design course, the notion of academic dishonesty focuses less on "cheating" and shifts more towards ethics and professional dishonesty. In particular, dishonesty regarding your contributions to team efforts, or with respect to your actions as a team member (e.g., lying about attending a meeting, getting work done, etc.) will be considered academic dishonesty and sanctioned as outlined by university policy. Other examples include incorporating code written by others without proper attribution, violations of patents and copyrights, and not maintaining professional discretion regarding your team's intellectual property or collaborative dynamic. A team has to work together; team members must "have each other's back" at all times.

Individual and Team Failure Policy: Capstone is unlike all other classes in our curriculum in that there is an outside client involved which (just as in real professional practice) means that students and teams have not just a responsibility to themselves and each other, but to their client as well. This means that (a) an individual's failure to contribute their fair share of effort and deliverables effectively can severely affect the progress of the team; and (b) that if a team as a whole becomes non-productive or dysfunctional, there is a danger of wasting the client's valuable time as well as degrading the reputation of our program. Thus, *this course has established a policy for terminating both non-performing individual team members, as well as entire projects that become non-viable.* The details of this policy are spelled out in "Policy for non-performing individuals/teams", posted on the course website.

Other Important Course Information:

Tips for being successful in CS476:

Student success is a joint responsibility. The CS476 course coordinator and your individual team mentors are here to facilitate your success, but you need to come to class/meetings, engage with the material and with your teammates, and just plain do the work. Below is a list of what is required to be successful in this particular class:

- **Engage in your project, take ownership.** If you see your project as just one more assignment in a standard class that you have to "keep up with", then you are bound for failure. In the real world, projects are not motivated by some outside force (like your evil professor), but are motivated by your personal drive and professional responsibility. If you don't engage and make this project into a direct representation of what you are capable of as a professional software engineer, then the outcome will be mediocre at best.
- **Recognize that this is your portfolio you are building.** In a standard CS course, you are working to pass the class and get a decent grade. Capstone is different: your capstone project can serve as your professional calling card as you look for your first job; employers often ask candidates about their capstone project. Your project website will be archived and active for many years on the CEFNS website. Make sure it's something you are proud to point people at.
- **Focus on teamwork.** Almost all of you will have had a teaming experience at some time in the previous three years. Whether these went well or poorly, try to learn from them…and apply the experience you gained to get it right. Just as in industry, you will be working with your teammates *for the entire year*. This means that keeping your teammates happy should be your absolute priority from day one. Do not let your teammates down; such disappointments can be very hard for them to forget.
- **Give the benefit of the doubt.** Everyone has a bad week sometimes, and when this happens to a teammate, it can be easy to immediately form a negative opinion of him/her…especially when you had to personally pick up the slack. Although action should certainly be taken if this becomes a pattern, it is best to initially give benefit of doubt, support your teammate and move on. Maybe next time it will be you that has the hard week.
- **Be direct, but always remain professional.** Emotions like anger, frustration, and disappointment are natural, but have no real place in a team management context. Neither does burying your head in the sand. If you see "issues" developing within your team dynamics, work to address them immediately, with calm, open, factual communication. This management skill is absolutely vital, but can be intimidating to learn. Feel free to come discuss an issue with your Instructor if you'd like advice on how to address it effectively.

- **Practice, practice, practice!** Nobody is an expert at teaming, project management, technical writing, and public presentation from the start. These are the skills that will get you promotions and raises just as much as…and possibly more than…your technical skills. This course and the next one, CS486c, are all about improving and refining these skills…and the way to do that is through practice and feedback on your work. Ask for help if you don't understand why your technical writing is getting poor marks, practice presentations repeatedly until you can speak fluidly and knowledgeably. Nobody enjoys struggling with these things…but you get better through practice.

UNIVERSITY POLICY STATEMENTS

COVID-19 REQUIREMENTS AND INFORMATION

Additional information about the University's response to COVID-19 is available from the **Jacks are Back!** web page located at https://nau.edu/jacks-are-back.

NAU SYLLABUS POLICY STATEMENTS

ACADEMIC INTEGRITY

NAU expects every student to firmly adhere to a strong ethical code of academic integrity in all their scholarly pursuits. The primary attributes of academic integrity are honesty, trustworthiness, fairness, and responsibility. As a student, you are expected to submit original work while giving proper credit to other people's ideas or contributions. Acting with academic integrity means completing your assignments independently while truthfully acknowledging all sources of information, or collaboration with others when appropriate. When you submit your work, you are implicitly declaring that the work is your own. Academic integrity is expected not only during formal coursework, but in all your relationships or interactions that are connected to the educational enterprise. All forms of academic deceit such as plagiarism, cheating, collusion, falsification or fabrication of results or records, permitting your work to be submitted by another, or inappropriately recycling your own work from one class to another, constitute academic misconduct that may result in serious disciplinary consequences. All students and faculty members are responsible for reporting suspected instances of academic misconduct. All students are encouraged to complete NAU's online academic integrity workshop available in the E-Learning Center and should review the full *Academic Integrity* policy available at https://policy.nau.edu/policy/policy.aspx?num=100601.

COURSE TIME COMMITMENT

Pursuant to Arizona Board of Regents guidance (ABOR Policy 2-224, *Academic Credit*), each unit of credit requires a minimum of 45 hours of work by students, including but not limited to, class time, preparation, homework, and studying. For example, for a 3-credit course a student should expect to work at least 8.5 hours each week in a 16-week session and a minimum of 33 hours per week for a 3-credit course in a 4-week session.

DISRUPTIVE BEHAVIOR

Membership in NAU's academic community entails a special obligation to maintain class environments that are conductive to learning, whether instruction is taking place in the classroom, a laboratory or clinical setting, during course-related fieldwork, or online. Students have the obligation to engage in the educational process in a manner that does not interfere with normal class activities or violate the rights of others. Instructors have the authority and responsibility to address disruptive behavior that interferes with student learning, which can include the involuntary withdrawal of a student from a course with a grade of "W". For additional information, see NAU's *Disruptive Behavior in an Instructional Setting* policy at https://nau.edu/university-policy-library/disruptive-behavior.

NONDISCRIMINATION AND ANTI-HARASSMENT

NAU prohibits discrimination and harassment based on sex, gender, gender identity, race, color, age, national origin, religion, sexual orientation, disability, or veteran status. Due to potentially unethical consequences, certain consensual amorous or sexual relationships between faculty and students are also

prohibited as set forth in the *Consensual Romantic and Sexual Relationships* policy. The Equity and Access Office (EAO) responds to complaints regarding discrimination and harassment that fall under NAU's *Nondiscrimination and Anti-Harassment* policy. EAO also assists with religious accommodations. For additional information about nondiscrimination or anti-harassment or to file a complaint, contact EAO located in Old Main (building 10), Room 113, PO Box 4083, Flagstaff, AZ 86011, or by phone at 928-523-3312 (TTY: 928-523-1006), fax at 928-523-9977, email at equityandaccess@nau.edu, or visit the EAO website at https://nau.edu/equity-and-access.

TITLE IX

Title IX is the primary federal law that prohibits discrimination on the basis of sex or gender in educational programs or activities. Sex discrimination for this purpose includes sexual harassment, sexual assault or relationship violence, and stalking (including cyber-stalking). Title IX requires that universities appoint a "Title IX Coordinator" to monitor the institution's compliance with this important civil rights law. NAU's Title IX Coordinator is Elyce C. Morris. The Title IX Coordinator is available to meet with any student to discuss any Title IX issue or concern. You may contact the Title IX Coordinator by phone at 928-523-3515, by fax at 928-523-0640, or by email at elyce.morris@nau.edu. In furtherance of its Title IX obligations, NAU will promptly investigate and equitably resolve all reports of sex or gender-based discrimination, harassment, or sexual misconduct and will eliminate any hostile environment as defined by law. Additional important information about Title IX and related student resources, including how to request immediate help or confidential support following an act of sexual violence, is available at https://in.nau.edu/title-ix.

ACCESSIBILITY

Professional disability specialists are available at Disability Resources to facilitate a range of academic support services and accommodations for students with disabilities. If you have a documented disability, you can request assistance by contacting Disability Resources at 928-523-8773 (voice), 928-523-6906 (TTY), 928-523-8747 (fax), or dr@nau.edu (e-mail). Once eligibility has been determined, students register with Disability Resources every semester to activate their approved accommodations. Although a student may request an accommodation at any time, it is best to initiate the application process at least four weeks before a student wishes to receive an accommodation. Students may begin the accommodation process by submitting a self-identification form online at https://nau.edu/disability-resources/student-eligibility-process or by contacting Disability Resources. The Director of Disability Resources, Jamie Axelrod, serves as NAU's Americans with Disabilities Act Coordinator and Section 504 Compliance Officer. He can be reached at jamie.axelrod@nau.edu.

RESPONSIBLE CONDUCT OF RESEARCH

Students who engage in research at NAU must receive appropriate Responsible Conduct of Research (RCR) training. This instruction is designed to help ensure proper awareness and application of well-established professional norms and ethical principles related to the performance of all scientific research activities. More information regarding RCR training is available at https://nau.edu/research/compliance/research-integrity.

MISCONDUCT IN RESEARCH

As noted, NAU expects every student to firmly adhere to a strong code of academic integrity in all their scholarly pursuits. This includes avoiding fabrication, falsification, or plagiarism when conducting research or reporting research results. Engaging in research misconduct may result in serious disciplinary consequences. Students must also report any suspected or actual instances of research misconduct of which they become aware. Allegations of research misconduct should be reported to your instructor or the University's Research Integrity Officer, Dr. David Faguy, who can be reached at david.faguy@nau.edu or 928-523-6117. More information about misconduct in research is available at https://nau.edu/university-policy-library/misconduct-in-research.

SENSITIVE COURSE MATERIALS

University education aims to expand student understanding and awareness. Thus, it necessarily involves engagement with a wide range of information, ideas, and creative representations. In their college studies,

students can expect to encounter and to critically appraise materials that may differ from and perhaps challenge familiar understandings, ideas, and beliefs. Students are encouraged to discuss these matters with faculty.

Last revised August 1, 2021