Course Information

Course Number:	CSCE482
Course Title:	SENIOR CAPSTONE DESIGN
Credit Hours:	3
Section:	934
Time:	Tue/Thr 2:20 P.M. to 12:45 P.M. (Lecture) Tue/Thr 2:50 P.M. to 5:20 P.M. (Lab)
Location:	EABA 118

Instructor Details

Instructor:	Dr. Dylan Shell
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Office Hours:	Walk-ins: Wednesdays 2:00 P.M. to 3:00 P.M., Also: by appointment.

Course Webpage: *http://robotics.cs.tamu.edu/dshell/cs482*

Course Description

This is a project-based course focusing on skills for system integration in order to solve real-world problems in computer science. It involves a significant team software project that integrates advanced concepts across computer science specializations, requiring the whole process from design, implementation, documentation and demonstration, as well as establishing a design methodology, management process and team management. Emphasis is placed upon student's activities as design professionals.

Detailed Description

CSCE 482 is a project-oriented course aimed at developing system integration skills. Students work in groups of 3-4 people to complete a significant software engineering design project. Every project requires complete implementation, documentation and demonstration of a software system, which may also involve minor hardware too. The focus is not only on the final product but also on design methodology, management process and teamwork.

Each team will be required to manage its own efforts to complete its project in a timely manner. Group members will be required to keep individual lab notebooks recording their efforts and their

personal impressions of the project. Students will be graded based on both the quality of the group product and their individual contributions.

Every team will be required to schedule a weekly meeting with the course instructor and the TA, preferably during the official class or lab hours. These meetings must be attended by every group member. Since the projects will be student managed, the exact nature and style of these meetings is at the group's discretion. However, every member of the group is expected to participate. At the end of the semester, each group will make a public presentation describing and demonstrating their work. These presentations will be open to the university community and visitors from industry.

Course Pre- and co-requisites

Students must have completed CSCE315, or an equivalent course.

Course Objectives

To prepare students for engineering practice with a major design experience based on the knowledge and skills acquired in earlier course work and incorporating standards and realistic constraints that include most of the following considerations: economic; environmental; sustainability; manufacturability; ethical; health and safety; social; and political.

Course Learning Outcomes

It is expected that successful participation in the course will allow the student to demonstrate:

- *an ability to apply knowledge of mathematics, science, and engineering (3.a)*
- *an ability to design and conduct experiments, as well as to analyze and interpret data (3.b)*
- *an ability to design a system, component, or process to meet desired needs (3.c)*
- *an ability to function on multi-disciplinary teams (3.d)*
- *an ability to identify, formulate, and solve engineering problems (3.e)*
- *an understanding of professional and ethical responsibility (3.f)*
- *an ability to communicate effectively (3.g)*
- *an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice (3.k)*

Textbook and/or Resource Materials

Required:

Patric M. Lencioni, 2002, "The Five Dysfunctions of a Team: a Leadership Fable" Jossey-Bass. (Electronic copy available to all via the library.)

Recommended:

Ralph Ford and Chris Coulston, 2007, "Design for Electrical and Computer Engineers," McGraw-Hill Education.

Barry Hyman, 2003, "Fundamentals of Engineering Design," second edition, Prentice Hall.

Roger Pressman, 2009, "Software Engineering: A Practitioner's Approach," seventh edition, McGraw-Hill.

James Shore, 2007, "The Art of Agile Development," O'Reilly
(Electronic copy available to all via the library.)

Grading Policy

The final grade you will receive in the class will be based on points accumulated during the semester. Thus, both continued progress (the process) and the quality of your product (and other deliverables) will determine your grade. Although the majority of your grade (55%) is based on the performance of your team, individual performance will also be closely evaluated.

The grading scale is:

- *A 90-100*
- *B 80-89*
- *C 70-79*
- *D 60-69*
- *F 59 or below*

1. Project Proposal (10%)

These points will be based on the originality, quality and feasibility of the proposed work, the analysis of alternative solutions, the consideration of societal/economic/ethical aspects, and the project management approach, as reflected on your written proposal (75%) and oral presentation (25%). Examples of prior proposal reports and presentations are available on the course canvas page. Submission of the written document will be due 11:59 P.M.

2. Critical Design Review (10%)

The CDR is a mid-semester evaluation of your project. The grade will be based on your progress to date, and the quality of your oral presentation and accompanying report. Examples of prior CDR reports and presentations are available on the course canvas page. Submission of the written document will be due 11:59 P.M.

3. Final Communication (10%)

This grade will be based on the quality of the final presentation (25%), as well as the contents and professional finish of the documentation (75%). Final reports should have a discussion of constraints that the team had to satisfy (e.g., cost, time, technology limitations) and of relevant industry standards used (e.g., coding, interfaces, safety). This includes a video describing the project. Examples of prior final reports and presentations are available on the course canvas page. Submission of the written document will be due 11:59 P.M.

4. Project Grade: Final completion, Weekly Progress, and Team Effectiveness (25%)

A final grade will be assigned to your project based on the completion of all the objectives stated in the proposal, as well as on a live demonstration. The complexity of your project and the size of your team will be factored in. Due date: Project demonstrations will take place the last day of class of the week prior to final presentations. This earlier deadline ensures that teams have time to (i) thoroughly test and validate their systems after the demo, and (ii) prepare the final presentation.

The weekly progress part of this grade will be based on your team's ability to keep the project on schedule. The weekly report should be incremental, and should specifically address the following:

1. *An **agenda for the meeting** with the instructor/TA*
2. *Any **major accomplishments** during this time period, including figures and results*
3. *The **team's goals** for the following week*
4. *An update on project management, including teamwork, purchases, schedule and milestone status*
5. ***Minutes** of the previous meeting*

Weekly progress reports are due 1:30 P.M. the day of the weekly meeting. This is due only for those weeks in which a meeting is held. The responsibility of preparing these reports will be rotated among team members. The team member preparing the report will also be in charge of facilitating the discussions during that weekly meeting, and preparing an action list for the following week.

It is very important to understand that accomplishing the technical objectives of the project is not sufficient. These accomplishments should not come at the expense of destroying relationships among team members. Thus, a grade will be assigned based on the ability of the group to function as a team. Is there evidence that the group engaged in team building activities? Were contributions to the project evenly distributed? Were members equally engaged in discussions during meetings? Was there an effective division of responsibilities?

5. Individual Performance (45%)

Points in this category are based on assessment of your personal contribution to the project and team-effort:

a) Personal Design and Implementation Contributions (35%)

You are required record what YOU do as a member of the project. This can be done in virtual form, via software version control comments and notes/commentary on the log. An example of a commentary of a git log is provided on the canvas webpage; this may need to be supplemented with extra documentation (e.g., showing sketches and design alternatives explored which did not make it into the final project).

A grade will be assigned to your personal contribution and logs of your design and implementation effort based on:

i. The regularity of your entries throughout the semester.

ii. The evidence of an engineering design process, including but not limited to schematics, ER diagrams, flow-charts, pseudo-code, tables of experimental results, and mathematical derivations.

iii. The clarity, legibility and organization of your annotations and commentary.

b) Participation (5%) (and potentially Team Dysfunctions exercise)

The instructor and TA will evaluate your attendance to meetings, participation in the discussions, and contributions to the team. Team leaders will be evaluated on their efforts to facilitate group operation as an effective team.

Location: Unlike some other capstone offerings, we do not insist on work being done in the lab; what matters is that the team worked cohesively. Your group is expected to be present in the lab on the group's respective meeting day (typically exclusively Tuesday or Thursday), as well as the presentation and CDR presentation days.

c) Peer Review (4%)

Your performance will be evaluated by each of your team members throughout the semester. (Dates appear in the table below.)

d) Ethics Module (1%)

This is a canvas model and is to be completed on your own some time before the final submission.

Furthermore, the instructor reserves the right to impose a grade penalty if a member is seen to actively undermine their group.

Any academic misconduct in this course will result in a grade of F.*

Note: Grades will not be assigned until all project deliverables have been turned in (see below), all borrowed items (e.g., keys, books, equipment) have been returned to their proper location or their owner, and the the space in EABA 118 returned to state resembling its initial condition. All team members are required to be present at the time of the final delivery.

Final Deliverables:

1. The final report provided in hardcopy.
2. A shared drive that includes the following (please organize into folders, e.g., Docs, Source, Hardware (if applicable), Media, References, Freeware)
   a) Designs: the final version of the code, documentation (APIs, internal support document, user-guide, help files), data, freeware software tools, etc.
   b) Reports: proposal, CDR, weekly reports, final report, and ALL presentations.
   c) Audiovisual media: a ±40 second project overview video as well as a high-quality video demonstration of the system working.
3. Final hardware prototype, if appropriate, as well as any spare parts and supplies.
4. Software install, if appropriate, to be demonstrated on multiple machines.
5. The final peer review
6. Evidence of individual design contributions

Document Preparation

All major documents (technical survey, proposal, CDR, and final documentation) should be submitted in a professional form. This includes containing a title page, an outline, as well as clear section and subsection headings, etc. The final report should be bound. Students are strongly encouraged to submit documents typeset in LaTeX. Proofread and run a spell check before submission! (Note the opportunities for extra-credit through use of the UWC, mentioned below.)

Use of AI tools, including ChatGPT, is permitted for students wishing to use them. To be consistent with TAMU's scholarly values, students must cite any AI-generated material that informed their work and use quotation marks or other appropriate indicators of quoted material when appropriate. Here is an example of attribution language: "The author generated this text in part with GPT-3, OpenAI's large-scale language-generation model. Upon generating draft language, the author reviewed, edited, and revised the language to their own liking and takes ultimate responsibility for the content of this publication." *When substantial parts of the reports were generated, the relationship between those sections and student contributions should be discussed by providing additional documentation to accompany the report submission. For purposes of grading, students may need to defend the against criticism that your human-authored contributions are limited; this may require, for instance, providing details of the prompts provided, and/or video recordings showing your interactions with the AI tools. Students may be asked to indicate how AI tools informed their process and the influenced final product, including how you validated any AI-generated citations, which may be invented by the AI. Claims that have a factual basis and which AI tools have extracted from other sources, should not be cited merely as attributed to the tool, but require the follow-up work to (1) verify they were not hallucinated, and (2) to make a proper attribution. Specifically* , "With a current US population of 330 million (ChatGPT-4.0), the need for X, Y, Z…" *is not adequate.*

Attendance Policy

Not attending weekly meetings harms the other members of your group and makes it much more difficult for the instructor and TA to assess your contributions to the group effort. Therefore, attendance, punctuality and active participation in the weekly meetings are strict requirements. Failure to attend a meeting or late arrivals (more than 5 minutes late) will be reflected in the participation portion of your individual grade. Emergencies, however, do happen. Lateness or absence can be excused if there is a valid reason. Illness, job interviews out of town, death in the family, inclement weather or accidents for commuters, etc., are valid reasons. Oversleeping, a term paper due, an exam to cram for, etc., are not valid reasons. Ultimately, the instructor reserves the right to determine what constitutes a "valid reason" on a case by case basis. If you know you're going to be late or miss a class, please let the instructor and your teammates know, so that they may plan for your absence and make the best use of their time. Attending the career fair is not a basis for missing class.

Late Work Policy

- *Work is expected to be completed by the due date. Occasionally the instructor may permit an extension to the deadlines, but those extensions will apply to every student equally. Standard university reasons for lateness shall be respected so long as the student communicates with the instructor as soon as possible—this means, specifically, it has been communicated before the deadline has passed and not ex post facto.*

Course Schedule

Week-by-week topic breakdown

Date	Topic	Material Due
20th Aug	*Course Overview and Introductions*	*Résumés*
22nd Aug	*Kick-off Lectures*	*Questionnaires (in-class)*
27th Aug	*Kick-off Lectures (cont.)* [Teams formed]	
17th Sept	*Proposal Presentations (Tues)*	
19th Sept	*Proposal Presentations (Thurs)*	
24th Sept	*Document preparation: No scheduled meeting (Tues)*	
26th Sept	*Document preparation: No scheduled meeting (Thurs)*	*Proposal Documents*
1st Oct		*Peer Review I*
8th Oct	Fall break Holiday (Tues)	
10th Oct	No scheduled meeting (Thurs)	
17th Oct		*Peer Review II*
22nd Oct	*CDR Presentations (Tues)*	
24th Oct	*CDR Presentations (Thurs)*	
29th Oct	*Document preparation: No scheduled meeting (Tues)*	
31st Oct	*Document preparation: No scheduled meeting (Thurs)*	*CDR Documents*
9th Nov		*Peer Review III*
26rth Nov	*Project Demos*	*Live Demonstration*
28rth Nov	Thanksgiving Holiday (Thurs)	
3rd Dec†	*Industry Panel Evaluation (Reading day: Tuesday)*	*Final Presentation*
10th Dec	*Check out (before 5pm) (Final slot: Tuesday)*	*Final Report, deliverables*

† Note: this date is subject to change depending on finalization by the CSCE department.

University Writing Center

The University Writing Center (UWC) has trained peer consultants available to work with you on any kind of writing or speaking project, including research papers, lab reports, application essays, or creative writing, and at any stage of your process, whether you're deciding on a topic or reviewing your final draft. You can also get help with public speaking, presentations, and group projects. We can work with you in person at our Evans or BLCC locations or via Zoom or email. To schedule an appointment or to view our handouts, videos, or interactive learning modules, visit writingcenter.tamu.edu. If you have questions, need help making an appointment, or encounter difficulty accessing our services, call 979-458-1455 or email uwc@tamu.edu.

For presentations and submitted reports (the proposal, CDR, and final report) you can obtain 15% extra-credit on each of these elements by providing evidence of having used the UWC to improve your draft. (For instance, showing a before and after, with evidence of their input.)

[Boilerplate required sections appear below.]

University Policies

Attendance Policy

The university views class attendance and participation as an individual student responsibility. Students are expected to attend class and to complete all assignments.

Please refer to Student Rule 7 in its entirety for information about excused absences, including definitions, and related documentation and timelines. Please pay careful attention: an interview is only considered an excused absence in very particular circumstances, which tend to happen very rarely for CS jobs.

Makeup Work Policy

Students will be excused from attending class on the day of a graded activity or when attendance contributes to a student's grade, for the reasons stated in Student Rule 7, or other reason deemed appropriate by the instructor. In cases where the decision is at the instructor's discretion, the likelihood of an accommodation/makeup is directly related to whether the student communicates with the instructor as soon as possible; requests for foreseeable absences that are made only after the absence will not be granted.

Please refer to Student Rule 7 in its entirety for information about makeup work, including definitions, and related documentation and timelines.

Absences related to Title IX of the Education Amendments of 1972 may necessitate a period of more than 30 days for make-up work, and the timeframe for make-up work should be agreed upon by the student and instructor" (Student Rule 7, Section 7.4.1).

"The instructor is under no obligation to provide an opportunity for the student to make up work missed because of an unexcused absence" (Student Rule 7, Section 7.4.2).

Students who request an excused absence are expected to uphold the Aggie Honor Code and Student Conduct Code. (See Student Rule 24.)

Academic Integrity Statement and Policy

"An Aggie does not lie, cheat or steal, or tolerate those who do."

"Texas A&M University students are responsible for authenticating all work submitted to an instructor. If asked, students must be able to produce proof that the item submitted is indeed the work of that student. Students must keep appropriate records at all times. The inability to authenticate one's work, should the instructor request it, may be sufficient grounds to initiate an academic misconduct case" (Section 20.1.2.3, Student Rule 20).

You can learn more about the Aggie Honor System Office Rules and Procedures, academic integrity, and your rights and responsibilities at aggiehonor.tamu.edu.

Americans with Disabilities Act (ADA) Policy

Texas A&M University is committed to providing equitable access to learning opportunities for all students. If you experience barriers to your education due to a disability or think you may have a disability, please contact Disability Resources in the Student Services Building or at (979) 845-1637 or visit disability.tamu.edu. Disabilities may include, but are not limited to attentional, learning, mental health, sensory, physical, or chronic health conditions. All students are encouraged to discuss their disability related needs with Disability Resources and their instructors as soon as possible.

Title IX and Statement on Limits to Confidentiality

Texas A&M University is committed to fostering a learning environment that is safe and productive for all. University policies and federal and state laws prohibit gender-based discrimination and sexual harassment, including sexual assault, sexual exploitation, domestic violence, dating violence, and stalking.

With the exception of some medical and mental health providers, all university employees (including full and part-time faculty, staff, paid graduate assistants, student workers, etc.) are Mandatory Reporters and must report to the Title IX Office if the employee experiences, observes, or becomes aware of an incident that meets the following conditions (see University Rule 08.01.01.M1):

- The incident is reasonably believed to be discrimination or harassment.
- The incident is alleged to have been committed by or against a person who, at the time of the incident, was (1) a student enrolled at the University or (2) an employee of the University.

Mandatory Reporters must file a report regardless of how the information comes to their attention – including but not limited to face-to-face conversations, a written class assignment or paper, class discussion, email, text, or social media post. Although Mandatory Reporters must file a report, in most instances, you will be able to control how the report is handled, including whether or not to pursue a formal investigation. The University's goal is to make sure you are aware of the range of options available to you and to ensure access to the resources you need.

Students wishing to discuss concerns in a confidential setting are encouraged to make an appointment with Counseling and Psychological Services (CAPS).

Students can learn more about filing a report, accessing supportive resources, and navigating the Title IX investigation and resolution process on the University's Title IX webpage.

Statement on Mental Health and Wellness

Texas A&M University recognizes that mental health and wellness are critical factors that influence a student's academic success and overall wellbeing. Students are encouraged to engage in proper self-care by utilizing the resources and services available from Counseling & Psychological Services (CAPS). Students who need someone to talk to can call the TAMU Helpline (979-845-2700) from 4:00 p.m. to 8:00 a.m. weekdays and 24 hours on weekends. 24-hour emergency help is also available through the National Suicide Prevention Hotline (800-273-8255) or at suicidepreventionlifeline.org.