Texas A&M University
Department of Computer Science and Engineering
CSCE 483: Senior Capstone Design
Spring 2017

Section 501: MW	9:10 AM- 9:35 AM		SCTC 317 (Lecture)
	9:40 AM-12:10 PM		HRBB 218 (Lab)
Section 502: MW	9:10 AM-9:35 AM		SCTC 317 (Lecture)
TR	5:15 PM-7:25 PM		HRBB 218 (Lab)

Instructor:	Rabi N. Mahapatra, rabi at tamu dot edu, 520BA HRRB, 845-5787
TAs:	Hsin-Min Cheng, dora90474 at tamu dot edu, (Section: 501)
	Brandon West, zenithwest at tamu dot edu, (Section 502)
URL:	http://courses.cs.tamu.edu/rabi/csce483/

Catalog Description
Engineering design; working as a design-team member, conceptual design methodology, design evaluations, total project planning and management techniques, design optimization, systems manufacturing costs considerations; emphasis placed upon student's activities as design professionals. Prerequisites: CSCE 315 and 462 and senior classification.
NOTE: concurrent enrollment with CSCE 462 is not allowed.

Textbook and references

Required
- *The Five Dysfunctions of a Team: a Leadership Fable,* by Patrick M. Lencioni (Jossey-Bass, 2002)
- Design for Electrical and Computer Engineers, by Ralph Ford and Chris Coulston (McGraw-Hill Science, 2007)

Recommended
- *Stuff You Don't Learn in Engineering School: Skills for Success in the Real World,* by Carl Selinger, (IEEE Press, 2004).
- *The Wisdom of Teams: Creating the High-Performance Organization*, by Jon R. Katzenbach and Douglas K. Smith, Collins (2003). Available on-line at TAMU Libraries.

Supplemental
- Technical material from the literature, manufacturer's datasheets and user manuals.

Detailed Course Description
CSCE 483 is a project-oriented course aimed at developing system integration skills. Students work in groups of 4-5 people to complete a significant engineering design project. Every project requires complete implementation, documentation and demonstration of a computing system design with both hardware and software components. The focus is not only on the final product but also on design methodology, management process and teamwork.

Each team is required to manage its own efforts to complete its project in a timely manner. Group members are required to keep individual lab notebooks recording their efforts and their personal impressions of the project. Students are graded based on both the quality of the group product and their individual contributions.

Every team is required to schedule a weekly meeting with the course instructor and the TAs, 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 are open to the university community.

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 engineering standards and realistic constraints that include most of the following considerations: economic; environmental; sustainability; manufacturability; ethical; health and safety; social; and political.

Expected 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)

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 bulk of your grade is based on the performance of your team, individual performance will also be gauged.

1. **Project Proposal (15%):** These points will be based on the originality, quality and feasibility of the proposed work, the analysis of alternative solutions, the consideration of economic and societal aspects, and the project management approach, as reflected on your written proposal (75%) and oral presentation (25%). *A template[1] for the proposal report and a presentation rubric are available on the course webpage.*

2. **Weekly Progress (10%):** This grade will be based on your team's ability to maintain the project on schedule. Each team submits a weekly report, which should be incremental and should specifically address the following:

    a. Agenda for the weekly meeting with the instructor and the TA

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[1] *Written documents must comply with the exact formatting of the template (fonts, sizes, spacing, etc.); documents that do not meet the formatting requirements of the template will be returned without review and will accrue a 10-point penalty per day. This requirement applies to the project proposal, CDR and final report.*

b. Team's accomplishments during this period. Accomplishments need to be measurable, e.g. "did more research on such and such" is not an accomplishment, it is an activity (and a loosely defined one).

c. Team's goals for the following week (individual tasks are entered on basecamp)

d. Minutes from the previous meeting

Weekly progress reports are due at 8AM on the day of the weekly meeting. Reports are limited to one page and should be submitted according to the template provided in the course website. The *team leader* will be responsible for submitting these reports and leading the discussion during the weekly meeting. One of the team members, acting as a *scribe*, will be responsible for generating the meeting minutes throughout the semester.

3. **Critical Design Review (10%)**: The CDR is a mid-semester evaluation of your project. The CDR grade will be based on the quality of your design (75%) –as reflected on your oral/poster presentation and written report, and on the degree to which you have a complete design (25%). *A template[1] for the CDR report and a presentation rubric are available on the course webpage.*

4. **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). *A template[1] for the final report and a presentation rubric are available on the course webpage.*

5. **Project Grade (20%):** 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 in front of the class. 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.

6. **Team work (5%):** 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?

> Note: the work should be done primarily in the lab and as a group, regardless of whether you can perform your task assignments individually elsewhere. Being physically present in the same room encourages collaboration and equal distribution of workload. A regular work schedule should be included in the proposal, showing the times when the team will meet in the lab to work on the project (in addition to meeting times).

7. **Individual Performance (30%):** Points in this category are awarded based on assessments of your personal contribution to the team efforts:

a. Notebook (10%): You are required to maintain an *individual* design notebook to collect any information relevant for the project, including ideas, references,

designs, and discussions. Your notebook will be graded based on:

(1) the evidence of engineering design (e.g., sketches, block diagrams, schematics, pseudo-code, experimental results, formal derivations),

(2) the regularity of your entries during the semester, and

(3) the organization of your notebook

We will use the Evernote software tool to maintain the notebooks. For an entry (a note in Evernote parlance) to be considered valid, it must have tags and comments added to it; notes without tags and/or comments will be ignored.

Participation (10%): The instructor and TAs will evaluate your attendance to meetings, participation in the discussions, and contributions to the team. Each student is also required to pass a teamwork quiz with a score of 75 or higher (see tentative schedule); failure to do so will result in a 5% penalty on the final grade.

b. Peer Review (10%): Your performance will be evaluated by each of your team members throughout the semester. Peer reviews should be submitted to the TA no later than 8AM of the due date. Late submissions will NOT be accepted.

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 workstations in the lab have been thoroughly cleaned up. All team members are required to be present at the time of the final delivery.

Final deliverables

1) Bound hardcopy of the final documentation

2) CDROM including the following (please organize into folders, e.g., Docs, Source, Hardware, Media, References, Freeware, etc.)
   a) Designs: code, schematics, data, data sheets, freeware software tools, etc.
   b) Reports: proposal, CDR, weekly reports, final report, and ALL presentations
   c) Audiovisual media: close-up pictures of your system and a high-quality movie demo of the system working, for posterity (see gallery in the course webpage for movie samples)
   d) Individual notebooks (in digital form)

3) Final prototype, as well as any spare parts and supplies

4) Software install, to be demonstrated on several machines

5) Peer reviews

Purchases and Reimbursements

Please ensure that purchase order (PO) forms submitted to the department are accurate. Submitting a PO with incomplete specifications or backordered items increases the workload for our accounting staff and causes unnecessary delays to your team. Submitting an incomplete PO will result in the team being prevented from submitting additional POs; from that point on, all additional purchases will have to be made by team members themselves and will be reimbursed at the end of the semester.

Please verify that items are in stock before submitting a PO, and provide alternative vendors if an item is likely to go out of stock (e.g., if the vendor only has a few units left). If you suspect that a critical item may become backordered, it may be better if you purchase it directly since

POs may take several days to go through.

Finally, please do not submit POs for small purchases (less than $50); for small orders, it is better you make the purchase upfront and then submit a reimbursement to the department.

Reimbursement requests are due at the time of final deliverables. To minimize overhead on our accounting staff, we will only reimburse up to five purchase orders (of your choice); this policy also encourages teams to plan their purchases in advance. Overnight or express delivery will not be reimbursed, unless approved in advance by the instructor. Reimbursement of sales taxes is not allowed by the university; please make sure to bring tax-exempt forms with you whenever you make local purchases (or purchases within the state).

Document preparation

All major documents (proposal, CDR, and final documentation) should be submitted in a professional format (e.g., spiral-binding), and should contain a title page, an outline, as well as clear section and subsection headings, etc. Please use the templates available in the course website. Please run a spell check before submitting.

Attendance Policy

Not attending weekly meetings harms the other members of your group and makes it much more difficult for the instructor to assess your contributions to the group effort. Therefore, attendance, punctuality and active participation in the weekly meetings are required. Failure to attend a meeting or late arrivals (more than 10 minutes late) will be reflected in 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 are 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.

Scholastic Dishonesty

Please review Section 20 of the TAMU Student Rules (http://student-rules.tamu.edu) for a list of examples of scholastic dishonesty. In particular, be aware of the issues of *plagiarism* and *fabrication of information*. The use of existing software implementations or hardware designs should be discussed with the instructor prior to being incorporated into the project. Proper credit must be given to the original source of concepts, designs, software, technical documents, scientific literature, etc.

ADA Statement

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, currently located in the Disability Services building at the Student Services at White Creek complex on west campus or call 979-845-1637. For additional information, visit http://disability.tamu.edu.

Course schedule and milestones

Week	Date	Lectures	Events	Materials due
1	1/18	Introduction	Entrance survey	
2	1/23	L0:Class introduction L1: Engineering design L2: Needs identification L3: Requirements specification		
	1/25	Video: The deep dive L4: Concept generation L5: Functional decomposition		
3	1/30	Video: The ABT template L6: Behavioral models	Teamwork quiz	
	2/1	L7: Testing		
4	2/6	L9: Teamwork		
	2/8	L10: Project management		Problem statement
5	2/13	L11: Ethical and legal issues		
	2/15	L12: Oral presentations		Requirements specification
6	2/20			
	2/22			
7	2/27			
	3/1		Proposal presentations	Project proposal; PR1
8	3/6		Proposal presentations	Project proposal; PR1
	3/8			
9	3/13		Spring Break	
	3/15		Spring Break	
10	3/20			
	3/22			
11	3/27		CDR presentations	CDR; PR2
	3/29		CDR presentations	
12	4/3			
	4/5			
13	4/10			
	4/12			
14	4/17			PR3
	4/19			
15	4/23			
	4/25		Project demos	Demo
16	4/30			
	5/1		Final presentation*	Executive summary
17	5/6		Check out (8:00-10:00AM	PR4; final report; deliverables

*Tentative date (subject to modification)