The University of Texas at Tyler
Department of Mechanical Engineering

MENG 4315 – Senior Design II

Credits: 0 hours lecture, 9 hours design studio per week

Instructor: Chung-Hyun Goh, Ph.D., Assistant Professor of Mechanical Engineering

Text(s): none
Additional Material: none

Course Information

Catalog Description: The senior design project, which was begun in MENG 4115, continues to completion. This major capstone design project builds on previous course work, includes all stages of the design process, and takes into account a variety of realistic constraints, such as manufacturability and sustainability; economic factors; and environmental, safety, and reliability issues. Preparation and presentation of final oral and written reports are required. The design project may be a team effort and may be defined in conjunction with industry

Prerequisites: MENG 4115

Required, Elective, Selected: Required

Course Goals

Instructional Outcomes: By the end of this course students will be able to:

1. Produce a design solution meeting design specifications, appropriate codes and standards, and multiple realistic constraints.
2. Use engineering techniques, skills, and tools including computers to identify and solve design-related problems.
3. Evaluate alternative design solutions using various socio-economic measures, e.g., business practice, economic, and quality of life.
4. Apply relevant aspects of professional codes of ethics when considering possible alternative decisions.
5. Generate an artifact of the design that may be a functioning prototype or a significant module of the prototype.
6. Devise and conduct tests to evaluate the performance of the artifact or prototype(s).
7. Analyze and report the results of performance testing of the artifact or prototype(s).
8. As a team member, plan, prepare and deliver well-organized, logical oral presentations.
9. As a team member, produce the project final design report using appropriate format, grammar, mechanics, and professional graphics.

10. Write periodic progress reports of their individual contributions to the design team activity.
11. Collect, analyze, and evaluate new information from external sources

Relationship to Student Outcomes: This course supports the following Mechanical Engineering Program Student Outcomes, which state that our students will:

1. be able to apply science, mathematics, and modern engineering tools and techniques to identify, formulate, and solve engineering problems
2. be able to design thermal/fluid, mechanical, and electro-mechanical components or systems, individually or on interdisciplinary teams, and effectively communicate those designs in both technical and non-technical forums
3. be able to collect, analyze, and interpret data from prescribed and self-designed experimental procedures and formally communicate the results
4. be able to apply a broad-based educational experience to understand the interaction of engineering solutions with contemporary business, economic, and social issues
5. recognize that ethical behavior and continuous acquisition of knowledge are fundamental attributes of successful mechanical engineering professionals

Topics Covered

- Working to Specifications
- Assessing Needed Computation
- Executing Computation and Quality Assurance Checking
- Obtaining and/or Executing Fabrication and assembly
- Prototype Testing and/or Demonstration
- Reports
- Presentations

Prepared By: T. E. Crippen Date: July 28, 2009

MENG 4315: Senior Design II
Spring 2019

Class Meetings: MWF 2:00 - 4:45 pm; RBN 2007

Date	Day	Activity	Deliverable
Jan. 16	**W**	**General Meeting (2:00); Review Semester Schedule**	
Feb. 1	F		Submit peer evaluations for Design Review 1
Feb. 4	M	Design review 1:	See below for design review deliverables
Feb. 6	W	Design review 1:	
Feb. 8	F	Design review 1:	
Feb. 13	W	**General Meeting (2:00); Oral progress reports**	
Feb 22	F		Submit peer evaluations for Design Review 2
Feb. 25	M	Design review 2:	See below for design review deliverables
Feb. 27	W	Design review 2:	
Mar. 1	F	Design review 2	
Mar. 6	W	**General Meeting (2:00); Oral progress reports**	
Mar 11 – 15 M – F Spring Break			
Mar. 29	F		Submit peer evaluations for Design Review 3
Apr. 1	M	Design review 3:	See below for design review deliverables
Apr. 3	W	Design review 3:	
Apr. 5	F	Design review 3:	
APR 5	**F**	**Prototypes completed/ready for testing**	**Working prototype**
Apr. 10	W	**General Meeting (2:00); Oral progress reports**	
Apr. 12	**F**	**General Meeting (2:00); Drafts of FDR**	Drafts: FDR – for review
Apr. 15	M		Poster draft – for review
Apr. 26	**F**	**EXPO for Industry Panelists and Faculty (2:00 - 4:45)**	Posters
Apr.. 26	F	Peer Evaluation for FDR	By 5:00 PM
May 1	**W**	**Time: 3:00 PM** Course Wrap Up; Course Evaluations	Final Design Reports, Video, Design Notebooks, end-or-course / Peer Evaluation

Design reviews

There are three weeks of design reviews in Senior Design II as indicated in the table below. **Peer evaluations** (using the form provided) are required prior to each design review. **All** peer evaluations are due **by 5PM** on the dates indicated.

Design Review	Design Review dates (MWF)	Peer evaluations due
1	Feb. 4, Feb. 6, Feb. 8	Friday, Feb. 1
2	Feb. 25, Feb. 27, Mar. 1	Friday, Feb. 22
3	Apr. 1, Apr. 3, Apr. 5	Friday, Mar. 29

Each team is assigned a time slot for Design Review 1 as below. The slots will be rotated for each Design Review.

Review Time	Monday	Wednesday	Friday
2:00 – 2:45 PM	RWTD	SDC	Reserve
2:45 – 3:30 PM	Airflow Capture Hood	SAE Baja	Reserve
3:30 – 4:15 PM	Patient Transfer	Hydronic System	Reserve
4:15 – 5:00 PM	H20 Belt	HPVC	Reserve

Note that each design review will START promptly at the indicated time. The design team will need to assemble in **RBS 2024** during the time allotted between reviews and **BE READY TO START ON TIME**. There is only a short 5-minute period between reviews during which one team must vacate the room and the next team move in and prepare to present.

Progress report memoranda (using the template provided) are to be submitted *prior* to the design review **by 5PM** on the dates specified in the following schedule:

Design review	Day of design review	Progress report due
1	Monday, Feb. 4	Monday, Feb. 4
1	Wednesday, Feb. 6	Monday, Feb. 4
1	Friday, Feb. 8	Monday, Feb. 4
2	Monday, Feb. 25	Friday, Feb. 22
2	Wednesday, Feb. 27	Friday, Feb. 22
2	Friday, Mar. 1	Friday, Feb. 22
3	Monday, Apr. 1	Friday, Mar. 29
3	Wednesday, Apr. 3	Friday, Mar. 29
3	Friday, Apr. 5	Friday, Mar. 29

Design Review Deliverables

Bring the following to each design review:

1. **One signed hard copy** of your progress report plus Gantt chart showing progress to date;
2. Individual **design notebooks**;
3. **Copies of notes** from preceding design reviews
4. **Blank design review form** for taking notes during the design review (see note 1 below);
5. **Supporting analyses or drawings** (electrical schematics, CAD / FEM work, simulation results) as necessary;
6. **Vendor data or specification sheets** (if applicable);
7. **Completed subsystems** (if applicable);
8. **Updated design report** (see note 2 below).

[1] The design review form may be filled out by hand during the design review and transcribed later for inclusion in the subsequent progress report, *or* the design review form may be filled out directly in digital form with a laptop computer.

[2] At the first design review, each team is to bring its Primary Design Document (PDD) with any changes required after its review in Senior Design I. At subsequent design reviews, the PDD should be updated as needed for the FDR to address issues from previous design reviews and reflect progress made since the preceding design review.

Oral Progress Report *(in the General Meeting)*

Consider the following factors to each design team:

1. **15 minutes oral presentation** of your progress to date – Explain the following things to other teams;
   What the project is; where the team is (current status); what accomplished so far, any problems; future schedule, etc.;
2. Submit two-page progress report at which key contents will be introduced and discussed in the oral presentation;
3. Submit the design review note which is completed in the design review process;
4. Show your **accomplishment** of design project in the presentation;
5. You don't have to prepare for **PowerPoint presentation**, but you can use it for showing the **pictures** if necessary;
6. **All members** should participate in the presentation for their **individual credits;**
7. Bring **the oral progress report evaluation form** individually (no submission with other forms will be allowed);
8. **Attendance/participation** will be considered as a part of **instructor evaluation factor** in the semester grade.

4315 Semester Grade Components

Team Grade Component	%	Individual Grade Component	%
Design reviews	30	Design notebook	5
Final design report	25	Attendance / Participation (in general meetings)	10
Industry (external evaluator) evaluation	20		
Poster	10		
MAXIMUM TEAM GRADE	**85**	**MAXIMUM INDIVIDUAL GRADE**	**15**

SEMESTER GRADE = TEAM GRADE x Peer / Instructor Evaluation Factor + INDIVIDUAL GRADE

The instructor evaluation factor may include a number of considerations applied at the discretion of the instructors. Examples include (but are not limited to) the following:

- Did the team complete its project in sufficient time to do meaningful testing?
- Were adequate records (design notebooks) kept of the progress of the project?
- Did the team manage its material and time resources well?
- Did the team function professionally?
- Did the individual team member make meaningful contributions to the project?
- Did all team members attend design reviews and general meetings?
- Did each team member perform professionally?

Design Reviews: Each design review includes group assignments of written report, progress report, and oral presentation results. Grading factors are considered on the written report (60%), progress report (10%), and oral presentation results (30%).

Attendance/Participation: Students' attendance and participation in the class/presentation can be also considered as a part of **instructor evaluation factor** in the semester grade.

Design notebooks: Design notebooks are *required* at design reviews. Be certain to include for each new entry a statement of purpose (e.g., "Determination of stresses in support brackets," "Measurement of antenna standing-wave ratio"). Each notebook page must be dated, signed and witnessed.

Grading Policies

Assessment and Measurement:

The students will be evaluated on the basis of performance on the assigned reports and presentations, industry evaluation, and class participation. A percentage of total points possible determine the course grade.

90 – 100	A
80 – 89	B
70 – 79	C
60 – 69	D
0 – 59	F

Course Structure:

20 points	Design reviews (three design reviews and oral progress reports)
25 points	Final Design Report (FDR)
20 points	Industry evaluation
10 points	Poster
10 points	Video of poster / prototype presentation
10 points	Class Participation (in general meetings) / attendance
5 points	Design notebook

Total Possible Points: **100 points**

Design Reviews:

There are three weeks of design reviews and oral progress reports in the general meeting (on Wednesday in the following week of each design review). Each design review (using a progress report template) and oral progress report[1] (design review note and two-page progress report) will have 15 points and 5 points, respectively. Total points obtained from three design reviews and oral progress reports will be converted to 20 points out of 100 points in the final grade consideration.

[1] Class participation in the oral presentation will be separately considered for the participation (5 points in the final grade).

Classroom Participation / Attendance:

Students must actively participate in general meetings and attend the class on time for full points. The following rubric will be employed to assign participation points. They will be added up in the final and the accumulated points will be converted into total 5 points out of 100 points for the final grade consideration.

Preferred (4 pts)	**Acceptable** (3 pts)	**Won't ask you to leave** (2 pts)	**May ask you to leave** (1 pt)	**Will ask you to leave** (0 pt)
Arrives on time or no more than 5 min. late Comments are relevant and reflect understanding and good participation Clear enthusiasm	Arrives no more than 10 min. late Comments are mostly relevant, but understanding may be slightly lacking Not overly enthusiastic, but positive	Arrives no more than 15 min. late Comments are minimal and demonstrate poor preparation Demeanor is sluggish	Arrives more than 15 min. late No comments are made Sleeping, texting, disengaged	Absent Disruptive or rude comments are made Drawing others into disrespectful behaviors (showing texts, passing notes, hanging around during the class, etc.)

Peer Evaluation:

There are four peer evaluations (Design review I, II, III, and Final Design Report). All peer evaluations are due by 5 PM on the dates indicated in the first page. Each evaluation will be individually assigned for 5 points and these points will be added to the participation scores in the final grade consideration. The results of peer evaluation will be multiplied to the team grade for each individual score with the following four level differences: A (100%), B (95 %), C (90%), D (85 %)

Design Reviews / Final Design Report:
The rubric below will be used to assess the report.

Excellent (8 -10 pts)	**Good** (5 – 7 pts)	**Fair** (2 – 4 pts)	**Poor** (0 – 1 pt)
Includes analysis or synthesis of course materials, personal experiences, and/or scholarly works. Includes citations to external materials of high academic quality (e.g., peer-reviewed). Thoughtful, academic, stimulating. Pertinent to the course	Usually includes analysis or synthesis of course materials, personal experiences, and/or scholarly works. Citations are of mixed quality (some academic, some less academic). Pertinent to the course	Significant amount of course material copied or repeated from the course OR copied from external sources without considering through analysis or synthesis. Citations are of mixed quality-high dependence on corporate websites or the like. Loosely pertinent to the course	No evidence of cognitive processing of course material or analyzing own experience through the lens of the course content. Not directly relevant to the course. Poorly organized. Poor or no citations given.

Grade Appeal Procedure

A student who wishes to contest a grade given by an instructor must initiate the procedure by contacting the instructor who assigned the grade. The instructor and the student should informally review the criteria for assignment of grades and the student's performance. The instructor may affirm the grade or revise the grade.
If the student is not satisfied after the informal discussion with the instructor, then the student may initiate a formal grade appeal by completing a Grade Appeal Form that may be obtained from the Office of Student Records. Normal grade appeals should be filed at the earliest date possible, but no later than six months from the final date of assignment. The instructor and the student should complete the appropriate parts of the form clearly indicating the instructor's rationale for the grade given and the student's basis for the grade appeal.
At each administrative level of the appeal process, an attempt will be made to resolve the issue. If the instructor holds one of the administrative positions used in the appeal process, then that level is omitted. If no resolution is reached at a particular level, then the appeal is forwarded with the recommendation of the administrator at that level with all documentation.
If the appeal is to be considered by the vice president for academic affairs, then a copy of the Grade Appeal Form shall be forwarded by the academic dean of the students. The Office of the President is the final step in the appeal process at The University of Texas at Tyler.

Food and Drink in Classrooms

Consumption of food and drink in university classrooms is prohibited.

Note: This course outline is subject to change based on the needs of the class.