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2018

Senior Design I

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BME45000: Senior Design I, Fall 2018

This documents contains only the *partial* class schedule, deadlines (including milestones), and grade compositions. Students should refer to additional hand-out/web material and instructor in-class instructions for *additional* assignments/deadlines. Deadlines may involve a presentation to the entire class, individual group presentation to course instructors. Deadlines are subject to change at the instructor's discretion. This document also introduces class safety, cleanliness, and security rules.

LABS & LECTURES: Tuesdays 11:00-1:50PM   BME45000
      Class meets in room Shepard Hall-17   3 Credits CODE 22522 & 22541

INSTRUCTORS:

Professor A. Carriero	Professor L. Cardoso
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BME, ST-403C	BME, ST-565
212.650.7591	212.650.7154

LAB TECHNICIAN: Dr. Zhiyong Qiu   qiu@ccny.cuny.edu   BME, ST-430 x7216
TEACHING ASSIST: TBD (Carriero)
      Annalisa DePaolis (Cardoso),

OFFICE HOURS: Instructors and teaching assistants will be available by appointment

PRE/CO-REQUISITES: All students must have completed BME 31000, BME 50100, BME 50300. Pre/Co-requisites: BME 50200, and BME 50500

ATTENDANCE: BME 450 stringently requires an unwavering commitment to participation by each student. A tremendous amount of resources have been put into developing each project to convey the engineering and professional requirements needed to succeed in project design and progression. Absence to any scheduled class meeting, TA meeting, team meeting or general class disruption will result in an automatic 2% deduction in the final grade (No excuses or exceptions). Probation and deregistration of the course are further penalties for failure to meet attendance requirements. Tardiness (e.g. 1 minute late) is scored as absence in all cases.

LATENESS: Students are required to attend every session beginning at 11AM. *Please turn off all pagers and cell phones at the beginning of each class*. Habitual latecomers will lose points from their final grade for each lateness. Inconsiderate cell phone owners will be dropped from the course.

SAFETY: Students are required to follow all posted safety instructions. Students are not allowed to touch or operate any powered equipment (drill, table-saw, etc.) without receiving prior training/approval by the department technician. Students are required to read all posted safety information and equipment manuals prior to use. **If you're not sure, ask**. Food and drink are never allowed in the design lab. Wear safety glasses at all times where required. Never leave any equipment (including soldering irons) running unattended. **Use your common sense. Alert course instructors/technician of any safety problems or any concerns.** Alert fellow students if you perceive any immediate safety risks. **In case of emergency you may call x6911 or 911 from your cell phone.** Students who observe but do not report unsafe conditions or violations of policy are responsible.

CLEANLINESS: It is the responsibility of all students to ensure the lab is maintained in an orderly and clean state. All tools must be *cleaned* and returned to their specific storage space after use. All debris must be cleaned from the table top and floors. Students should make every effort to prevent damage to

laboratory equipment, shelves, and table tops (note the black table top can scratch, use the wooden table tops when necessary. Do not use the wooden table tops for soldering). Students should help maintain lab supplies (including circuit components) in an orderly state. Student may choose to leave proto-types and a minimum amount of associated supplies in an assigned storage area on a shelf in the lab; these supplies must be clearly labeled with the students' names or they may be removed.

SECURITY: Under no conditions are students to remove any equipment, supplies, or tools (including those incorporated into students design projects) from the design lab without the specific permission of the course instructor or the department technician. Student teams may be assigned equipment as part of their project that may be removed from the lab or school; the team leader must sign this equipment out with the technician and is responsible to return the equipment undamaged at the end of the semester. Students not enrolled in Senior Design are not allowed in the design laboratory under any conditions unless approved by Dr. Qiu or BME faculty – students in the labs are required to confront trespassers.

The Design Lab will be made available to students outside of class time only through the permission of the course instructors *and* the department technician (Dr. Qui, qiu@ccny.cuny.edu). Only work related to Senior Design may be performed in the Senior Design Lab. Until otherwise specified, students are not allowed in the design lab without the supervision of a course instructor, the department technician, or a Group TA.

If students become aware of any violation of the safety/security policies or become aware of a (potential) defect with any piece of equipment (whether or not you caused the violation/defect) they are **required** to report this to the course instructor or the department technician. Students who do not strictly follow the above guidelines can be deregistered from the course without warning.

SENIOR DESIGN PROCESS OVERVIEW. Senior design consists of two required courses, Design I and II. Design I focuses on the engineering design phase of a project development (after specifications have been largely determined and prior to manufacturing). Through lectures and hands-on-experience students are introduced to: working on teams, design process, planning and scheduling (time-lines), technical report writing, proposal writing, and oral presentations.

<u>Students will work in a "team" of 5-6 students</u>. Each team will have one "team leader" at all times-either selected by the instructor or elected by vote. The team leader may change based on a prescribed schedule. <u>The team leader is responsible for delegating responsibilities</u>. The team will receive a group score for 50% of the total grade while the remaining 50% of the total grade will be based on individual performance. The student team leader may bring concerns about team performance to the course TA/instructor.

As individuals and teams, students will be regularly evaluated by the course directors on project progress, commitment, and professionalism. Inadequate progress/performance will result in course dismissal. In a majority of cases, students will receive a minimum of one warning orally or in writing prior to dismissal. The entire team of students is <u>primarily </u>responsible for:

1. Keeping project on a defined timeline.
2. Ensuring the project meets course guidelines
3. Meeting all benchmarks.
4. Preparing and timely submitting all reports/presentations.
5. Arranging and attending a regular formal pre-scheduled meeting with team (weekly), the group Teaching Assistant (TA) (weekly), and course instructors (weekly).
6. Completing weekly individual task assignments and reporting status of project progress in a professional manner through team meeting minutes.
7. Producing a product that meets or exceeds device specifications.

The students are responsible for ensuring they fully understand the project scope and specifications. If the specifications provided by the sponsor are not sufficiently clear/specific, it is the students' primary responsibility to clarify these issues with the sponsor/group TA/course director – and to do so with sufficient foresight/planning to allow time for corrections. *Students should both devote significant resources up-front to identify concerns, unknowns and ambiguities, as well as work ahead of schedule in anticipation of unplanned events.*

It is the student's responsibility to determine if the project meets the BME Senior Design project scope including if the project is feasible given the defined timetable/benchmarks, and available resources. Failure to meet project objectives due to unavailable resources (including space, proprietary technology, equipment/supply back-order, time) is not acceptable. Resource management is a central component of the design project. *Students should expect and plan on extensive "unexpected" delays (ordering etc.) and schedule/design conservatively.*

As individuals and teams, students will be regularly evaluated on project progress, commitment, and professionalism. Inadequate progress/performance will result in course dismissal.

GUIDELINES FOR PROJECT MANAGEMENT: GROUP MEETING: Each team must schedule a *minimum* of one "official group meeting" every week which may **not** be on a day when the Senior Design class meets. Each meeting must be scheduled (time and place) greater than **one week in advance** via email and group-TA and class-TA must be copied each week (UNSCHEDULED MEETING = ABSENCE for all group members). The meeting is directed by the Team Leader, if the Team Leader is not present they must designate an alternative meeting director. Attendance must be taken at each meeting indicating 'present' or 'absent' (as always, tardiness is noted). If inaccurate attendance is observed by group-TA during specified group meeting time, all members will be considered absent for the given meeting. Group meeting minutes should be individually uploaded to Blackboard

TASKS: At the official team meeting the team leader must assign at least one "task" per team member which should be commensurate to ~8 hours of work a week. More than one task may be assigned per team member and team members may share a task: however, each team member must have one task that they are solely responsible for every week with quantified/defined deliverables. "Weekly reports" detailing upcoming task delegation, attendance, current timeline (dated that week), as well as status of previous week's task assignments (feed-back) must be reported to group-TA (10% of final grade – GROUP SCORE) in hard-copy. Group members must ensure these administrative deliverables are submitted in a **documented**, timely, and complete manner. Tasks may take less or more than one week. Deductions will be made if weekly report is not submitted or tasks are too trivial or too vague.

TASK STATUS: The team leader is responsible to request feedback on all previous tasks. The task status report must clearly and simply show what tasks were assigned, on what date, and if the task was completed (i.e. "fully", "satisfactorily", "minimally", "delayed", "not started"). Group members who fail to adequately complete weekly tasks will face a penalty to their task completion score (20% of final grade – INDIVIDUAL SCORE). Team Leaders must assign at least one individual (unshared) task per student per week that has a deadline of 1 week, and should be phrased in such a way that performance can be quantified (i.e. avoid ambiguities like "search the web for"… but rather "find at least 5 examples of…that are relevant for….").

FORMAL GROUP-TA MEETING: Each team must schedule at least one "formal meeting" with the group-TA every week that is not on a day when the Senior Design Class meets and is separate from the official team meeting. Each meeting must be scheduled (time and place) **one week in advance** via email and group TA and class TA must be copied each week (UNSCHEDULED = ABSENCE for each group member). Individual team members or the whole team is encouraged to meet and consult with the TA outside of the formal meeting: however, there is no substitute for the scheduled formal group-TA meeting.

IN-CLASS TECHNICAL UPDATES: In-class "technical updates" will be administered by instructor on an individual basis. Technical updates will be project specific and focus on reported issues based on group TA evaluation. Individuals who fail to complete an assigned weekly task will likely be questioned by instructor in regard to that task. Evaluation will be assessed by student's capacity to convey progress and understanding on uncompleted or pending tasks (10% of final grade – INDIVIDUAL SCORE). Moreover, each student is expected to understand the current timeline and overall current group objective.

WEEKLY-UPDATED TIMELINE: Groups must also develop a projected "timeline" of project progress. The timeline should evolve continuously to reflect expectations/expansion of project development and task completion. The timeline must be reported weekly to the group TA and accurately reflect schedule of project objectives for the semester. Failure to adequately maintain timeline, with any necessary weekly updates, will results in penalty (10% of final grade – GROUP SCORE). Each week, timelines must be submitted to the group-TA along with the weekly report.

IN-CLASS NOTEBOOK: In addition, the team leader (or an appointed surrogate) must have with them at EACH class, the FULL record of all the previous and current timelines and group-reports. These should be well organized, clearly labeled, and indexed. Missing information is scored as 0.

GUIDELINES FOR PROJECT DELIVERABLES: Students will document and present their progress throughout the course in interim oral/written presentation. In addition to course milestones, students will accommodate all further requests by the sponsor for data and information in a timely and professional manner. Students are strongly encouraged to provide sponsor with a regular progress update; such an update should focus only on issues relevant to the sponsor.

For details specific to the content of project deliverables please direct questions to class TA and instructor.

SPONSOR: In interacting with project sponsors, students are expected to show professionalism, punctuality, and diligence. It is critical students understand they are representing both themselves and the department in these interactions. Students should be considerate of the sponsor's very limited time and constrained schedule. Simultaneously, students must cultivate an active professional relationship with the sponsor, and ensure they obtain all necessary information from the sponsor.

Sponsors don't need to know about your daily activities, but sponsors who are kept involved and up-to-date tend to be more personally motivated to help the group – "involved sponsors are involved". "Hiding" from the sponsor when progress is behind schedule is a short-sighted and disastrous policy. Sponsors should be viewed a valuable resource to project background but not a first stop for general questions. Each team should appoint one individual (possibly, but not necessarily, the initial team leader) to be the "primary sponsor contact team member". Though the team leader may change – the contact person should ideally be fixed the entire project. All questions, updates and comment to the sponsor should be funneled through the team leader.

GRADING
40% Project Management
      10% In-class Technical Update (weekly - INDIVIDUAL)
      10% Timeline of Project Progress (weekly update to group TA - GROUP)
      10% Task delegation (weekly report to group TA - GROUP)
      10% Task completion (weekly report to group TA - INDIVIDUAL)
60% Project Deliverables
      25% **Project specifications, prior art and intellectual property report** (GROUP)
      25% **Design concepts, selection of best concept and cost analysis report** (GROUP)
      10% Presentation of concepts to class (INDIVIDUAL)

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PLANNED SCHEDULE

Note: every assignment comprises a written report and a short PPT presentation

Class	Date	Topic
1	08/28/2018	Course overview
2	09/04/2018	BME Lecture: **Team Work, Timeline and Product Documentation**
3	09/11/2018	BME Lecture: **Need Statement and Problem Definition**
	09/18/2018	No classes schedule
4	09/25/2018	**ZAHN Center Workshop: Five Whys Workshop and Asking Better Questions** BME Lecture: **Product Design Specifications** Assignment due: **Need Statement and Problem Definition**
5	10/02/2018	BME Lecture: **Prior Art** Assignment due: **Product Design Specifications**
6	10/09/2018	BME Lecture: **Intellectual property, Licensing, Patents, Copyrights and trade secrets** Assignment due: **Prior Art**
7	10/16/2018	BME Lecture: **Safety Engineering Quality Control, Reliability, Liability and Regulations** Assignment due: **Project Specifications, Prior Art & Intellectual Property**
8	10/23/2018	**ZAHN Center Workshop: Presenting with Power and Managing Team Dynamics** Assignment due: **Revised Project Specifications, Prior Art and Intellectual Property**
9	10/30/2018	Students Presentation and written report: **PROJECT SPECIFICATIONS, PRIOR ART AND INTELLECTUAL PROPERTY** Assignment due: Written report on project specifications, prior art and intellectual property
10	11/06/2018	BME Lecture: **Testing and Evaluation of Concept Designs** First day for paper/computer design, simulations, mockups and/or prototype(s) to evaluate design concepts. Assignment due: **Detailed Task Schedule for Team Project**
11	11/13/2018	**BME Lecture**: Cost Analysis Assignment due:
	11/20/2018	Friday Schedule
12	11/27/2018	**ZAHN Center Workshop: Intro to the Business Model Canvas** Instructors meet with their teams Assignment due: **Draft Report of Design Concepts and Testing Methods**
13	12/04/2018	**ZAHN Center workshop: Head+Heart=Hustle & Fear of Failure** Instructors meet with their teams Assignment due: **Revised Report of Design Concepts and Testing Methods**
14	12/11/2018 & 12/12/2018	Final design concept presentation: **DESIGN CONCEPTS, SELECTION OF BEST CONCEPT and COST ANALYSIS** Assignment due: Written report on project specifications, prior art, intellectual property, design concepts, selection of best design and cost analysis.