ISyE 4106 Senior Design Syllabus

Fall 2009

1 COURSE OBJECTIVES

Senior Design provides a design experience similar to ISyE professional practice, and an opportunity for you to learn about the business world. You will learn how to

- properly define and scope a problem;
- identify and analyze relevant factors;
- apply appropriate industrial engineering methodologies and computational tools;
- generate and evaluate alternative solutions; and
- improve your skills in
  - technical writing,
  - public speaking,
  - working within a team, and
  - project and time management.

The vehicle for this learning is an intensive, semester-long, team-based engineering design project. You are responsible for finding a suitable project and a project team.

2 PROJECT REQUIREMENTS

There are four main requirements that a Senior Design project must meet:

- **Engineering Design**. The project must involve a recommendation for change(s) to a system or to the construction of a new system, and an economic analysis of the costs and benefits. A project may include the analysis and presentation of data, cycle time analysis, simulation, optimization, determining standards, documenting process flow, etc., but these elements do not constitute an engineering design project by themselves.

- **Methodology**. The project must require the use of substantial industrial and systems engineering tools and methods learned in the curriculum. A project might be quite valuable for a company, but if it does not contain significant ideas and/or methods from ISyE courses, it will not qualify for ISyE course credit.

- **Magnitude**. Each team member is expected to spend a minimum of 12 *productive* hours per week on the project for a total of 180 hours for the semester, which equates to a minimum of 1080 hours for a six-member team. The project's scope must be consistent with this expectation.

- **Value**. The value of the project to the client must be commensurate with the amount of time spent. Part of Senior Design is learning to identify which problems are worth your time to fix, and which are not.

In addition to completing a project that meets these requirements, you are required to present your results in oral and written form, and to act in a professional manner toward the faculty, the client company, and your fellow students at all times throughout the process.

3 ORGANIZATION

The **Senior Design Coordinator** (Dr. Joel Sokol) has final authority over all matters pertaining to the course.

Faculty Advisors are responsible for the day-to-day progress of their teams during the semester. You are responsible for keeping your advisor informed of the team's progress and intentions on a regular basis. The faculty/team assignments are:

Advisor	Section A: MWF 12-2pm and MW 6-9pm	Section B: TR 12-3pm and TR 6-9pm
Dr. Shabbir Ahmed Groseclose 410, 4-2320 shabbir.ahmed@isye.gatech.edu	Dunwoody Senior Baseball	CBeyond GE Energy UPS
Dr. Ozlem Ergun Groseclose 220B, 4-2369 ozlem.ergun@isye.gatech.edu	Honda Rainmaker Group	CARE Cooper Lighting (MTS)
Dr. Marc Goetschalckx Groseclose 325, 4-2317 marc.goetschalckx@isye.gatech.edu	Manheim (Canada)	Manheim (Fort Wayne) Manheim (Palm Beach) Midtown Consulting Group
Dr. Chang Wook Kang Groseclose 439, 5-3254 cwkang57@hanyang.ac.kr cwkang57@hotmail.com	Manheim (Planning)	Emory Healthcare (Campus) Emory Healthcare (Midtown) Manheim (System)
Dr. Pinar Keskinocak Groseclose 408, 4-2325 pinar.keskinocak@isye.gatech.edu		Flu-Free Schools
Dr. Anton Kleywegt Groseclose 409, 4-4323 anton.kleywegt@isye.gatech.edu	BlueLinx USG	
Dr. Yajun Mei Groseclose 343, 4-2334 yajun.mei@isye.gatech.edu	GT Undergraduate Admissions Legacy Property Group	Cooper Lighting (Inventory) Northside Hospital

Teams may consult with **ISyE faculty other than their advisor**, but **must request permission** from their faculty advisor before doing so, to avoid deluging certain faculty beyond their assigned responsibilities (as has happened in the past). To maintain impartiality in grading, the Senior Design coordinator is not eligible to advise teams on their project once they are assigned a faculty advisor.

The **ISyE Workforce Communication Lab** (http://www.isye.gatech.edu/communication) assists Senior Design students with preparation and delivery of presentations. The lab is located in Room 115 of the Main ISyE Building (not Groseclose). ISyE's Director of Workforce Communication, Dr. Judith Norback (judith.norback@isye.gatech.edu, 314 Groseclose, 5-1079), will announce the lab's hours.

Dr. Blake Cherrington (blake.cherrington@ile.gatech.edu, 4-1517), Executive-in-Residence at Georgia Tech's Institute for Leadership and Entrepreneurship, is available for consultations regarding teamwork and small-group leadership issues. Conversations with Dr. Cherrington are confidential; the contents will not be shared with your advisor or the Senior Design coordinator.

The senor design coordinator, Dr. Norback, and Dr. Cherrington may request your participation in surveys and other data collection efforts. You may decline to participate; however, by each of their deadlines you must inform them of your decision to participate or decline. (Of course, your grade will not be affected by your decision.)

4 SCHEDULE

There are two sections of the course. Each section has 12 hours of meeting time per week:
- Section A meets MWF 12-2pm and MW 6-9pm.
- Section B meets TR 12-3pm and TR 6-9pm.

Aside from the required meeting times listed below, most of the meeting times are set aside for your team to work independently, so that you all are guaranteed to be free to work together and/or visit your client site. You will also probably meet with your faculty advisor during one of these time periods; the regular schedule and ground rules for each team's meetings with their advisor will be determined by the advisor. [NOTE: Advisors' styles and meeting requirements differ; for example, some advisors require teams to prepare a written agenda for each meeting, including a progress report, unresolved issues, and proposed next steps; other advisors do not. It is your responsibility to adhere to your advisor's preferences.]

There are several required meeting times and deliverable deadlines that every team must adhere to:

Date	Time	Location	Activity
Aug 17-18[1]	6pm	IC 205	Full class: meeting with course coordinator
Aug 19-20[1]	W6pm, R6:30pm	IC 205	Full class: leadership & communication overviews
Aug 24	10am	[5]	**Deadline:** submit proposal presentation (faculty version)[6]
Aug 24-26[1]	In class[3]	TBD	Team: present proposal to faculty
Aug 31-Sep 4	TBD[4]	Client	Team: present proposal and deliver proposal report to client
Sep 4	10am	[5]	**Deadline:** submit proposal report[6]
TBD[2]	6pm	IC 205	Full-class: executive workforce panel discussion
Oct 9	10am	[5]	**Deadline:** submit interim progress report[6]
Oct 13	10am	[5]	**Deadline:** submit interim presentation (faculty version)[6]
Oct 14-16[1]	In class[3]	TBD	Team: present interim progress to faculty
Oct 19-23	TBD[4]	Client	Team: present progress and deliver interim report to client
Nov 23	10am	[5]	**Deadline:** submit final presentation (faculty version)[6]
Nov 23-25[1]	In class[3]	IC 205	Full class: present final project to faculty and class
Nov 30	10am	[5]	**Deadline:** submit final report[6]
Nov 30-Dec 9	TBD[4]	Client	Team: Present and deliver final report to client
Dec 9	6pm	IC 205	Senior Design Award finalist presentations
Dec 10	10am	Groseclose 332	**Deadline:** submit CD of all work product for the semester

[1] Dates that fall on MWF are for Section A only, and dates that fall on TR are for Section B only.

[2] This session is mandatory for both sections, but only occurs on one date. If you are in the section that does not regularly meet on that day of the week, you may watch a videotape of the session instead.

[3] Both afternoon and evening class times will be used. For proposal and interim presentations, each team will be assigned a specific time to be present. **For final presentations, each team must attend all of the presentations in its section.**

[4] The exact date and time for each team's client presentation should be determined by the client, team, and faculty advisor. Within 24 business hours of your team's client presentation, each team member must independently **submit a completed peer evaluation form** to the Senior Design coordinator (hard copy) and to the faculty advisor (in whatever format he/she prefers).

[5] Submit a hard copy to Dr. Harry Sharp (Groseclose 332) and an electronic version via T-square.

[6] Use the following naming convention for files: "Client SubmissionType.ppt"; for example, "Norfolk Southern Railroad Interim Presentation.ppt".

NOTES:
- Your faculty advisor may also require you to meet other deadlines (e.g., providing him/her with a copy of your reports a week before the submission deadline).
- Adjustments to the schedule may have to be made.
- Attendance is mandatory (unless otherwise instructed), and you must also be on time.

5   PROJECT PHASES

The Senior Design project has four major phases.

- **Project selection phase**. One or more problems are investigated and judged for suitability according to the four requirements (design, methodology, magnitude, and value). It is assumed that all students in Senior Design have successfully completed the project selection phase.

- **Project definition phase**. The problem, deliverables, design strategy, project plan, and value to the client are more-clearly defined. At the end of this phase, the Project Proposal Presentation and Report spell out the work the team plans to do and the value the client can expect to receive.

- **Interim phase**. Data are collected, analyzed, and validated; relevant factors are understood; and the design strategy is finalized. At the end of this phase, the Interim Progress Presentation and Interim Progress Report describe the work product to date and the remaining plans for the semester.

- **Final phase**. The design strategy is evaluated and its value demonstrated. At the end of this phase, the Final Presentation and Final Report provide a comprehensive and self-contained description of the work completed during the semester.

6   PRESENTATIONS AND REPORTS

Each of the phases of Senior Design (other than project selection) culminates in a presentation and report delivered to the faculty and client.

- **Presentations:** Since the faculty and client audiences have different knowledge, experience, and needs, you are required to create two separate presentations at each phase: one targeted to the faculty and the other targeted to the client.

- **Reports:** To avoid the writing becoming a major time burden on teams, only one Senior Design report is required at each phase. It should be a hybrid, with the body of the report targeted to the client, and additional details for the faculty (e.g., detailed descriptions of the client, of mathematical details, etc.) placed in appendices.

All presentations and reports should be received by the client no later than the time of the client presentation. Client presentations must be scheduled at times that are suitable to all attending parties (all team members, the faculty advisor, and all client-side attendees). You may hold one or more of your client presentations on campus, provided that the client agrees. **All presentations and reports should be approved by your faculty advisor before being sent to the Senior Design coordinator or the client.**

Additional Presentation Guidelines

- Each team member must present a significant portion of either the faculty or client presentation at the end of every phase.

- Each team member who presents to the faculty in the project proposal presentation must present to the client in the interim progress presentation, and vice versa.

- Time limits and formats for the in-class (faculty) presentations are:

	Time limit	Format	PowerPoint slides
Proposal	10 minutes	Sitting at conference table	Hand out to faculty; projection is optional
Interim	15 minutes	Standing in conference room	Project on screen, hand out to faculty
Final	20 minutes	Standing in front of class	Project on screen, hand out to faculty

7 GRADING

The Senior Design coordinator is responsible for determining final grades for all teams and team members. The faculty advisor, other faculty, and client will provide input. The exact grading scale and descriptions of the evaluation guidelines are available on the Senior Design t-square site. At a high level, the four categories judge the quality of your team's work in four areas: work product, written report, oral presentation, and professionalism.

- **Work product** includes the quality of the team's identification, scoping, modeling, and analysis of the problem, and the quality of the team's recommendations to the client. More credit is given for difficult projects, creative solutions, comprehensive analyses, and high value, and a narrowly-scoped or "safe" project will receive less credit than a more ambitious project. The Senior Design coordinator will also consider any factors outside the control of the team that might have influenced the project's outcome.

- **Written report** includes how well the report covers the project and how easy it is to read and understand. This includes completeness, conciseness, flow, and writing quality. Correctness of spelling, grammar, word usage, etc. is also important.

- **Oral report** includes how well the presentation covers the project, how easy it is to understand, and how interesting and engaging the speakers are. It includes both speaker quality and slide quality.

- **Professionalism** includes the team's attitude, initiative, responsiveness, reliability, work ethic, preparation, independence, and integrity (including intellectual integrity).

In addition to the categories above, teams are responsible for meeting all deadlines (including those set by the advisor and/or client, even if they do not appear in the syllabus), submitting all deliverables exactly as requested, maintaining adequate progress throughout the semester, and behaving professionally toward the client, faculty, Senior Design coordinator, and fellow students. **Failure to do any of these, or any other unprofessional team behavior, will result in penalties to the team's grade.** Penalties will be assessed by the Senior Design coordinator according to the severity of the action; they can range from as little as a third-of-a-letter-grade deduction to a one- or two-letter-grade deduction from your team's initially-assigned grade. Even more-egregious cases may result in a deduction of more than two letter-grades, the assignment of a D or an F in the course, or even termination from the course midway through the semester.

In general, the ideal is for all team members to receive the same grade. However, **individual deductions from the overall team grade will be assessed** for failing to contribute a fair and significant share to the team's effort, missing mandatory meetings without prior approval, coming late to meetings without prior approval, missing a presentation to the faculty and/or class (even for an interview; companies understand that you need to schedule your interviews around immovable academic commitments), unprofessional behavior, attitude, or dress during a formal or informal meeting, violating course rules, failing to respond in a timely manner to a request from the client, faculty advisor, or Senior Design coordinator, etc. The range of penalties for individual deductions is the same as that for team deductions.

Based on their relative overall contributions to the project, as determined by the advisor and Senior Design coordinator, team members can receive a **higher or lower grade** than the team grade. Since Georgia Tech does not currently use plus or minus grades on transcripts, the difference in the grades of team members may not coincide exactly with the grade adjustments; for example, if a team's project grade is C- and one team member received a one-third-letter grade deduction to D+, then that team member's transcript will show a grade of D and all other team members' transcripts will show a C.

8   FEEDBACK

Faculty advisors will provide feedback and guidance to their teams throughout the semester. Faculty advisors are also responsible for communicating their teams' progress to the Senior Design coordinator throughout the semester and receiving feedback. The Senior Design coordinator will provide oral feedback to you after the project proposal presentation and written feedback after the interim progress presentation. In both cases, the Senior Design coordinator's feedback may be expanded on in more detail by your faculty advisor.

Teams will provide self-evaluations to the Senior Design coordinator after the proposal, interim, and final presentations to the client. This input will be used in addition to the faculty advisor's opinions when determining grade adjustments and/or deductions.

If at any time the Senior Design coordinator determines that a team or individual's progress and accomplishments are unacceptable, then the Senior Design coordinator has the discretion to determine the remedy. Remedies include requiring special assignments for individuals or the team, or terminating that team or individual's participation in the course.

Beginning in Summer 2008, ISyE instituted a **no-drop policy** for Senior Design. Students are only allowed to drop the course with special permission from the Associate Chair for Undergraduate Programs. Permission is generally granted only in extreme situations (serious illness/injury, etc.).

9   HONOR CODE

You are expected to conduct yourself in accordance with Georgia Tech's honor code. Please consult http://www.deanofstudents.gatech.edu/Honor and/or your faculty advisor if you have any questions. Faculty advisors and the Senior Design coordinator will also abide by the honor code.

10 LEGAL ISSUES

- Only the Office of Sponsored Programs and the Legal Services Department of the Georgia Institute of Technology are allowed to enter in a contract on behalf of the Georgia Institute of Technology.

- On all written communications, proposals, forms, data collection sheets, presentation handouts, and other documents, **a disclaimer must be prominently displayed** that the document has been created in the framework of a student design project and that the Georgia Institute of Technology does not officially sanction its content.

- Students are not allowed to receive formal compensation for work done in Senior Design. Companies may provide assistance in the form of photocopying, binding and typing services, and in some cases, supplies, meals and travel expenses.