EE 364E
Engineering Design & Entrepreneurship

Syllabus & Course Guide

Fall 2019

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NOTICE: There are some intrinsic references to 364D (the other Senior Design Class) in this document. If you find something confusing in this document, bring it up in class to discuss.

SYLLABUS

The Senior Design sequence is the culmination of your undergraduate engineering education at The University of Texas at Austin. In your previous courses, you acquired a great store of mathematical, scientific, and engineering knowledge. The two semesters that make up the sequence will walk you through the design process and give you practice in solving a real-world engineering problem. In EE 364E, you will plan a project from problem definition to a high-level design with a plan to execute a prototype. In EE 464S, you will implement that design in the form of a working prototype. That experience will help prepare you—as much as circumstances allow—for the challenges of hands-on engineering in the workplace.

This Course Guide contains the policies, procedures, schedules, assignment instructions, and

advice for completing the course successfully. **You must follow these requirements *to the letter*. A large portion your grade will depend heavily on your conformance to the contents of this Course Guide.**

Senior Design Objectives

The primary purpose of the senior design sequence is to give senior engineering students the opportunity to carry out a complex, long-term design project through the implementation stage—that is, to the point where they build, test, and evaluate a prototype of their designs. In EE 364E, you and your team, starting from a set of customer needs, will develop a practical statement of the engineering problem, assemble a list of specifications that the design must meet, propose a solution, and produce a high-level design and a plan for fabrication. In EE 464, you will build a prototype of your solution for testing, refine it, and demonstrate it. At each stage of the project, your team must identify and assess alternative approaches and employ a variety of problem-solving methods and design tools. To accomplish these tasks, you must demonstrate effective organizational, project management, and communication skills.

Learning Goals

Design is the process by which professional engineers combine their technical, mathematical, and scientific knowledge to devise products or systems that meet the technological needs of society. In essence, the engineer combines materials and laws of nature to find practical solutions to the problems. As such, the course sets the following learning goals for each student:

- **Build on your experience and knowledge to solve practical, real-world engineering problems.** You will learn how to translate knowledge into action, something you will need to practice throughout your career. This course differs from your previous courses in that it is designed to help you learn not what engineers know exactly but what engineers do with what they know. In addition, the course will help you develop the internal and external resources to meet challenges that, initially at least, require more than you already know. Ideally, you will develop the research, collaborative, and communication skills that will allow you to fill in those gaps in knowledge and skills as you proceed, just as a professional engineer must do.

- **Exercise and gain proficiency in the design process from start to finish.** In 364E, you and your team partners will develop a design concept from your research and brainstorming efforts. You will base this concept on an accurate interpretation of a problem statement. Then, you will identify and exploit sources of relevant and potentially helpful information. In EE 464, you will implement the design by building a prototype, which you will test and evaluate. During the process, you will develop useful design procedures and practical work habits (such as updating the laboratory notebook regularly).

- **Manage a complex project.** You will learn to manage resources (monetary, labor, and material), a project schedule, and team personnel (regulation of your and your partners shared and individual responsibilities). In short, a design project is a multidimensional activity restricted by time, budget, finite resources, and the intellectual attributes of the team. At any given time, the complexity of operations may become overwhelming, unless you and your team members have exercised management principles to help you maintain oversight and control over your project.

- **Collaborate with team partners.** You will practice teamwork skills. Collaboration is

necessary for design and testing, project reporting, and project management, control, and decision-making. The logic of collaboration is simple: Good engineers working collaboratively accomplish more than good engineers working alone. Working effectively with peers and experts forces you to express and justify your ideas, tests your ideas for reasonableness and accuracy, exposes you to the language of engineering design, introduces you to new ideas, and relieves you from carrying the entire cognitive load.

- **Gain practice in project communications.** One of the most important procedures of any design project is documentation. *Note that documentation is a critical component of the project, not a supplementary task*. Throughout your project you will maintain an up-to-date laboratory notebook—basically a paper (or electronic) trail of your ideas, decisions, rationales, and important technical data. In addition, you will write a number of reports that conform to strict standards of content and format. Finally, you will be asked to prepare and deliver one oral report during the semester to explain and defend your design ideas before an audience of peers and faculty. As much as possible, those communications will be similar in content and quality to those you will later prepare in the workplace.

- **Learn to learn on your own.** In industry, no two design problems have exactly the same solution. Inevitably, you will encounter problems a bit beyond your experience. *That is as it should be*. In this course, you must take charge of your learning, just as you will in your career. What you need to know and how to find it is up to you (with a little help from your Faculty Mentor). A common cause of project failure is for a team to "not know what they don't know"; in other words, they did not do enough research to discover the higher plane of design solution possibilities that lay just beyond what they already knew or learned in class.

To meet those objectives, your team will engineer the solution of a real-world design problem.

Writing Flag Course

This course carries the Writing Flag. Writing Flag courses are designed to give students experience with writing in an academic discipline. In this class, you can expect to write regularly during the semester, complete substantial writing projects, and receive feedback from your instructor to help you improve your writing. You will also have the opportunity to revise one or more assignments, and you may be asked to read and discuss your peers' work. You should therefore expect a substantial portion of your grade to come from your written work. Writing Flag classes meet the Core Communications objectives of Critical Thinking, Communication, Teamwork, and Personal Responsibility, established by the Texas Higher Education Coordinating Board.

Applicable Learning Styles and Strategies

Those engineers do best who have an inquisitive and exploratory nature to their learning style. They carefully and patiently examine the implications of the problem so that they can define the problem in terms that point to practical solutions. They develop multiple alternative solutions—from the ideal to the most expeditious. They are aggressive in their pursuit of information: They identify the types and sources of the required information as early as possible in their project so that they synthesize their solutions from the latest and most complete knowledge. They determine where in their design they can compromise and where they cannot in order to meet project schedules and other requirements. They are not afraid to negotiate with the Faculty Mentor, corporate sponsor, parts suppliers, technicians, and each other. They have the ability to sense when enough is enough —that is, when they have come as close to a design goal or sub-goal as they can reasonably expect under the circumstances.

Because your design project will build a unique solution to a unique configuration of technical goals and constraints, the specific lessons you learn from the project may not be exactly transferable to your next design project. *What is transferable, however, is the set of problem-solving skills and strategies you steadily accumulate*.

Instructors

Your instructor for this course is Prof. Mark McDermott, and your project will have a *Faculty Mentor or an Industry Mentor*, with whom you will work closely throughout the duration of the project. In addition, you will work in the laboratory under the supervision of a Technical TA. For writing assignments and oral presentations you will have expert assistance from the Writing TAs.

Instructors
Dr. Mark McDermott
Dr. Bill Fagelson

Technical TAs
Rita Kambil

Writing TAs
TBD

TA Office locations and hours will be announced during the first week of class.

Textbook

The following textbook contains helpful information about design problem-solving and project control. Other readings will be recommended during lectures.

R. Ford and C. Coulston, *Design for Electrical and Computer Engineers: Theory, Concerns, and Practice*. McGraw-Hill: New York, 2007.

In addition, a useful reference text for technical writers is the **Purdue Online Writing Lab** (OWL, https://owl.english.purdue.edu/owl/).

EE 364E Prerequisites

The prerequisites for this course are (1) credit for EE 333T (or any engineering department's version) with a grade of at least C- and (2) credit with a grade of at least C- or concurrent registration for an advanced laboratory (EE 440, 445L [or 345L], 445S [or 345S], 461L, or 462L [or 362L]). These requirements are NEVER waived.

Course Schedule

The EE 364E Preliminary Course Schedule (Table 1 below) outlines the chronology of design project activities and assignment submissions. You will begin the design process by developing a clear understanding of your design problem, identifying a set of design options, and developing a system design. The assignments and schedule are designed to walk you through that process and

to force you to undertake some of the thinking that goes into good design.

Attendance and Participation Policies

Note that EE 364E meets regularly throughout the semester. The following policies relate to lectures, laboratory hours, and completion of reporting assignments:

1. **All team members are required to attend lectures.** Failure to attend lectures lowers your grade and reduces your ability to contribute effectively to the team. The penalty for poor attendance can be as great as 6 percentage points on your FINAL course average.
2. EE 364E is a CLOSED LAPTOP and CLOSED DIGITAL DEVICE class in the lectures unless (1) you have requested and received advance permission, or (2) an exercise for their use is announced in class. In addition, silence mobile phones.
3. Formal laboratory hours are arranged according to the unique number of the course section. The senior lab rooms are available for additional project work whenever the labs are open.
4. **All team members will contribute** to the preparation of written assignments.
5. **All team members will collaborate** in the preparation and delivery of oral presentations

Table 1. EE 364E Course Schedule (Rev 1.0 -- 8/21/19)

Wk	Date	---- Monday ---- Lecture Class Time: 12:00-1:00 PM EER 1.516	Date	---- Wednesday ---- Lecture Class Time: 12:00-1:00 PM EER 1.516	Date	---- Wednesday ---- EE 364E Lecture/Lab Class Time: 6:30 – 7:30 PM EJC 1.214
1			28 Aug	First class day: **364E Course Overview**	28 Aug	**The Engineering Design Process**
2	2 Sep	**LABOR DAY**	4 Sep	**Guest Speaker**	4 Sep	**Lecture: "The Elevator Pitch"** **Select Faculty/Industry Mentor**
3	9 Sep	**Writing technical reports**	11 Sep	**ATTEND: Engineering Expo**	11 Sep	**Lecture: Market Research** **Meet Faculty/Industry Mentor** **Start working on "The Pitch"**
4	16 Sep	**Problem Statements**	18 Sep	**Requirement specifications**	18 Sep	**Lecture: Market Analysis** **Continue working on "The Pitch" & the "Prototype"**
5	23 Sep	**Project Management**	25 Sep	**Project Management**	25 Sep	**Lecture: Product Cost Analysis** **Start working on Competitive Analysis/Prior Art Report**
6	30 Sep	**Project Planning**	2 Oct	**Submit: Pitch (*Preliminary*)** ***No Lecture – Work on Pitch Presentation***	2 Oct	***Team presentations: "The Pitch"***
7	7 Oct	**Risk Analysis**	9 Oct	**High Level Design**	9 Oct	**Guest Presentation** **Continue working on the "Prototype"**

8	14 Oct	**System Metrics**	16 Oct	**System Metrics** **Submit: *Pitch (Final)***	16 Oct	**Lecture: Developing Business Plans** **Start working on the preliminary BP**
9	21 Oct	**Patents**	23 Oct	**Prior Art**	23 Oct	**Presentation: "Art of Persuasion"** **Continue working on the preliminary BP and the "Prototype"**
10	28 Oct	**Financial Analysis**	30 Oct	**Working in teams**	30 Oct	**Pres: When business plans change** **Continue working on the preliminary BP and the "Prototype"**
11	4 Nov	**Engineering Ethics**	6 Nov	**Submit: *Competitive Analysis*** ***No Lecture – Work on Mkt Research Presentation***	6 Nov	***Team presentations: "Market Research Results"***
12	11 Nov	**Engineering Management**	13 Nov	**Engineering Management**	13 Nov	**Lecture: Technical Economics** **Continue working on the "Prototype"**
13	18 Nov	**Attend EE 464 Open House 1:00 – 4:00 PM**	20 Nov	**Prototype Design Report**	21 Nov	**Lecture: Building Productive Teams** **Continue working on the "Prototype**
14	25 Nov	***No Lecture – Work on Prototype Design Report***	27 Nov	**THANKSGIVIING HOLIDAY**	27 Nov	**THANKSGIVIING HOLIDAY**
15	2 Dec	**Course Review**	4 Dec	**Submit: *"Prototype"* Design *Report*** ***No Lecture***	5 Dec	***Team presentations: Preliminary Business Plan***
16	10 Dec	***Last Day of Class*** ***No Lecture***				

Submission of Written Reports

With the exception of the weekly Project Status Reports, you will **submit two copies** of all written assignments:

- You will submit **one electronic copy,** using Canvas, **no later than 11:30 p.m.** on the day it is due. The official electronic submission *must* be to Canvas. **Course staff will not accept e-mail submissions of documents.**

  Your submission to Canvas will contain a time stamp, which will leave no question as to whether you have met the deadline above. **The penalty for lateness is a 10% deduction *per day* of the assignment's total (i.e., 10% off of both the technical and the written) grades.**

- You will submit **one copy** of the report to your Faculty Mentor, and you should arrange the details of how, when, and in what format (hard or soft copy).

Note: Submissions of the report in class and that to the Faculty Mentor do not override the requirements outlined above regarding timely submission to Canvas.

In addition, you will submit **one hard copy of (1) the preliminary version of the *Problem***

Statement and **(2) the *System Design Report*** at the start of class on the given due date.

Academic Dishonesty

Policies set by the University of Texas at Austin will be followed regarding academic dishonesty. PLEASE BE CAREFUL!! Copying text, figures, specifications, and so on that are not your own into your reports is PLAGIARISM ***unless*** they are referenced properly. All cases of plagiarism will receive severe penalties. Be especially careful to reference properly material from the web. **The graders in this course tend to take an unforgiving, cold-hearted, and truculent view of the merest hint of plagiarism.** For more information on what constitutes plagiarism, see Appendix A of this Course Guide.

Students with Disabilities

Students with disabilities may request appropriate academic accommodations from the Division of Diversity and Community Engagement, Services for Students with Disabilities at 471-6259 (voice) or 232-2937 (video phone) or **http://www.utexas.edu/diversity/ddce/ssd .**

Use of E-mail for Official Correspondence with Students

All students should become familiar with the University's official e-mail student notification policy. It is the student's responsibility to keep the University informed as to changes in his or her e-mail address. Students are expected to check e-mail on a frequent and regular basis in order to stay current with University-related communications, recognizing that certain communications may be time-critical. It is recommended that e-mail be checked daily, but at a minimum, twice per week. The complete text of this policy and instructions for updating your e-mail address are available at http://www.utexas.edu/its/help/utmail/1564.

Use of Canvas in Class

This class uses Canvas—a Web-based course management system with password-protected access at http://courses.utexas.edu—to distribute course materials, to communicate and collaborate online, to post grades, to submit assignments, and potentially to give you online quizzes and surveys. You can find support in using Canvas at the ITS Help Desk at 475-9400, Monday through Friday, 8 a.m. to 6 p.m., so plan accordingly.

Religious Holy Days

By UT Austin policy, you must notify the course instructor of your pending absence at least 14 days prior to the date of observance of a religious holy day. If you must miss a class, an examination, a work assignment, or a project in order to observe a religious holy day, you will receive an opportunity to complete the missed work within a reasonable time after the absence.

Classroom Evacuation for Students

All occupants of university buildings are required to evacuate a building when a fire alarm and/or an official announcement is made indicating a potentially dangerous situation within the building.

Familiarize yourself with all exit doors of the classroom and building. Remember that the nearest exit door may not be the one you used when entering the building. If you require assistance in evacuation, inform your instructor in writing during the first week of class.

For evacuation in your classroom or building:

Follow the instructions of faculty and teaching staff.

Exit in an orderly fashion and assemble outside.

Do not re-enter a building unless given instructions by emergency personnel.

PROJECT TEAMS

In industry, all significant projects are conducted in teams. The organization of EE 364E simulates those conditions. By working together cooperatively and by meeting regularly with your Faculty or Industry Mentor, Technical TA, and Writing TAs, you will be able to accomplish what any single member of the team could never accomplish alone.

Team Formation

To give students a realistic sense of design collaboration and project management, the course requires at least **five** people on each team. You should base your choice of team members on a diversity of technical skills and common interests in available projects. If you have difficulty forming a team on your own, the course instructor and Technical TA will help you identify potential team partners. All students must be on a team by Week 4 of the semester and must have turned in a project preference sheet (see Canvas). **Teams must take EE 464 together in the same semester**.

Use of Laboratory Periods

Team projects require face-to-face meetings during scheduled work times in the laboratory. All members of your team must be able to meet together for at least 3 hours per week, 2 hours of which must be during one of the scheduled lab periods. It is not necessary for everyone to be registered for the corresponding unique number; it is the group attendance that is essential. After you have formed your team and agreed on your lab meeting time, then that lab session will be the session you are required to attend throughout the semester.

Project Status Reporting

The team will report progress in three ways: by submitting weekly Project Status Reports to and meeting weekly with the Faculty Mentor, and by meeting the Technical TA weekly during lab sessions.

Each Project Status Report will summarize past, present, and future team activities, give details regarding open issues, and provide an overview of team progress. The work of individual team members should be spelled out. For specific instructions on the contents of the status report, see the Project Reports section in this Course Guide.

The weekly meeting with your Faculty Mentor will cover open issues raised in your status reports (or other assignments) and discuss your general progress. During these meetings, which should last approximately 20 minutes (with additional time allowed for questions), the Faculty Mentor will take the role of your “manager” and give you important feedback. These meetings are also an

opportunity for the Mentor to assess individual project performance.

Weekly meetings in the lab with the Technical TA are for assessing progress and team management, obtaining guidance on meeting course goals and requirements, and conducting general course management communication.

Project Management and Control

A complex and lengthy engineering design project involving a group of engineers requires good planning at its start and close monitoring throughout its life. A project, in other words, must be managed. What is there to manage? Besides the design itself, tasks must be apportioned among team members, work stages must accord with scheduled milestones (see Table 1), costs must be estimated and carefully monitored, materials and equipment must be procured on time, a system of communications must be set up among team members, and an effective working relationship should be in place in which all members of the team can work at their highest potential. Without effective management, a project can quickly drift along the course of least resistance until it runs aground because of cost overruns, missed milestones, miscommunication, wasted effort, and a poor design. In addition to everything else, project management and control are an important part of your grade.

All members of a team, therefore, should be active in keeping the project on track, and all members are expected to participate in all project activities, including the preparation of all written and oral reports. Your lab notebook, project reports, and discussions with your Faculty Mentor should all provide copious evidence that you are on top of your project as well as your design. Each team member, moreover, should be able to offer basic explanations of the project to the TAs and faculty when asked.

Effective project management depends on your ability to keep project information complete and up to date. As you move through the project, you will accumulate the following project management tools:

- Input/output diagrams
- User interface diagram
- Cost and material tables
- Block diagram of the design
- Work assignment sheet
- Gantt chart
- Issue list
- A history of complete and informative weekly status reports

Each time you meet with your Faculty Mentor, you should have whichever of these management tools you have created until that point up to date and ready to show. In addition, each team member should be able to discuss project status knowledgeably, and the team should be able to demonstrate that all members are equally engaged in productive activity.

Keep in mind that you and your team are as responsible for conducting a successful project as you are for designing a successful product—they are not the same. The following are a few tips to help you manage your project:

Develop a Common Understanding of the Design Problem: Be sure that all team members have a clear notion of the core specifications, the design problem, and what they both entail. Remember that your team will be responsible for providing a completed working solution to the problem, one that meets the core specifications.

Plan Your Project: Plan your project just as you plan your design. Put most of your planning effort in the early stages, and then constantly monitor and revise your plans as events unfold.

Assign Tasks Clearly and Equitably: Each team partner must know exactly what he or she is expected to accomplish. Overall, all team members should be equally involved in the design solution and the management of the project. Some partners may want to do more or less design work; others may want to do more or less management work. Even so, all team members should share in both kinds of responsibilities.

Make Full Use of Management Tools: Use the management tools you learned in EE 333T and will review or learn in EE 364E. Those tools include work breakdown structures, linear responsibility charts, project flow diagrams, calendars and Gantt charts, cost estimates, block diagrams, and lists of equipment needs. Always keep these tools up to date. Usually, good design and good project management go hand in hand. For example, a Gantt chart will often suggest natural work breakouts—that is, natural work divisions that can be allotted to individual team members.

Communicate: Hold regular meetings, with all team partners present, in addition to your weekly meetings with your Faculty Mentor. Effective project coordination requires that all partners are working from the same information. As problems arise, all members can contribute to solutions. Each team partner should report on his or her progress or lack of progress. Problems should be aired early and dealt with aggressively. It is difficult to communicate too much.

Keep an Eye on the Schedule: The easiest way to fall behind in any class is poor time management. The schedule provides you with specific milestones, and it is your team's job to organize your activity around meeting those milestones. Consider creating a Gantt chart even before it is required in an assignment and keeping it up to date to reflect the current situation. It is often the single best indicator of your progress: a detailed, well-constructed Gantt chart can show you right away where you are making headway and where you are lagging behind, and a good way to start meetings is to go over the Gantt chart together.

Be Alert to Events Affecting the Critical Path: The critical path is the sequence of tasks that must be followed before the project can be completed. If one task on the critical path is delayed a day, then all succeeding tasks on the critical path will be delayed a day. Tasks not on the critical path can be accomplished in parallel with the others. Coordinate the tasks so that, at any given time, all team members are directing their efforts along the critical path, or, when time is available, are working on tasks parallel to the critical path. In this way, you eliminate redundancy of effort and avoid neglecting critical or supplementary tasks.

Plan for Contingencies: Identify points where the risk of delay or failure is highest. For each case, have a contingency plan identifying your team's response should the worst happen.

Negotiate Differences of Opinion Constructively: Inevitably, team members will have different ideas about what constitutes good design and engineering practice. Those differences are healthy, for they fire discussion in which everybody can learn something new. Frequently, an

ingenious compromise of two opinions constitutes a better solution than either one of the differing opinions.

Monitor Costs and Use of Materials: Carefully estimate project costs early in the project, then make every effort to stay within the budget you have set. Keep tabs on the amount of materials used in your project, including waste.

Collaborative Practices and Peer Evaluations

At any given time during the project, all team members should be fully engaged in project activities, including not only lab work but also the preparation of written and oral reports. Project tasks should be assigned to partners equitably, but in a way that capitalizes on individual strengths and experience. If your strengths lay in particular project areas (for example, planning, proposing, researching, implementing, managing, coordinating, communicating, researching, and so on), then by all means put your energies into those areas. That does not absolve you, however, of responsibilities in other project areas, or of understanding what is happening in those project areas. You and your other team members will have opportunities to assess each other's qualities as team members. Your Faculty Mentor, in turn, will consult those evaluations when determining your grade as an individual contributor to your team's project (see below).

GRADING POLICIES

Course grades will be based on your work in three areas: project performance, project reporting, and in-class performance (see Table 2 for the weighting factors in all three areas). Your Faculty Mentor will assess individual project performance on the basis of technical achievements and how you report them in your lab notebooks and Project Status Reports, performance in weekly meetings and in the oral design review; project management skills; and the feedback your teammates provide in peer assessments. The Writing TA will provide a grade on all written project reports (except the weekly Project Status Reports), and the course instructor and/or Technical TA will provide a technical grade. Finally, the course instructor will provide an individual grade on the basis of participation and attendance.

Final course averages will be determined by applying the weighting in Table 2 to numerical grades. Final grade categories are as follows:
93.0 – 100.0 = A
90.0 – 92.9 = A–
87.0 – 89.9 = B+
83.0 – 86.9 = B
80.0 – 82.9 = B–
77.0 – 79.9 = C+
73.0 – 76.9 = C
70.0 – 72.9 = C–
67.0 – 69.9 = D+
63.0 – 66.9 = D
60.0 – 62.9 = D–
0.0—59.9 = F

Table 2. Grading Scheme for EE 364E

	Technical Performance	**Communication** (Assessed by Writing TA)
Individual Project Contribution (Assessed twice on the basis of technical and project performance, weekly project status reports, weekly meetings, laboratory notes, currency of project management tools, and peer assessments)	20%	–
Mentor Assessment (Assessed at the end of the semester on the basis of technical and project performance, weekly project status reports, weekly meetings, laboratory notes, and the Oral Design Review)	10%	
Instructor's Grade (Participation & Attendance)	8%	–
Written Reports		
Problem Statement -	5%	12%
Competitive Analysis & Prior Art Report	8%	7%
"Prototype" Design Report*	15%	15%
TOTAL	**66%**	**34%**

* ***All project teams must attend at least two writing consultations with the Writing TA. Failure to do so could result in a deduction (up to 5 points) from the writing grade for the Prototype Design Report. See*** **Project Reporting** ***for more information on the Writing Consultations.***

Evaluation of Project Performance

A significant portion of each individual team member's grade will reflect his or her technical contributions and performance on the project. Each member will receive **two** individual **Project Performance** grades, spread over the course of the semester, each covering the preceding period (see the Project Performance Grade Worksheet in Canvas). *This grade is one of the few opportunities that your Faculty Mentor has to differentiate among team members*, and it is your responsibility to make sure that your Mentor is aware of your contributions. Remember that these grades are not meant to be a competition among team members: **In an effective, successful team, *everyone* contributes at a high level.**

The Faculty Mentor will assess your project performance in three broad areas: technical performance, reporting, and project management and control. Criteria for technical performance include general progress in your work, depth of your research and data-gathering efforts, use of effective methods and lab techniques, robustness of your design, and identification of and response to risk factors. Project management relates to your ability to keep project records current, control the project budget and schedule, and manage project workflow and division of labor. The mentor will also consider the effectiveness of all project reporting, although only the Oral Design Review will receive a specific grade from the mentor.

In addition, all members of the team should, generally speaking, be equally involved in the technical accomplishments of your project, as demonstrated by contributions during meetings, lectures, and laboratory sessions. To assess the content of your contributions, the Faculty Mentor will rely heavily on your lab notebook, performance in weekly meetings, and the feedback your teammates provide in peer assessments, in addition to any other observations.

To help the Mentor judge your performance as a team member, all partners will assess each other's performance as project partners (see the EE 364E Team Peer Assessment form in Canvas) at two points during the semester, coinciding with two of the project performance grades. The Faculty Mentor will use these peer assessments, along with his or her own observations, in determining project performance grades, giving credit to partners who make outstanding team contributions, or denying credit to partners who make little or no contributions. Remember that when you report a team member's failure to pull his or her weight, you are not "betraying" that person. In fact, he or she has put *you* in the difficult position of feeling guilty for reporting the facts.

The Project Performance grades are opportunities for you to receive assurances that you and your team are performing at an appropriate level or, alternately, to understand clearly where you are not meeting expectations so that you can correct those shortcomings. **Good engineers view poor performance evaluations as opportunities to improve their work, not as predictors of future performance.**

Evaluation of Written Reports

The Writing TAs, course instructor, and Technical TAs will evaluate written assignments (except for the weekly Project Status Reports) against professional standards of technical content, writing quality, and project reporting. The Writing TAs will grade your reports for appearance, clarity, comprehensiveness, and style and mechanics (see the EE 364E Report Writing Evaluation Form in Canvas). The course instructor and/or Technical TAs will grade your reports for depth, comprehensiveness, and accuracy of technical information (see the EE 364E Report Technical Evaluation Form in Canvas). Note that you will receive separate grades from these graders.

Your Faculty Mentor will also read your technical reports, as well as the weekly Project Status Reports, and use them to better understand and grade your overall technical progress. They will be a factor in your Project Performance grades from your Faculty Mentor.

Evaluation of In-Class Performance

The course instructor and Technical TAs will evaluate your performance in impromptu briefings that will occur in regular class meetings throughout the semester. As with the briefings you will provide your Faculty Mentor in your weekly meetings, these briefings are an opportunity for stakeholders to keep tabs on your project and its progress. They are also an opportunity for you to demonstrate that you and your team have control of the project and understand where you are in the process. By definition, these briefings are unscheduled—here, as in industry, you never know when someone will ask about the project—so you should always come to class prepared to discuss, and answer any questions about, your work. Along those lines, consider developing working descriptions of the following:

- A concise but informative description of your design problem (for example, your Elevator Speech)
- Summary versions of any other material you have presented in earlier reporting.

- A clear sense of what you have accomplished, what you are currently working on, and what is next on the agenda—that is, a working version of your weekly Project Status Report.

RESOURCES AND ASSISTANCE

For guidance in your design activities, you have available your Faculty Mentor, the course instructor, and the Technical TA. For questions on project reports, you may consult with the Writing TAs. The TAs and faculty are knowledgeable, but they are not in the business of giving you convenient answers; their purpose is to help you discover answers on your own.

Facilities and Resources

Laboratories are located in Ernest Cockrell Jr. Hall (ECJ), with a checkout counter. Because different projects require different equipment and materials, it is best to talk to the Technical TA—and possibly your Faculty Mentor—as early as possible about the types and location of the facilities and resources for your project. To broaden your experience in the course, you are encouraged to use the full gamut of facilities available to the Electrical and Computer Engineering Department.

The Role of Your Faculty Mentor

Because each design problem is unique, the set of problem-solving skills you and your partners bring to the problem will also be unique. If you expect your Faculty Mentor to show you and your team "how it's done," then you understand neither the design process nor the aims of this course. First, design, is a discovery process that requires that *you* match what you know or can figure out with what the problem calls for. No one can do that but you. Your Mentor's job is to help you create the conditions in which you can work most effectively. In that role, he or she can advise, assist, encourage, and help you locate resources—in other words, serve as a mentor and coach during your design project. At times, the Faculty Mentor can point out problems in your thinking, raise issues for you to consider, and perhaps suggest a more promising course of action. Your role is to supply the knowledge and skill to perform and complete the design. The following are a few of the ways your Faculty Mentor will work with you:

- Discuss and explore your design problem, supervise your efforts, and periodically review your progress. You can expect the Faculty Mentor to have expertise and experience in your general problem area and in managing complex projects.
- Observe and evaluate your team's project performance. **Note:** Each of you must assert yourself during laboratory operations. Expect the Mentor to question you individually to assess your knowledge of the project and contribution to its progress.
- Be available for weekly team meetings.
- Sign or review notebooks during weekly meetings to ensure that they are being kept up to date in real time.
- Attend your Oral Design Review and grade its contents and your performance.
- Offer feedback on the technical contents of your written reports.

- Assess the project management and control aspects of your team's performance.

The Role of Your Technical TA

The Technical TA for EE 364E will assist the course instructor with administration of the course. He or she will

- Meet with each team regularly and be available for general consultation hours in the Lab (exact hours to be announced).
- Evaluate the technical contents of your written reports, excluding the weekly Project Status Reports. (The Writing TA will assess considerations such as the quality of technical writing and conformance to format standards.)
- Answer any questions about the course objectives, rules, and policies.
- Review your notebook periodically during the semester.
- Keep grade spreadsheet and post grades to Canvas.

The Role of Your Writing TA

You and your partners are required to schedule and attend up to two mandatory Writing Consultations with the Writing TA to discuss issues related to your project reports. Failure to comply with this requirement will result in a 5-point reduction of the writing grade of your System Design Report. The Writing Consultations are described further in the Project Reporting section.

Throughout the semester, your Writing TA is available to help you and your partners plan what you want to say in a written document, clarify format issues, discuss the grading system for written reports, and advise you on your general writing style. The following items state what the Writing TA can do for you:

- Lead Writing Consultations where you will receive general feedback on your writing assignments and help in establishing sound editorial and collaborative practices.
- Explain the grading policy for written assignments.
- Answer any questions about the assignment itself.
- Preview your report for *general* organization and conformance with format standards.
- Answer *specific* questions about grammar or wording.
- Advise you on the IEEE documentation conventions for citing the work of other authors in your text and creating a reference list.
- Direct you to reference books that will help you refresh your writing skills.
- Advise you on the *general* organization, format, and readability of the visuals for your oral reports.
- Advise you on your oral delivery techniques.
- Discuss your graded assignments to help you improve your grades on later papers.
  NOTE: *You must wait at least 24 hours from receiving a writing grade and TA comments before discussing the grade and/or comments with your Writing TA.*

The Writing TA will not do the following:

- Proofread your report before you hand it in.
- Rewrite paragraphs, passages, or sentences.
- Accept reports by e-mail attachment for comment or grading.

The most effective way to improve the grades of your written reports is to consult frequently with the Writing TA. When a TA has numerous reports to grade, he or she may have only enough time to mark, but not explain in written detail, the problems in your writing. **To get the full benefit of the writing assignments and to improve your grades on later reports, you would do well to visit a Writing TA during office hours and discuss the TA's or grader's comments and markings on the assignments returned to you.** (Again, note that *you must wait at least 24 hours from receiving a writing grade and TA comments before discussing the grade and/or comments with your Writing TA.)*

How to Find HELP!!

For assistance with course policies and rules, consult with the course instructor and your Technical TA. If you have technical question concerning your topic area, your Faculty Mentor should be your first choice for advice. In addition, for answers to some questions, you may have to turn to experts in the topic area, that is, additional staff or faculty members. Try to identify your most reliable sources of information early in our project. Be extremely wary, however, of advice or instructions on the Web. Remember, most of the information you read there has not been reviewed for quality or correctness, and it has been written by people who want you to buy their products or who may be even less knowledgeable than you.