EE 4349 Spring 2013
Engineering Design Project
Sec 002 Tues-Thurs 9:30 A.M. – 12:20 A.M. NH 130

David A. Wetz, Ph.D.

Catalog Course Description:
EE4349 Engineering Design Project (0-3)
A practicum resulting in the design, construction, and evaluation of a device or system, building on electrical or electronic knowledge and skills acquired in earlier course work, and incorporating appropriate engineering standards. The application of project management techniques in order to meet design specifications through the effective allocation of team resources, scheduling, and budgetary planning. The demonstration of the finished product/prototype through both oral presentation and a written project report. Mode of Instruction: Practicum.

Pre-Requisite:
EE4340, Concepts and Exercises in Engineering Practice
Grade of C or better in EE 4340. Grade of C or better in all prior 3000 and 4000 level EE coursework.

Instructor:
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Office Hours: **T**-T 1:00 P.M – 4:00 P.M. I have an open door policy so please feel free to stop by my office or lab any time. If I am able, I am happy to help.

(To ensure proper prioritization and prompt attention, MUST include "EE4349_F12_Pnn where Pnn is your Project ID" as the first text in SUBJECT section of all e-mail)

Course Website: http://www-ee.uta.edu/hpi/EE_4349/
Note that this is currently a common website – to be shared by all EE4349 sections. However, students should consult the syllabus for their respective section as some differences in policies may occur.

Section Information: EE4349-000

Times and Location:
Tuesday and Thursday
9:30 A.M. – 12:20 P.M.
NH 130

Required Textbook: None

Project Assignment:
Students will continue with and complete projects assigned during EE4340. If students were not assigned projects during EE4340 in the previous semester they will bid for and be assigned to projects and teams immediately after the first class period.

Proj ID:	Name of Project:	Sponsor:	Brief Description:	Team Members
P85B	MicroMouse Robot	Dr. Wetz	Every year at the Applied Power Electronics Conference (APEC) there is competition called 'Micromouse' (http://apec-conf.org/participating-in-apec-mainmenu-261/participating-in-micromouse-mainmenu-242) in which participants develop a fully automated car or 'robot' that can maneuver itself throughout a fairly detailed maze.	Isaac Cohen Clint Gnegy-Davidson Cuong Van Vu Christopher Portillo
P92	AC Watt Meter	Dr. Wetz	An wall connectable AC Watt meter must be designed. The wall outlet must be passed through for the connection of a conventional load and an LCD display must give the current voltage level, current being passed through, frequency, power, and kilo-watt hours consumed.	Arar Abohaija Jason Adams Deogracias Matukanga Dustin Easley
P93	Wireless Garage Door Sensor	Dr. Chiao	The team will be designing and building a stand-alone home security sensor detecting human motion. The power supply will be solar panels. The sensor modality will be determined by the team and the requirement is to detect human motion but reject animal motion within a distance of two meters. The sensor location will be random, for example, on the lawn or on the driveway, and the sensors communicate with a wireless transceiver inside the house.	Chaudhry Arafat Adebanke Adetola Raul Portillo Cody Lundberg
P95	Solar wireless lighting system	Dr. Chiao	The team will design, fabricate, test, and document a solar wireless lighting system.	Adnan Quazi Charchit Piya Huy Huu Tran Tai Ha
P96	DC Motor Power Subsystem - Electric Racecar	Dr. Woods (MAE)	We are in the process of designing and building an electric racecar for a 2014 competition. This car will have four in-wheel motors. Each motor will be a direct drive motor. We will design the motor controller with some help from TI. We will use a TI micro-controller for the switching and logic controls. We plan to use power transistors to drive the three phases from 200 volts. This SDP is part of the larger project. Specifically, it involves the design, fabrication and testing of the subsystem that will power the motors. In addition, the controller must have regenerative braking. This controller must fit on a PCB that is connected directly to the 11 inch diameter stator. The team will assist in the design of the PCB.	Timothy Morrison Kris Kotrla Yujan Sulpya Noor Khan

P97	Power Regeneration/Battery Charging System - Electric Racecar	Dr. Woods (MAE)	(This is closely related to P96). We are in the process of designing and building an electric racecar for a 2014 competition. This car will have four in-wheel motors. Each motor will be a direct drive motor. We will design the motor controller with some help from TI. We will use a TI micro-controller for the switching and logic controls. We plan to use power transistors to drive the three phases from 200 volts. This controller will have regen capability and this SDP will focus on that aspect. This SDP is part of the larger project. Specifically, it involves the design, fabrication and testing of the subsystem that will power the motors.	Muamba Muanankese Travis Lloyd Bruke Tsehayetsidk

Design Constraints:
The system/device(s) must be designed and constructed by the team. Commercial products may not be purchased and reverse engineered, but reference to texts and outside sources is highly encouraged. This design constraint against reverse engineering also applies to sub-assemblies within the project. Don't plagiarize, it isn't worth it.

Similarly, the design must be built using discrete components. That is, kits may not be purchased and integrated into the design unless specifically approved in writing by the course instructor and project sponsor. The purchase of individual IC chips to perform desired functions is within the scope of the project. As needed, subassemblies such as microprocessor development boards may be purchased and integrated into the project as approved by the project sponsor and course instructor.

Grading:
Each project has a sponsor, considered to be "the customer" or client. Thus, the project is expected to produce a real-world deliverable of interest and value to the project sponsor – and is not simply an academic exercise. The project grade will be determined from performance on several key identified elements of the course. **You are working as a group but will be graded individually so don't expect your group to carry you.** It is expected that each student will carry his or her own weight and that you will work together as a team. This course is intended to model the real world and that is how it will be when you leave UTA. It is recognized that each individual project can have different progressions depending on both the project and team members. This more professional, real-world framework, along with the desire to encourage thoroughness and completeness in your work, guided the development of the grading rubric for EE4349, which is described below.

• Grading Approach and Considerations
Team performance is no doubt important. However, there is a range of possibilities regarding what individual members contribute. Ideally, all members would contribute equally to each project and each team member's grade would be the same as the team grade. Since this is not always the case, it is necessary for the grading process and rubric to incorporate elements that reasonably reflect individual contributions to determine meaningful individual grades.

• Determination of a Team Grade
A team grade will be determined by performance in several key aspects of the course. Final grading will not be the simple sum of graded components with different weights, as it can be demonstrated that this approach can produce final results that do not properly reflect actual performance.

Rather, a criterion-based approach is utilized that is centered around the course deliverables. These are grouped into categories and the performance within each category is evaluated. Each category is outlined as follows:

Hardware/Software Performance: This includes how well the specifications of the project were achieved. It also includes physical appearance and packaging. Does "it" work (i.e., were the system performance specs generally met) or not? If not, what level of functionality and performance was achieved?

Presentation Performance: The primary element of this component is the video presentation of the project with emphasis on demonstrating the results obtained. In addition, face-to-face presentations to the course instructors and project sponsor are considered. The rubric employed in EE4340 for creation and evaluation of oral presentation will serve as the basis for evaluating EE4349 presentations, with continued emphasis on both content and format.

Documentation Package Performance: Completeness and quality of: 1) the information to be submitted on the CD/DVD deliverable, which is described on the course website, and 2) laboratory notebooks.

Work Practices Performance: This category includes items and performance distributed over the entire semester. This includes: 1) planning - and submission of a revised project plan early in the semester, 2) attendance at lab sessions, 3) timely submission of thoughtful and meaningful weekly reports, 4) willingness to seek, accept, and pursue constructive recommendations from instructors, and 5) consistent recording of designs, reference information, procedures, test set-ups, and data in Engineer's notebooks, etc.

The rubric for evaluating Team Performance and determining a Final Team Letter Grade is based on these categories and is summarized in the table below. This is not the final *individual* grade.

Note that performance in each of these categories is not completely independent. Thus, it is relatively unlikely, for example, for a team to exhibit acceptable performance in the presentation category and unacceptable performance in all other categories.

Rubric Used as the Guideline for Determination of Final Team Grade

Hardware/ Software Performance	Documentation Package Performance	Presentation Performance	Work Practices Performance	Letter Grade
1	1	1	1	A
1	1	1	0	B
1	1	0	1	B
1	1	0	0	C
1	0	1	1	Borderline D-C (can possibly drive to C or better with timely revision of Documentation Package)
1	0	1	0	Borderline D-C (can possibly drive to C or better with timely revision of Documentation Package)
1	0	0	1	Borderline D-C (can possibly drive to C or better with timely revision of Documentation Package)
1	0	0	0	Borderline D-C (can possibly drive to C with timely revision of Documentation Package)
0	1	1	1	Borderline D-C (C more likely, but depends on further analysis of hardware/software)
0	1	1	0	Borderline D-C (D - more likely and final; too late

				to rectify poor work practices)
0	1	0	1	Borderline D-C (depends on further analysis of hardware/software, unusual circumstances)
0	1	0	0	D (this combination is less likely to occur in practice)
0	0	1	1	D (this combination is less likely to occur in practice)
0	0	1	0	F (this combination is less likely to occur in practice)
0	0	0	1	F
0	0	0	0	F

Note: "1" – Minimally Acceptable ("Good or Better") Quality or Performance
"0" – Unacceptable ("Poor or Worse") Quality or Performance

• **Determination of Individual Grades**

The Team Grade is the starting point for determination of Individual Grades. Individual Performance will be determined by a combination of peer reviews (i.e., evaluation by your team members, similar to evaluations utilized in EE4340), a student's Engineer's notebook, lab session attendance and work methods, and collective observation made by instructors during weekly lab interactions. Each team member is expected to have individual, defined responsibilities and these play a significant role in the judgments of contributions/performance offered by peers and instructors.

A final evaluation of Individual Performance will be determined (0 – "poor or worse", 1 – "adequate – meets expectations", 2 – "superior or better"). It is difficulty to codify the exact criteria for each of these categorizations. Instructors will attempt to clarify expectations when working with individual teams and team members. Students are encouraged to discuss expectations regularly within the team and with instructors.

The following table will be used as a guideline for determining a given student's final grade.

Rubric Used as the Guideline for Determination of Individual Grades

Team Grade	Individual Performance	Individual's Final Grade
A	0	F or D
A	1	A or B
A	2	A
B	0	F or D
B	1	B or C
B	2	A
C	0	F or D
C	1	C
C	2	B
D	0	F
D	1	Unlikely Case*, but C or D possible
D	2	Unlikely Case*
F	0	F

F	1	Unlikely Case*, but C or D possible
F	2	Unlikely Case*

* If at least one team member meets or exceeds expectations, it is highly unlikely that the Team Grade will be less than "C". In the rare cases when this may occur, experience indicates that there are typically unusual factors involved. It is not feasible to provide a rubric that covers all such cases. Individual grades will be determined in such situations on a case-by-case basis in a manner consistent with principles underlying the above rubrics.

• Intermediate Grades

Intermediate letter grades will be determined employing the integration of available information using the grading rubrics described (see also Elements Contributing to Grading – below) and communicated to each student. They will reflect "status/progress at a given point in time". The final grade, however, will be independently determined and depend most heavily on the final results as determined by performance in the categories listed in the above rubrics at the end of the semester Thus, poor performance – and poor grades - at intermediate points *provide warnings* that students are on a path that needs immediate attention and correction. These may, as well, support in part a final grade reflecting a poor final result.

If a successful final result is delivered, final grading can take precedent over poor intermediate grades (at the discretion of the instructor) thereby providing an opportunity to earn a very good final grade. However, students are strongly discouraged from thinking that this approach is a viable substitute for good performance in the first half of the course. Likewise, good intermediate grades are no guarantee of a good final grade. It is considered, however, that it will be more likely for a team to meet final objectives if intermediate objectives are met and steady progress is made (and this will be reflected by intermediate grades). Again, these principles reflect what happens in the real world you are preparing to enter.

• Elements Contributing to Grading

Class Attendance and Sign-In/Sign-Out: Attendance is considered mandatory unless the instructor is notified ahead of time and a good reason is given. Scheduled class time is not only an opportunity for the team to work together, but is also critical for instructor interaction, evaluation of progress, and problem solving. One unexcused absence will be accepted with no impact, but **no more will be tolerated**. A form will be available during the regularly scheduled lab times for students to sign-in and sign-out. This will document attendance/work during these time periods.

Engineer's Lab Notebook: In keeping with standard industry practice, each student must keep a formal Engineer's Notebook during the execution of this project. The volume must be bound so that pages cannot be removed. All work performed on the project should be documented in the Notebook. PROJECT NOTEBOOKS will contribute significantly to determining individual team member performance. All entries must be dated. This will support determination of intermediate and final grades.

Weekly Reporting: Each team must designate a member to be responsible for submitting a brief written weekly **TEAM** status report. An Excel file will be available on the course website to facilitate this process. One file will cover all reports for the entire semester, with new information added to the previous version of the file each week. These reports are due on Monday of a given week and should be submitted by email to the course instructor and GTA.

In addition, teams should provide this information to the project sponsor. Teams are encouraged to meet weekly with projects sponsors, bring a hard copy of their own **INDIVIDUAL**, type written weekly report generated using the Word template, with them to this meeting, have the sponsor sign the hard copy, and submit this hard copy of the instructor at the next regularly scheduled course meeting. It is understood that not all project sponsors will want to meet on a weekly basis and the instructor will determine the intent of individual sponsors. Nonetheless, *some* (but not *none*) periodic meeting with your project sponsor is expected during the course of the semester and weekly reports should accurately reflect the essence of such meetings.

In addition, at least once every other week, the instructor will request an impromptu oral report during the class session. Teams should be prepared to deliver such reports at any time. During these reports, the overall project status should be addressed, key problems identified (if any), and proposed methods of resolution described. In addition, each team member should be prepared to identify their area of responsibility and progress made since the last report (not simply what you "were working on", but *progress made*. If none, state it as so.). These reports are anticipated to last approximately 15 minutes. It is therefore necessary to be clear and concise.

The Project Plan: The project plan is a written document that must include a description of the work to be accomplished, including specifications, a hierarchical task analysis, and resource allocation (task assignments) schedule, and budget. This should consist of a careful review, update, and revision of the latest plan submitted in EE4340, according to specifications provided in that course. Accordingly, each team is responsible to break the project down into individual tasks, assign members to each task, plan a project schedule that takes into account all tasks and ensures completion by the assigned date. A GANTT chart relating tasks (including assigned individual) and schedule should be included in the Project Plan. This should be submitted by email to the course instructor and GTA no later than the end of week 2.

Each team must select a team leader who will coordinate the team's activities. The team leader will be responsible for liaison between the team and the sponsor as well as the course instructor.

Design Reviews:

Design Review 1: Each team will make a formal Design Review Powerpoint presentation to the entire class. This is targeted for about week 4-5. Teams must work to provide a complete design by this time in order to allow for sufficient time for parts acquisition, construction, testing, etc. The focus will be to describe the design of the system and should include elements such as functional block diagrams, options considered for implementing major blocks, decisions made, decisions that still need to be made, key analyses that are required to achieve the finalization of major blocks, sketches or computer drawings of final packaging concepts as well as identification of major problem areas and plans for their solution.

Design Review 2: This will occur somewhere around Week 7-8. To minimize the impact on the time of other teams, this presentation will only be made to the instructor and GTA and will take place at the team's lab workstation area or other agreed upon location. This should include presentation of materials on the workstation computer (or one of the team member's computer), as well as a "show-and-tell" of bread-boarded subsystems (or the overall system). The computer-based presentation should cover the status of the design - including both hardware and software (which by this time should be finalized or close to being finalized). It should also describe and illustrate the status of project documentation (see Final Package). This presentation should reflect progress toward a final presentation.

Design Review 3: This review can occur at any time between Design Review 2 and Week 13. It will also be made only to the course instructor and GTA. It will take place at the team's lab workstation area. The content and focus is the same as Design Review 2. However, it is expected that the team will now have hardware and software close to the final packaged form (i.e., printed circuit boards made and tested, etc.) and at least preliminary test results that document performance. In essence, this ideally should be a "dry run" of the final demonstration.

Individual Interim Reports: At mid-semester (targeting week 7), each team member is required to submit an individual report. The format of this report will be discussed in more detail in class, but each person's report must discuss all aspects of the project – including those that are not your primary responsibility. You are encouraged to get help from the team members who did the work, but it is essential that *your explanation* of the work is *your own* and not copied from the team member who performed the work. Be sure to reference your team member in any work they perform and you use. The reports should include an abstract, introduction, background, experimental setup/results, conclusions, and reference sections. As such, you should consider this as an opportunity to make significant progress toward the preparation of final deliverables and avoid end-of-semester stresses due to procrastination.

Interim Peer Evaluations: Around mid-semester (after formal Design Review presentations), team members will submit peer evaluations of their members using a form provided. In addition, the entire class will evaluate formal Design Review presentations using a form provided. Peer reviews will contribute substantially to the determination of individual grades. However, the intermediate peer evaluations provide an opportunity to identify and correct potential problems and thereby improve overall team performance.

Project Poster: Teams are required to prepare and submit a poster that summarizes their overall project. Look under Downloads on the course website to obtain a copy of a Powerpoint template for making the poster. At the minimum, an electronic format of the completed Powerpoint file is required. (Printing of posters may also be required – consult your course instructor). Posters may be presented to the EE faculty and EE advisory board. It is important to do a professional job on this element. You may wish to use the poster and/or part of its content as part of your final presentation.

Pre-Final Project Report: A preliminary final project report must be delivered to your sponsor, the course instructor, and GTA at least three days prior to your final "live" presentation/demonstration. See details regarding the Final Project Report and Live Presentation/Demonstration below.

Live Project Presentation/Demo: Some form of a final "live" presentation/demonstration is required. Details of this element can vary across EE4349 sections, may be "open to the public" or "more limited" (e.g., only instructors and project sponsors) and may depend on project status at the end of the semester. Consult your instructor for details. General guidelines are provided here.

You are required to arrange and deliver a face-to-face, live presentation and demonstration of your project if your sponsor requests it. You are encouraged to arrange to do this regardless of your sponsor's request. The course instructor and GTA should be informed and involved in the scheduling of this. This should be carried out no later than the last day of classes for the semester. If you are unable to schedule this presentation/demonstration with your sponsor, plan to deliver it to at least the course instructor. You are encouraged to utilize your poster to facilitate this presentation.

Video Presentation (*consult your section instructor regarding this requirement*): Instructors will keep abreast of your progress and the status of your project during the semester via Design Reviews and informal checks during each lab session. We will thus have a good sense of the status of your project as the semester end nears. Your final presentation and demonstration must be documented in the form of a video presentation. This should: 1) briefly describe the overall project and its goals (giving at least a little background so that someone not familiar with the project can appreciate its relevance), and 2) focus on demonstrating the results obtained. This should be a thoughtful, well-structured presentation that is 15-20 minutes in length.

Typically, the video should include Powerpoint type slide content as well as video of lab demonstrations. All team members should participate in the production and presentations. There are good and poor ways to present such information. Previous videos will be available for review during the semester to help plan your approach. It is suggested that preliminary video preparation efforts begin early in the semester so as to work out technical issues and procedures. We have found that there is at least one student on a team who has access to devices to acquire and edit videos. If not, video equipment will be made available. All teams must plan to do this video. Note that your instructor will let you know as the semester end approaches if you are "not ready" to do a final video. In cases where sufficient progress toward achieving project objectives has not been made, you may be informed to delay doing the final video until sufficient progress is made. In such cases, it is likely that team members will receive a grade of "incomplete" or less than a "C" for the course.

Final Project Report: The final report should be submitted by the last scheduled class day in hard copy form and also emailed to the instructor and GTA. For the electronic submission of the report, it is highly recommended that the main report file and all appendices be integrated into a single PDF file. (For the Final CD/DVD submission – see below – source files are required; i.e., .docx, .xlsx, etc.).

The Final Report should be sufficiently detailed to allow the project sponsor to implement and/or replicate your work. The final report and appendices should contain photos as necessary to support understanding and documentation of the project and performance verification results.

You should begin working on your Final Report immediately (clearly – there are some sections that will be defined at the beginning of the semester!) and continue to develop it throughout the semester. The instructor may ask to inspect the status of your team's final report at any time.

The final report should contain the following sections:

- Cover Page (Project ID, Project Title, Team Members, Sponsor, Semester)
- Abstract
- Introduction - Description of the system/device (a brief "big picture" overview, enabling someone unfamiliar with the project to achieve a basic understanding of it and its relevance).
- Brief Background – Describe similar systems/devices and relate to the current project.
- Design specifications to which the project was intended to be built,
- Design options considered and rationale for choice made, including decision matrices wherever applicable,
- Design Description/Theory of Operation - Describe in detail how the final design achieves the desired functionality and performance. Include relevant calculations (or point to relevant appendices), etc.
- Test Set-ups and Procedures/Results – Describe in full detail methods used to demonstrate that the project met *(or how well final result met)* design specifications.
- Conclusion – Assess the final status and make recommendations, as appropriate, for follow-on work.

Appendices should also be included. Depending on the nature of your project and choices made regarding what is included in the main Final Report document, they should contain the following elements when applicable:

- Schematic diagrams (complete except for subassemblies, such as a microprocessor board, integrated into your design).
- Software code listing for all code developed as part of the project. This should be fully documented at multiple hierarchical levels, including: 1) a description of the purpose of each major section of code (and subprograms), including
- A Parts Layout Diagram for each circuit board, ideally linked to the schematic diagram (but this may be different for different project sponsors and their requirements).
- A Detailed Parts List (Bill of Materials), including package description (e.g., SOIC-8), Mfg. Part No., Description, Vendor Part No., and cost.
- A copy of the Project Plan, including any modifications made as the semester progressed
- A Detailed Description of each person's unique contribution to the team
- Summary of the learning accomplished as a result of performing this project
- A detailed reference list of all sources reviewed in the design of the project and cited in other documentation.
- Any additional support material deemed to be relevant to the project.

Appendices can be included within the primary final report file. However, it is generally more practical to have separate source files for appendices. Each should be named with well thought out, descriptive names. Include your project ID (e.g. Pxx) as part of every file name.

Submission of Engineering Lab Notebooks: Concurrent with the submission of the final report, all Engineering Lab Notebooks must also be submitted. These will be retained for at least two weeks following end of the semester. Students may request a return of their notebook.

Final Hardware/Software Package: Teams must arrange with their project sponsors to submit to them a final hardware/software package. It is the responsibility of each team to communicate to the course instructor by no

later than week 12 what the sponsor requires in this regard. Project components should not simply be left in the student lockers at the end of the semester.

Final Deliverables CD/DVD: In addition to the items listed above, a Final Deliverables CD/DVD must be submitted. This package should be a "stand-alone" source, providing everything necessary for another EE - or your project sponsor - to understand your project and, if necessary or desired, carry it forward.

The CD/DVD should contain a well organized set of materials. At the root level, a Pxx_ReadMe.doc file should be included that describes everything else on the CD. Folders should be included for:

- Final Report – including Appendices (see above) (the final report folder should consist of a Final Report file .doc or .docx as well as any other source files for separate appendices).
- PCBs - This should include: 1) a Pxx_ReadMe_PCB.doc file that explains what software (including version numbers) was used to develop schematics and layout PCBs what one must know in order to fabricate PCBs, 2) Schematic file(s), 3) so-called "board" file(s) that contain the layout, and 4) all library files required.
- Software - This should include source code listing containing explanations sufficient for someone else to understand the structure and logic of the code. This includes explanations (not just "comments"!) of each major routine, assembly/compiling instructions, etc. Any support files required should also be included. Each major software component should have its materials included in separate subfolders (e.g. Pxx_HostPC_SW, Pxx_Microcontroller_SW, etc.)
- Data Sheets: PDF datasheets for ICs and any "special" components should be included. If you are in doubt regarding what constitutes a "special component", include the data sheet!
- Literature References: Include PDFs of any papers you consulted that provide useful background regarding your system. Also, include copies of papers listed in the Reference section of your report.
- Poster - This folder should contain an electronic copy of a poster describing the project
- Video - This folder should contain one or more video files (.avi, .mpg) representing a Final Project Presentation and Demonstration. Efforts should be made to combine this into a single file. No more than three files will be reviewed. Refer to the course website for additional information.

Revision to Submitted Materials: You should assume that grading will be based on materials submitted. You should take advantage of any opportunities for preliminary reviews of components of your final report by the course instructor or project sponsor. At the discretion of the course instructor, an opportunity may be provided to revise materials based on instructor recommendations prior to determination of final grades. This depends in part on timely submission of materials.

Beyond the determination of final grading, you should also expect that you may need to called upon to clarify and/or revise one or more parts of your final report after it has been reviewed by the Project Sponsor and/or Instructor. End-of-the-semester time pressures often limit the opportunity for a complete and thorough review of details. In the real-world, it is common for a sponsor to need “more detail” or “clarification” of a submitted report. Thus, while it is may not influence your grade, from a professional perspective you should recognize an obligation to respond to reasonable sponsor follow-up requests. We believe that any such interactions will also contribute in a positive way to your development.

Learning Objectives and ABET Outcomes:

EE4349 – Engineering Design Project - Learning Objectives

Number	Course Learning Objective
1	Learn how to take a project definition, as assigned by a sponsor, and effectively transform it into a to system design
2	Learn how to apply the theoretical solutions of the problem into a physical system that achieves the desired results
3	Learn how to effectively present the theoretical and applied aspects of the project to others in

	PowerPoint presentation form
4	Learn how to write a technical report that describes the theoretical and applied aspects of a system design
5	Learn how to apply electrical engineering theory and design into a project that is non-electrical engineering in nature
6	Learn how to document research and laboratory work in an ongoing research notebook
7	Learn how to effectively present the theoretical and applied aspects of the project to others in poster presentation form
8	Learn how to work collaboratively in a group with others to solve a technical problem
9	Learn how to design and create a professional printed circuit board
10	Learn how to prototype electrical circuits and test them in the laboratory
11	Learn how to utilize and combine numerous different electrical engineering disciplines to meet the project goals

The EE undergraduate program is accredited by a body known as ABET. ABET has establish a series of outcomes for undergraduate engineering projects (designated as "a" through "k" items). Consideration of these outcomes and how EE4349 contributes to achievement and assessment of them is provided here:

a. an ability to apply knowledge of mathematics, science, and engineering; (VERY WELL COVERED)
b. an ability to design and construct experiments, as well as to analyze and interpret data; (VERY WELL COVERED)
c. an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability; (VERY WELL COVERED)
d. an ability to function on multidisciplinary teams; (COVERED OCCASIONALLY)
e. an ability to identify, formulate, and solve engineering problems; (VERY WELL COVERED)
f. an understanding of professional and ethical responsibility; (VERY WELL COVERED)
g. an ability to communicate effectively; (VERY WELL COVERED)
h. the broad education necessary to understand the impact of engineering solutions in a global and societal context; (COVERED)
i. a recognition of the need for, and an ability to engage in lifelong learning; (VERY WELL COVERED)
j. a knowledge of contemporary issues; (BRIEFLY COVERED in SOME CASES)
k. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice. (VERY WELL COVERED)

• Grade of "Incomplete"

Due to the fact that EE4349 is likely to be taken in what is anticipated to be a student's "final semester", it is generally not desirable nor practical for students to receive a grade of incomplete. Both teams (as a whole) and individual team members must consider the status of their project during the course of the semester and evaluate whether a reasonably acceptable outcome is in grasp.

In questionable cases, either teams or individual students must make determination of whether they wish to submit their work for grading at the end of the semester OR request an incomplete. Submitted work will be graded without any guarantee of receipt of a passing grade – and students should be prepared to consider and accept consequences. Requests for an incomplete must be submitted via email prior to the last regularly scheduled class session. Such requests will only be approved based on consideration of circumstances leading to the request, the amount of remaining work, and an assessment of the probability of completing remaining work in a reasonable (1-2 weeks) period.

Other Important Course Policies and Procedures:

Lab Safety Training: Students registered for this course must complete the University's required "Lab Safety Training" prior to entering the lab and undertaking any activities. Students should be notified via MavMail when their online training is available. Once notified, students should complete the required module(s) as soon

as possible, but no later than their first lab meeting. **There are no exceptions to this requirement. Until all required Lab Safety Training is completed, a student will not be given access to lab facilities, will not be able to participate in any lab activities, and will earn a grade of zero for any uncompleted work.**

Communicating Effectively: During the course of project execution, there will be much communication (mostly via e-mail) between project members, teams and sponsors, and the course instructor. This document raises key issues and describes guidelines that you should follow to achieve a professional level of communication and good results.

Parts Acquisition: As of the Fall 2012 semester, new procedures are being implemented for parts acquisition. Please read the following carefully. There are three primary sources for parts to support your project: 1) the EE lab stock, 2) parts purchased from various component distributors (major ones were identified and discussed in EE4340), and 3) special items provided by your sponsor.

The EE lab has a stock of commonly used items that are especially useful for prototyping. These items are listed on a website, along with a parts request form: http://www-ee.uta.edu/eelabs2/

We will attempt to have the parts stockroom open during the class meeting times to get parts for you (This will not be possible for the evening section of the course). You must complete a parts request form and submit it to the instructor via email before any parts will be handed out. The instructor will forward approved requests it to the EE Tech Staff for assistance. They typically get back to me within 48 hours so there will not always be an immediate availability. (We apologize for this limitation, but it is what it is! Think ahead and don't wait till the last minute.) PLEASE, DO NOT GO TO THE TECH STAFF ON YOUR OWN TO GET PARTS. GO THROUGH YOUR INSTRUCTOR!!!!!!!!!

Teams may also purchase parts directly. Each team must designate a team member as the team purchasing agent. This person will be responsible for submitting receipts for reimbursement and will be the individual who received the reimbursement. Other team members may make purchases, but all such transactions must be handled internally by the team. The team purchasing agent will be allowed to submit a request for reimbursement only once at the end of the semester. The total amount requested must be less than $200.00 unless otherwise arranged with the course instructor. Reimbursement of each item for which reimbursement is requested is subject to review and approval of the course instructor. All such items must clearly be project related. Students are encouraged to discuss purchases in advance with the course instructor. Further details will be provided in class.

Some project may require utilization of more costly and specialized items. Individual project sponsors are expected to provide access to such items and agree to do so when their project proposals are submitted.

PCB Layouts: Where possible all circuits should be laid out as printed circuit boards using EAGLE software. Please consult with the course instructor or the GTA before beginning this. There is a tutorial type file, customized for Senior Design Project considerations, listed on the course website. It is essential that teams developing PCBs utilize the guidelines in this file.

E-mail Topics: Do not embed too many topics in e-mails; one is best. Especially when you are asking questions of someone, this will delay the response. It is better, for example, to send two separate e-mails than it is to send one e-mail that attempts to address two issues.

E-mail Subject Headings: You should always consider the recipient when generating e-mails. This will also serve you well. Recipients may have many different ongoing projects. Well-organize engineers will most likely be filing e-mails for easy future reference. You can assist this by incorporating descriptive subject headings. For this course, the subject header should be structured as follows:

EE4349_SP10_Pnn_Topic

Where *Pnn* is the project ID (e.g., P54) and *Topic* identifies what the e-mail is about.

Files and File Naming: Major problems can occur when various documentation files (Word project descriptions, Excel files containing various elements, printed circuit layouts, etc.) are distributed to the various project participants – IF file naming is done without careful thought.

File names should be descriptive. To avoid confusion (and disasters in some cases), they should also consider whether or not there is likely to be a revision of the file by someone at a later time.

Here are some examples of appropriate file names:

Pnn_Final_Report_fv1.doc (fv1 represents "file version 1")

Pnn_Final_Report_ApndxA_fv3.doc

Pnn_Schematic_fv2.sch

Within the document itself (whenever possible), include a statement that clearly describes what the document is – and include a date that indicates when the document was prepared. PLEASE REVIEW and UTILIZE further guidelines provided on the course website.

Students should adhere to these conventions.

Electronic Communication: UT Arlington has adopted MavMail as its official means to communicate with students about important deadlines and events, as well as to transact university-related business regarding financial aid, tuition, grades, graduation, etc. All students are assigned a MavMail account and are responsible for checking the inbox regularly. There is no additional charge to students for using this account, which remains active even after graduation. Information about activating and using MavMail is available at:

http://www.uta.edu/oit/cs/email/mavmail.php.

Drop Policy: Students may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student's responsibility to officially withdraw if they do not plan to attend after registering. Students will not be automatically dropped for non-attendance. Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. For more information, contact the Office of Financial Aid and Scholarships (http://wweb.uta.edu/ses/fao).

It is noted that dropping EE4349 create consequences for not only the student choosing to drop, but also for their team members. It is therefore essential to consult with the course instructor and keep team members aware of intentions to drop the course.

Americans with Disabilities Act: The University of Texas at Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including the Americans with Disabilities Act (ADA). All instructors at UT Arlington are required by law to provide "reasonable accommodations" to students with disabilities, so as not to discriminate on the basis of that disability. Any student requiring an accommodation for this course must provide the instructor with official documentation in the form of a letter certified by the staff in the Office for Students with Disabilities, University Hall 102. Only those students who have officially documented a need for an accommodation will have their request honored. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at www.uta.edu/disability or by calling the Office for Students with Disabilities at (817) 272-3364.

Grade Grievances: Any appeal of a grade in this course must follow the procedures and deadlines for grade-related grievances as published in the current undergraduate / graduate catalog. For undergraduate courses, see:

http://wweb.uta.edu/catalog/content/general/academic_regulations.aspx#10

Academic Integrity: All students enrolled in this course are expected to adhere to the UT Arlington Honor Code:

I pledge, on my honor, to uphold UT Arlington's tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence.

I promise that I will submit only work that I personally create or contribute to group collaborations, and I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code.

Instructors may employ the Honor Code as they see fit in their courses, including (but not limited to) having students acknowledge the honor code as part of an examination or requiring students to incorporate the honor code into any work submitted. Per UT System Regents' Rule 50101, §2.2, suspected violations of university's standards for academic integrity (including the Honor Code) will be referred to the Office of Student Conduct. Violators will be disciplined in accordance with University policy, which may result in the student's suspension or expulsion from the University.

The application of this policy to EE 4349 will take two dimensions. The first is that your design must represent the work of your team, and cannot be taken directly from other sources, whether published in book, magazine, or on the internet. The second is that each team must work independently of all other teams, and may neither receive nor give direct design assistance to a member of another team. When in doubt, please consult the instructor prior to utilizing input that may be of a questionable nature in this regard.

Student Support Services: UT Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. Resources include tutoring, major-based learning centers, developmental education, advising and mentoring, personal counseling, and federally funded programs. For individualized referrals, students may visit the reception desk at University College (Ransom Hall), call the Maverick Resource Hotline at 817-272-6107, send a message to resources@uta.edu, or view the information at www.uta.edu/resources

Student Feedback Survey: At the end of each term, students enrolled in classes categorized as lecture, seminar, or laboratory will be asked to complete an online Student Feedback Survey (SFS) about the course and how it was taught. Instructions on how to access the SFS system will be sent directly to students through MavMail approximately 10 days before the end of the term. UT Arlington's effort to solicit, gather, tabulate, and publish student feedback data is required by state law; student participation in the SFS program is voluntary.

Final Review Week: A period of five class days prior to the first day of final examinations in the long sessions shall be designated as Final Review Week. The purpose of this week is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and no instructor shall assign any themes, research problems or exercises of similar scope that have a completion date during or following this week unless specified in the class syllabus. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade, except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final examination during Final Review Week. During this week, classes are held as scheduled. In addition, instructors are not required to limit content to topics that have been previously covered; they may introduce new concepts as appropriate.

Library: The Library's website address is http://www.uta.edu/library.

The following is a list of commonly used library resources:

Library Home Page	http://www.uta.edu/library
Subject Guides	http://libguides.uta.edu
Subject Librarians	http://www-test.uta.edu/library/help/subject-librarians.php

Database List	http://www-test.uta.edu/library/databases/index.php
Course Reserves	http://pulse.uta.edu/vwebv/enterCourseReserve.do
Library Catalog	http://discover.uta.edu/
E-Journals	http://utalink.uta.edu:9003/UTAlink/az
Library Tutorials	http://www.uta.edu/library/help/tutorials.php
Connecting from Off- Campus	http://libguides.uta.edu/offcampus
Ask A Librarian	http://ask.uta.edu

The following is an excerpt from the College of Engineering's statement on Ethics, Professionalism, and Conduct of Engineering Students. Read the statement carefully, sign it, and return it to your instructor. You may make a copy for your records. Additional copies of this statement can be obtained from your instructor or the Office of the Dean of Engineering.

STATEMENT ON ETHICS, PROFESSIONALISM, AND CONDUCT FOR ENGINEERING STUDENTS
COLLEGE OF ENGINEERING
THE UNIVERSITY OF TEXAS AT ARLINGTON

The College cannot and will not tolerate any form of academic dishonesty by its students. This includes, but is not limited to cheating on examination, plagiarism, or collusion.

Cheating on an examination includes:

1. Copying from another's paper, any means of communication with another during examination, giving aid to or receiving aid from another during examination;
2. Using any material during examination that is unauthorized by the proctor;
3. Taking or attempting to take an examination for another student or allowing another student to take or attempt to take an examination for oneself.
4. Using, obtaining, or attempting to obtain by any means the whole or any part of an un-administered examination.

Plagiarism is the unacknowledged incorporation of another's work into work which the student offers for credit.
Collusion is the unauthorized collaboration of another in preparing work that a student offers for credit.

I have read and I understand the above statement.

In addition, I understand that, in order to ensure fairness to all students, exams will be proctored and possibly videotaped.

Course and section number: ____EE 4349-(001 or 002)_____

Date: _____

Student's signature: _____

Student's name, printed: _____

Student's ID number: _____

Student's e-mail address: _____
(please print clearly)