UNM ECE Capstone Senior Design
Sponsor Handbook
Revised: August 2020

This document is the UNM ECE Capstone Senior Design Sponsor Handbook. It is to be used as a guide for both Prospective and Returning Senior Design Sponsors, whether companies external to UNM or ECE Faculty members. This handbook is applicable to both Interdisciplinary, and ECE-only projects.

Due to the COVID-19 pandemic, UNM and the School of Engineering will require students, staff, and faculty to follow all health guidelines of the New Mexico Department of Health. Specifically, students, faculty and staff will adhere to social distancing guidelines, will wear masks in all buildings on campus (students are expected to provide their own masks), will maintain a distance of at least six feet from others, and will wash their hands frequently when on campus. To ensure social distancing, classes and laboratories that have enrollments larger than a third of the capacity of the scheduled classroom will be offered in a Face-to-Face + Remote Scheduled format. This will require that students attend class on campus only on certain days, watching the class live via the internet on other days. Your instructor will assign you to specific days to attend on campus – if you have a special need regarding timing, contact your instructor for an accommodation. If you have an underlying health condition that will preclude you from coming to campus, take care of a family member with an underlying condition, or simply do not feel comfortable coming to campus, you can attend remotely; please contact your instructor to make arrangements for this. It is possible that sometime during this semester the pandemic may worsen; if this happens it may be necessary to close campus and transition all classes to a remote delivery.

NOTE:
• To meet the UNM 1/3-student capacity for face-to-face classes (F2F):
  o Only 1/2 of the students can come to face-to-face class Tue or Thu, rest of the class will connect via ZOOM or TEAMS.
  o F2F students will be split in half in rooms ECE210 and ECE216.
• It is expected for students to use their cameras when connected. Special approval is required to NOT use a camera. Participation is part of the grade.
  o When participants do not use a camera over 60% of effectiveness is lost.
• All online sessions will be recorded. Rollcall and participation required.
• The following electronic tools will be used:
  o LEARN
  o ZOOM
  o MIRO
  o Microsoft Tools
    ▪ TEAMS
    ▪ Planner
    ▪ Project
    ▪ OneNote
    ▪ Class Notebook
    ▪ Bookings
    ▪ SharePoint

NOTE 2:
• We encourage sponsors to NOT submit Export Control projects.
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About ECE Senior Design

ECE Senior Design is a two-semester course sequence comprised of ECE 419 and ECE 420 and is a requirement for an ECE baccalaureate degree. Students work closely with “Project Sponsors”, and must satisfactorily complete three major tasks:
1. Demonstrate significant progress towards a project that is challenging and has technical merit
2. Maintain accurate documentation of the project and the work performed
3. Complete the 1-credit Engineering Ethics unit embedded in ECE 419

Benefits to Sponsors

• High quality technical manpower support in more timely completion of engineering R&D projects and expediting of new product development.
• First-hand access to – and better acquaintance with – electrical and computer engineering students to facilitate future recruitment of ECE employees and consultants.

Sponsor Financial Support

Once a project team has commenced work, Sponsors are requested to provide financial support. This is to help defray the costs associated with Senior Design such as, but not limited to: computing, fabrication, instrumentation, components, printing, and so forth.

Funding levels and proposed payment dates are as follows:
• Companies with less than 100 total employees: $1,000
• Companies with more than 100 total employees: $2,500
• It is requested that payment be received by or before October 1st of this calendar year. Note that this payment can be treated as a tax-deductible gift.
• Please make the check payable to the UNM Foundation, and send the check directly to the Foundation at: University of New Mexico Foundation, Inc., Two Woodward Center, 700 Lomas Blvd NE, Suite 108, Albuquerque, NM 87102-9916

On the check memo line please include: Senior Design 202196. You will receive a tax receipt and a thank you letter from the Foundation.

About Interdisciplinary Senior Design

The School of Engineering encourages Senior Design projects that are interdisciplinary in nature. Currently, such projects may contain a mix of ECE students and Mechanical Engineering students. It is anticipated at some future date that interdisciplinary Senior Design project teams may consist of a mix of students from any and all five engineering departments in UNM’s School of Engineering.

Few differences exist between Interdisciplinary Senior Design and ECE Senior Design as described in this handbook. The major difference is that while ECE design teams are typically set at 2-4 ECE students, interdisciplinary teams:
• Require a minimum of two students each from a given Department (currently ECE and ME),
• Shall contain a minimum of three, and a maximum of seven, Senior Design students,
• May require an increased funding level from the sponsor depending upon the anticipated costs for the mechanical aspects of the project.
Sponsor Eligibility
The following are eligible to sponsor an ECE Senior Design project:
• Full-time, direct employees of companies external to UNM
• UNM ECE (or ME) Faculty - see page 4 for details
• UNM Professors with secondary appointments to ECE (or ME)
The following individuals are not eligible to sponsor an ECE Senior Design project:
• Parents or relatives of students
• University Faculty or Staff, UNM or otherwise, without an appointment to UNM ECE (or ME)
• Retired, part-time, student, intern, or consulting staff of a company external to UNM

Defining a Senior Design Project
Prospective Sponsors are requested to complete a brief proposal form (see Project Definition Document Section, below) defining a project that:
• Is of interest to the Sponsor and is something the Sponsor would care to pursue
• The Sponsor may not have sufficient time or manpower to address
• **Is NOT in the critical path of any work flow.** Sponsors are requested to not “take over,” advance, or complete a student project at any time during the academic year - including Winter Break.
• **The Sponsor is 99% certain the project can be solved with the planned approach**
• Lends itself to a team of 2 - 5 Electrical Engineering and/or Computer Engineering students

Proposals should be submitted:
• Electronically to the Course Instructor
• **This document is due by or before September 1.**

Project Definition Document
A Project Definition Document (form is provided by the Course Instructor) shall be completed by the Sponsor and approved by both Sponsor and the Course Instructor, to specify:
• What the Sponsor specifically expects to receive from students in terms of deliverables
• Level of support (technical guidance, materials, computing, etc.) the Sponsor will provide
• Sponsor agreement to provide a Technical Mentor (see p. 5)
• Amount of payment

Proposed projects lacking a Project Definition Document may not be considered.

Projects at a Student’s Place of Employment
Projects at a student’s place of employment are typically not permitted. However, such projects may be considered if the Sponsor (not the student) originates and defines the project, and agrees in writing:
• To define a project sufficient in scope for 2-5 Senior Design students by the deadline of August 10th
• To sponsor and technically guide a team of 2-5 students via an appointed Technical Mentor
• To meet the suggested funding level
• To not permit the employed student(s) to work on his or her senior design project during regularly scheduled working hours
• That neither the Sponsor nor Technical Mentor has the authority or influence to review, promote, direct, sign the timecard of, or reward the student in any way
• The student is not in the Sponsor’s or Technical Mentor’s working group
• That the student is not being paid or reimbursed in any way associated with the proposed project

Such consideration does not guarantee the approval of such a project nor does it guarantee the forming of a project team.
Faculty-Sponsored Projects

A student cannot be paid by a Faculty Sponsor to do his or her Senior Design project. If a student is being paid by the Faculty Sponsor (e.g., as a work-study), then

- Senior Design work cannot be done during regularly scheduled working hours
- The project cannot be related to the work-study’s job duties
- The project is open to a team of 2-5 students with commensurate Faculty mentorship and guidance.

Two types of Faculty-sponsored Senior Design projects are currently defined:

1. Projects without the potential of marketable results (e.g., to benefit a UNM laboratory or research effort), and
2. Projects with the potential of a marketable result.

Projects falling under the first category, i.e., projects without the potential of marketable results, have no special considerations. Projects with the potential of marketable results have an additional set of requirements. Before the project may commence:

- If creation of Intellectual Property (IP) is a potential outcome of the design project, the Faculty Sponsor and student team are to consult with STC.UNM before commencing the project to disclose this possibility.
- If recommended by STC.UNM to the ECE Department Chair, a written agreement shall be created specifying, at a minimum:
  - Roles of the members
  - How expenses and profits are to be handled
  - Ownership of the IP
  - A default clause, i.e., if students leave the team or the Sponsor ceases to contribute.

Faculty-sponsored projects with marketable potential and without these elements are not eligible to become Senior Design projects.

Presentation of Proposed Project

Prospective Sponsors are asked to give a 10-15 minute Presentation of Proposed Project to Senior Design students. This presentation should include:

- A clear overview of the proposed project
- A statement of why the project is of interest to the Sponsor
- Major expected deliverables
- What the team should expect with respect to guidance and technical mentoring
- Location(s) where project work is to be performed
- Equipment and/or computing resources necessary to complete the project
- Citizenship requirements, if any
- Specific technical skill requirements

Sponsor presentations start on the second day of Senior Design and will continue until all prospective Sponsors have pitched their projects. Sponsor presentations will occur during class time: Tuesdays & Thursdays, 12:30 - 1:45pm.

No presentations shall be given after the end of the third week of the semester without Instructor approval. This is to ensure that students commence work on their projects beginning week 4.

Team Formation

Projects shall be selected, and teams shall be formed, by the fourth week of the term. Based upon input from both Sponsor and students, along with students’ major/track, skills and GPA, the Course Instructor shall define a project team. Although Sponsor input is considered in this matter, the Course Instructor reserves the right for the final determination of team membership and size.

While Sponsors are encouraged to speak with students about projects in order to gauge realism of the technical objectives and student interest level, the final decision for assigning members of a team rests with the Course Instructor. Sponsors may not define student design teams, membership, or specific member roles.
Please note that it is possible that a prospective project may not be staffed due to factors such as number of students, number of sponsored projects, equipment limitations, lack of student interest, etc. Sponsors are strongly discouraged from:

- Soliciting or recruiting student team members before semester’s start
- Soliciting, recruiting or appointing a student Project Manager
- Proposing projects requiring a great deal of research and/or definition before the team may commence work

Teams may not commence work before semester’s start or before teams are formed.

Statement of Work (SOW)

A Statement of Work (SOW) shall be created by the project team to be approved by the Instructor before sending to Sponsor for final signature. This document shall specify:

- What the student team shall deliver (hardware, software, documents, etc), and when they are due
- What facilities shall be used to perform the work
- Equipment, materials, etc., needed to complete the project

The student team writes the Statement of Work in conjunction with the Technical Mentor and Instructor. It is due no later than two weeks after project teams have formed.

Technical Mentor

Each Sponsor must provide a Technical Mentor at project commencement. In some cases this may be the same individual as the sponsor. The technical mentor:

- Is appointed and/or provided by the sponsor
- If the sponsor is external to UNM, must be a direct, full-time employee at the Sponsor's company
- Cannot be a retired, part-time, student, intern, or consulting member of a company external to UNM
- May be a PhD Candidate graduate student if the sponsor is a UNM ECE Faculty member
- Is a discipline expert, available from the start to provide technical information to the student team
  - It is expected that the technical mentor will meet or converse with the team on a weekly basis
  - We request a minimum of one hour of time each week from the technical mentor
- Has a defined role to consult, advise, and monitor

Proposed projects without an identified Technical Mentor may not be considered.

Project Outcomes

It is not possible for UNM ECE to guarantee the results of a particular team or project. As with all teams there may be factors beyond the control of the University, or the Sponsor, leading to unanticipated project outcomes. Projects that are well-defined from the beginning have a higher chance of succeeding.

About the Students

UNM's ECE program strives to prepare its future graduates using best-in-class practices and curricula. Team sizes are set at 3-5 to ensure sufficient manpower to complete the Sponsor's project while assuring the team will possess a balance of skill sets. Team sizes other than 3-5 are not permitted.

Sponsors may not sub-divide a design team once formed.

The Course Instructor reserves the right to change team membership during the duration of the project should it become necessary.

Student Outcomes

By participating in a Senior Design project, students shall gain valuable insights and experience of real-world engineering, such as project definition, project organization, technical work, project documentation, teamwork, and management.

Sponsors are encouraged to recruit students for internship and/or employment opportunities as appropriate.
Sponsor Expectations of Students

Most students are taking other senior-level engineering classes with associated homework, projects, and exams. Many ECE students are also employed part- or full-time, and some have family obligations.

Applying standard guidelines, students are expected to contribute approximately 9 hours/week for a 3-credit class. Some of this time will be spent on definition and documentation.

Sponsors should expect a "best-effort" on behalf of the students.
Sponsors should not expect work output or engineering insight typical of direct employees and especially those with an engineering degree and/or industry experience.
Sponsors shall be given a copy of the following student-created documents:

- Statement of Work
- Functional Specification (including Test Plan & Characterization Report)
- Final Report
- Project Poster

Student Work Schedule

Students may not commence work on a design project until the Statement of Work has been approved by the Course Instructor. Approval typically occurs in Week 9 of the Fall semester, but may occur sooner for projects that are very well defined as determined by the Course Instructor.

Project work is to cease by or before the end of Week 13 of the Spring semester. This is to ensure that students have sufficient time to prepare for Faculty Panel presentations, the Poster Session, and so forth.

A total of 21 weeks is therefore reserved for the students to work on their design projects. For a team of four working nine hours per week this is about 750 person-hours of student work. This fact should be considered when defining a project.

Sponsors may not ask students on their design team to do any work beyond Week 13 of the Spring semester. Sponsors cannot require students to work during breaks such as Fall Break, Thanksgiving, Winter Break, or Spring Break. The Course Instructor cannot obligate students during these breaks and neither can the Sponsor. However, some students may choose to work on their project during these breaks.

Intellectual Property

Students may not sign any Intellectual Property agreements. Students may not sign any Non-Disclosure agreements. These are University policies and there are no exceptions.

No project work may include elements that are deemed For Official Use Only, Proprietary, Sensitive, or Classified. Project Posters will be publicly displayed and Project Notebooks will be publicly available. All data generated by students shall be public domain.

No documents produced by the design team and subsequently signed by the Sponsor shall be legal instruments. Sponsors sign such documents (e.g., SOW) to indicate review and concurrence only.

If students are to work with hardware or code that is of value to the Sponsor, it is encouraged that such hardware or code is made into the form of a ‘black box’ to preserve its proprietary nature.

The Sponsor has the right to specify that their project team be comprised of US citizens.

Notifications

The Course Instructor and the Sponsor shall notify each other in writing (email is acceptable) within 10 days of any of the following occurrences:

- Change of Sponsor or Sponsor's Technical Mentor
- Change of student team membership
- Change in availability of facilities
- Redefinition or re-scope of the project
Design Team Management

A volunteer from each student team will be appointed by the Course Instructor to act as Project Manager. This individual will have an extensive set of management and reporting responsibilities in addition to his or her fair share of technical work. In return this individual will receive a year's training in management practices and may also claim the title of Project Manager. Duties will include, but are not limited to, supervision of the creation of documentation including the SOW, conducting regular meetings with the team, Sponsor, and Instructor, and formal weekly written reports to Sponsor and Instructor.

The student Project Manager shall be the first point of contact between the design team and the Sponsor regarding daily operations. Other concerns or situations should be brought to the attention of the Course Instructor.

Grading (see ece419 and ece420 Syllabi)

The first semester, ECE 419, is graded based upon project definition, associated documents, commencement of project work, and the Engineering Ethics unit. Sponsors (including their Technical Mentors) will be asked to assess student performance and the results will be taken into account when determining a semester grade. The second semester, ECE 420, is graded based upon:

- Technical merit of the project & project accomplishments
- A 20-minute formal presentation to an ECE Faculty Panel
- Feedback from their Sponsor/ Technical Mentor
- Performance Appraisals from the Project Manager

The Course Instructor is responsible for awarding semester grades, and although the factors listed above are considered in the determination of a final grade, the Instructor reserves the right to assign semester grades.

Posters & Poster Session

A Poster Session, accessible to both the University and the public, shall be held the end of April. By default, students will incorporate both the name and the logo of a sponsoring entity on such posters.

Should a sponsoring organization require approval of the Poster or other materials before public display, it is the responsibility of the Sponsor to ensure that such approval is secured in a proper and timely fashion and according to the requirements of the Sponsor's firm.

The size and contents of the Poster are set by the Course Instructor. The size may not be altered. A Sponsor’s background image may be used if the following conditions were met:

- The Sponsor has paid the sponsorship fee and,
- The Sponsor directly sponsored the project

Sponsors may not apply their background image or logo to a Poster if they gave technical assistance to a Senior Design team but did not directly sponsor and fund the project.

SUMMARY OF SPONSOR RESPONSIBILITIES & DELIVERABLES

- A Project Definition Document to be received by the Course Instructor no later than September 1st
- A Presentation of Proposed Project to the class within the first three weeks of the semester
- Financial Support consisting of a cash payment before October 1st
- Identification of a Technical Mentor, available from September 10th until May 10th
- Written acceptance of the student-originated Statement of Work
- Provision of Facilities, Software, Equipment or Materials, if required by the project
- Timely Notification as described in the previous section
- Assessments of student performance, once per semester
- Attendance at the Poster Session is recommended but not mandatory
- Agreement to the terms and guidelines described in this Handbook