

TO: The Faculty of the College of Engineering

FROM: Elmore Family School of Electrical and Computer Engineering

RE: New Graduate Course, ECE 60002 Ideas to Innovation II

The faculty of the School of Electrical and Computer Engineering has approved the following new course. This action is now submitted to the Engineering Faculty with a recommendation for approval.

ECE 60002 Ideas to Innovation II

Sem. 1 & 2, Lecture 2 Recitation 1, Cr. 3.

Prerequisite: Master student standing

Description:

This course is part of the Ideas to Innovation (I2I) Project course sequence, which forms the core of the ECE Project Track MS program. In this sequence of courses, students transform ideas and concepts into innovations, including improved components, systems or processes. Building from topics suggested by faculty, companies, prior I2I teams and inventions helps focus the projects on current and relevant problems. Students analyze the competitive landscape and define required performance for their designs, which allows them to identify the novelty as well as key challenges which must be met. The I2I team project is comparable in scope and rigor to a 6-credit MS thesis but is focused on design rather than research. In addition to building technical depth in current technology areas, the project definition, design and reporting phases serve as the vehicles for developing communication, project management and other professional skills. Ideas to Innovation Project-2 focuses on the team-based design project and includes i) detailed and final design of a component/system/approach, ii) development of prototype or other relevant demonstration to "de-risk" key challenges associated with the proposed approach and iii) characterization/benchmarking of the prototype. Assignments will include formal design reviews.

Reason: This course is part of the professional development component for our professional masters program. It is part two of a two course series that students need in order to complete our project-track course requirements.

Course History: Spring 2020 – 2, Spring 2021 – 23, Spring 2022 – 18, Spring 2023 – 52, Spring 2024 – 48



Mithuna Thottethodi,
Associate Head for Teaching and Learning
Elmore Family School of Electrical and Computer Engineering

ECE 60002 IDEAS TO INNOVATION MS PROJECT -- PART II

Spring 2024

COURSE CREDIT HOURS: 3

SCHEDULE

Lecture: M W 9:30 - 10:20AM WALC 1121

Recitation Sections

Each team will have a dedicated recitation time throughout the semester. Recitations and design reviews will be held in POTR 236 unless alternative arrangements are made in advance.

PREREQUISITES

Graduate standing in ECE, enrollment in ECE Project-Track MS program, and completion of Ideas to Innovation - I.

INSTRUCTORS: Prof. David Janes, Email: janes@purdue.edu
Prof. Arnold Chen, Email: chen2503@purdue.edu
Prof. Santokh Badesha, Email: sbadesha@purdue.edu
Prof. Babak Ziaie, Email: bziaie@purdue.edu

OFFICE HOURS: By appointment, location TBD or via WebEx
Offline technical/logistical questions can often be handled via email.

TEACHING ASSISTANTS:

Qiming Cao	Email: cao393@purdue.edu
Nicholas Morrissey	Email: nmorriss@purdue.edu
Manas Pratap	Email: mpratap@purdue.edu
Dikshit Jain	Email: jain666@purdue.edu

Recitation schedules and office hours for the TAs will be posted on Brightspace. Each TA will serve as a subject-matter consultant for specific topics. Teams are encouraged to consult with the appropriate TA during posted office hours and to include a brief summary of the resulting outcomes/action items in recitation.

LAB ACCESS:

The lab (POTR 236) will be accessible during open lab sessions, including posted TA office hours and recitation sessions. All teams are allowed to use the lab during these periods; please be respectful of the teams engaged in recitation presentations or discussions with TA/instructors. Access to software under Purdue site licenses will generally be available; if you need specialized software/hardware resources, please work with your TA to identify the specific requirements.

COURSE WEBSITE: Purdue Brightspace. Login with your PU account.

LEARNING RESOURCES/ TEXT: Handouts and other reference material; additional reading on innovation ecosystems will be assigned.

COURSE DESCRIPTION

This course is the second semester of a year-long Ideas to Innovation MS project course. In this sequence of courses (Parts 1-3), students will i) conduct a multi-semester team project, focused on a design or an advanced modeling/simulation effort, ii) learn professional skills required for effective project definition, management and communication and iii) start learning business and corporate skills relevant for entrepreneurship and intrapreneurship. In contrast to senior-level ECE design courses, the MS project will incorporate emerging technologies and will be motivated by a systems-level focus. Throughout the sequence, the project definition, design and report phases will serve as the vehicles for developing communication, project management and other professional skills.

Each project team will be advised by one or more faculty mentors during the ideation, project definition and design stages.

Part II (Spring) will focus on preliminary and detailed design of the project, culminating in a final prototype demonstration. Development of professional skills will focus on presentation skills, project management and other essential business skills.

The course sequence will integrate components in three tracks:

Track 1: Ideation, project definition, and execution

This track starts with an “ideation” phase which utilizes an innovation model adopted from leading technology companies. The process starts with identifying a problem to be solved, defining a solution and evaluating the competitive landscape and user profile. Once a relevant and appropriate problem/solution pair has been identified, teams will develop a set of design goals and deliverables. In subsequent semesters, the teams will turn these design goals into detailed designs and build prototypes for final demonstrations.

Track 2: Professional skills development

This track focuses on essential professional skills. This includes effective interviewing/resume skills and writing/presentation skills. In addition, aspects of effective teamwork, leadership, professional ethics, and diversity/inclusion will be addressed.

Track 3: Business and corporate skills

This track will incorporate various aspects of entrepreneurship/intrapreneurship relevant to engineering teams, including intellectual property, the management/business side of innovation, and market evaluation.

LECTURE/RECITATION SESSIONS

Lecture: Weekly lecture session will be available “in-person” in assigned classroom as well as through WebEx. To the extent possible, lectures will be recorded and posted on Brightspace.

Recitation: Each project team will have a dedicated recitation section. During most weeks, the recitation sessions will be organized as “stand-up meetings” and provide an opportunity to present status updates and receive feedback from TAs and/or course instructors. In addition to the recitation sessions, team members are expected to work individually/collaboratively on the

project, participate in team meetings, utilize Basecamp for “to-dos”, progress status and key documents. During “design review” weeks, design reviews/demos will be conducted during the scheduled recitation sessions.

Note: Format/scheduling of lecture and recitation sessions subject to change, based on prevailing Purdue policies on “in-person” versus “virtual” classroom restrictions.

LEARNING OUTCOMES

By the end of this course, you will be able to:

- i) Conduct an advance engineering design, develop a working prototype of a system, and quantify the performance of a prototype
- ii) Develop appropriate technical and non-technical documentation of an engineering design and prototype
- iii) Generate and present design reviews and demonstrations
- iv) Participate in, and manage aspects of, a project team

ASSIGNMENTS

The assignments will generally focus on team projects, in which each member of the team is expected to contribute in a significant fashion. The design reviews/demos are indicated in the daily schedule and reflected in the “Grading” breakdown (below).

For each assignment, a more detailed set of guidelines will be distributed in advance. Due dates and submission instructions will be provided in guidelines for each assignment. Note that the submission/presentation dates indicated in the syllabus are subject to change; deadlines provided in assignment guidelines and lecture/Brightspace announcements will supersede information in the syllabus.

The assignments are all team assignments and will include statements of contributions by each team member. Each team member is expected to accept responsibility for a specific aspect of the technical work, e.g. subsystem(s), software component, algorithm development, sensing/control approach, etc., and to consistently work on that aspect throughout the semester. Each person is expected to deliver on their commitment to the team. If you are unwilling or unable to contribute to your team’s project, and/or have significant concerns about the contributions from one or more of your team members, please contact the instructors as soon as possible to discuss alternatives.

GRADING

The grade breakdowns for each assignment are listed below.

Basecamp usage	8%
Interactive Lecture/Recitation Participation	8%
Project Plan Presentation/Document	12%
Design Review I	20%
Design Review II/Interim Demo	20%
Design Review III/ Final Demo	20%
Peer/Instructor Assessment	12%

Design reviews and project plan/reports will generally be graded as team assignments (e.g. all team members receive same score), except in cases in which one or more team members have not contributed proportionally to the technical work and/or the presentation/Q&A.

The Peer/Instructor Assessment is aimed at assessing individual contributions to the team's success. This will include:

- i) Peer evaluation/feedback of the individual by other team members (via CATME evaluation tool)
- ii) Evaluation/feedback of other team members provided by the individual, including substantive comments (using CATME evaluation tool)
- iii) Instructional staff's assessment of individual contributions (e.g. designated person responsible for a given function/subsystem)

Basecamp usage will be evaluated based on completeness/currency of to-do list and engineering/reference documents. Platforms such as Google docs are appropriate for generation of common documents (e.g. presentations), but final versions of such docs should be archived on Basecamp.

Grades for assignments will be posted on Brightspace. Course grading will utilize +/- grade scale (i.e. A/A-/B+/B/B-...).

GROUP CONTACT

A mass email distribution list will be created through Brightspace. Please make sure you check your registered email address for course announcements and other important information. Announcements will also generally be posted on Brightspace.

RESOURCES FOR PURCHASING COMPONENTS

Funds are available for each team to purchase components and other resources needed for the project. Orders for components must be placed through the ECE business office and delivered to an ECE office. Components and software purchased using departmental funds remain the property of ECE and should be returned at the end of the program. Specialty purchases, including software, access to servers, etc. require approval by department – please discuss requirements with instructors.

COURSE POLICIES

- **Join lectures/recitation sessions on time.**
- **Use of devices** (e.g. cell phones, laptops) **during lecture/recitation should be focused on course material.**
- **Absence for medical issue, family emergency or extracurricular activity:** In the event that you need to be absent from class due to a medical issue, family emergency or extracurricular activity, please communicate with the instructor as far in advance as possible. This will allow a discussion regarding the nature/duration of the absence and how the learning outcomes associated with any missed class activities may be addressed. As per university policy: “ultimately students are responsible for all required coursework

and bear full responsibility for any academic consequences that may result due to absence.” See later sections for guidelines for quarantine/isolation.

- **Only in well-documented emergency situations** will students be allowed to submit assignments or make presentations at time other than the officially announced date; no other excuses are accepted.
- You cannot do extra work after the semester is over to change your grade. **All grades are FINAL once submitted.**
- An **incomplete grade** is only for students who do most of the required work (at least 75%) and at the end of the semester cannot finish the course due to a **well-documented emergency or other circumstances beyond the student’s control.**
- If you have any issue or difficulty with the course you need to **contact the instructor during the semester and seek help in advance.**
- In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances beyond the instructor’s control. Here are ways to get information about changes in this course.
 - Course webpage on Purdue Brightspace
 - Instructor’s email
 - Instructor’s phone

CODE OF CONDUCT

In addition to issues covered under Purdue’s academic integrity statement, students and staff affiliated with this course are expected to adhere to the following Code of Conduct:

As a student or staff member affiliated with the course, I will support an environment of mutual respect, fairness, accountability, collaboration, partnership, honesty and integrity.

- I will be honest, fair, respectful and courteous in my dealings with students, staff members and other individuals whom I encounter in the activities of the course. This applies both in formal activities such as lecture and informal activities such as team meetings and collaboration sessions.
- I will work within a team to achieve a successful project outcome as well as to advance the professional skills of all members of the team. I understand that members of my team will bring a diverse set of ideas, technical skills and academic/professional experience.
- In peer-review exercises and staff-reviewed assignments, I will provide and/or receive constructive criticism in a respectful manner.

PURDUE UNIVERSITY ACADEMIC INTEGRITY STATEMENT

Academic integrity is one of the highest values that Purdue University holds. Individuals are encouraged to alert university officials to potential breaches of this value by either emailing integrity@purdue.edu or by calling 765-494-8778. While information may be submitted anonymously, the more information that is submitted provides the greatest opportunity for the university to investigate the concern.

PURDUE HONORS PLEDGE

As a boilermaker pursuing academic excellence, I pledge to be honest and true in all that I do. Accountable together - we are Purdue. (composed by students)

ACADEMIC DISHONESTY POLICIES

Every member of the Purdue community is expected to practice honorable and ethical behavior both inside and outside the classroom. Any actions that might unfairly improve a student's score on homework, quizzes, or examinations will be considered cheating and will not be tolerated.

Examples of cheating include (but are not limited to):

- Sharing results or other information during an examination.
- Bringing forbidden material or devices to an examination.
- Working on an exam before or after the official time allowed.
- Requesting a re-grade of answers or work that has been altered.
- Submitting homework that is not your own work or engaging in forbidden homework collaborations.
- Let others use your clicker and pretend to be you in class

At the instructor's discretion, cheating on an assignment or examination will result in a reduced score, a zero score, or a failing grade for the course. All occurrences of academic dishonesty will be reported to the Assistant Dean of Students and copied to the ECE Associate Head of Education. If there is any question as to whether a given action might be considered as cheating, please see the instructor or the teaching assistant before you engage in any such action.

ACCESSIBILITY:

Purdue University strives to make learning experiences accessible to all participants. If you anticipate or experience physical or academic barriers based on disability, you are welcome to let me know so that we can discuss options. You are also encouraged to contact the Disability Resource Center at: drc@purdue.edu or by phone at 765-494-1247.

ATTENDANCE POLICY:

This course follows Purdue's academic regulations regarding attendance, which states that students are expected to be present for every meeting of the classes in which they are enrolled. Attendance will be taken at the beginning of each class and lateness will be noted. When conflicts or absences can be anticipated, such as for many University-sponsored activities and religious observations, the student should inform the instructor of the situation as far in advance as possible. For unanticipated or emergency absences when advance notification to the instructor is not possible, the student should contact the instructor as soon as possible by email or phone. When the student is unable to make direct contact with the instructor and is unable to leave word with the instructor's department because of circumstances beyond the student's control, and in cases falling under excused absence regulations, the student or the student's representative should contact or go to the Office of the Dean of Students (ODOS) website to complete appropriate forms for instructor notification. Under academic regulations, excused absences may be granted by ODOS for cases of grief/bereavement, military service, jury duty, parenting leave, or emergent or urgent care medical care.

Being “present” also means participating remotely and completing work assigned for days when we do not meet face-to-face. This work is required to help you meet the course learning outcomes. These times count toward the course contact hours and your course grade.

NONDISCRIMINATION STATEMENT:

Purdue University is committed to maintaining a community that recognizes and values the inherent worth and dignity of every person; fosters tolerance, sensitivity, understanding, and mutual respect among its members; and encourages each individual to strive to reach his or her potential. In pursuit of its goal of academic excellence, the University seeks to develop and nurture diversity. The University believes that diversity among its many members strengthens the institution, stimulates creativity, promotes the exchange of ideas, and enriches campus life. A hyperlink to Purdue’s full Nondiscrimination Policy Statement is included in our course Brightspace under University Policies.

BASIC NEEDS SECURITY:

Any student who faces challenges securing their food or housing and believes this may affect their performance in the course is urged to contact the Dean of Students for support. There is no appointment needed and Student Support Services is available to serve students 8 a.m.-5 p.m. Monday through Friday. Considering the significant disruptions caused by the current global crisis as it relates to COVID-19, students may submit requests for emergency assistance from the [Critical Need Fund](#).

MENTAL HEALTH/WELLNESS STATEMENT

- **If you find yourself beginning to feel some stress, anxiety and/or feeling slightly overwhelmed, try WellTrack, <https://purdue.welltrack.com/>.** Sign in and find information and tools at your fingertips, available to you at any time.
- **If you need support and information about options and resources,** please see the Office of the Dean of Students, <http://www.purdue.edu/odos>, (or call 765-494-1747) for drop-in hours (M-F, 8 am- 5 pm).
- If you find yourself struggling to find a healthy balance between academics, social life, stress, etc., sign up for free one-on-one virtual or in-person sessions with a Purdue Wellness Coach at RecWell. Student coaches can help you navigate through barriers and challenges toward your goals throughout the semester. Sign up is free and can be done on BoilerConnect.
- **If you’re struggling and need mental health services:** Purdue University is committed to advancing the mental health and well-being of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of mental health support, services are available. For help, such individuals should contact Counseling and Psychological Services (CAPS) at 765-494-6995 during and after hours, on weekends and holidays, or by going to the CAPS office on the second floor of the Purdue University Student Health Center (PUSH) during business hours. The CAPS website <http://www.purdue.edu/caps/> also offers resources specific to situations such as COVID-19.

CLASSROOM GUIDANCE REGARDING PROTECT PURDUE

The [Protect Purdue Plan](#), which includes the [Protect Purdue Pledge](#), is campus policy and as such all members of the Purdue community must comply with the required health and safety guidelines. Required behaviors in this class include: staying home and contacting the Protect Purdue Health Center (496-INFO) if you feel ill or know you have been exposed to the virus, properly wearing a mask [in classrooms and campus building](#), at all times (e.g., mask covers nose and mouth, no eating/drinking in the classroom), disinfecting desk/workspace prior to and after use, maintaining appropriate social distancing with peers and instructors (including when entering/exiting classrooms), refraining from moving furniture, avoiding shared use of personal items, maintaining robust hygiene (e.g., handwashing, disposal of tissues) prior to, during and after class, and following all safety directions from the instructor.

Students who are not engaging in these behaviors (e.g., wearing a mask) will be offered the opportunity to comply. If non-compliance continues, possible results include instructors asking the student to leave class and instructors dismissing the whole class. Students who do not comply with the required health behaviors are violating the University Code of Conduct and will be reported to the Dean of Students Office with sanctions ranging from educational requirements to dismissal from the university.

Any student who has substantial reason to believe that another person in a campus room (e.g., classroom) is threatening the safety of others by not complying (e.g., not wearing a mask) may leave the room without consequence. The student is encouraged to report the behavior to and discuss next steps with their instructor. Students also have the option of reporting the behavior to the [Office of the Student Rights and Responsibilities](#). See also [Purdue University Bill of Student Rights](#).

Related Considerations:

1. *A listing of recommended safe practices for the specific class or laboratory setting (other PPE or safety behavior) can be found at the links below.*
 - [Overarching SOP for Classrooms, Instructional Laboratories, and Experiential Courses](#)
2. *References Supporting Protect Purdue Compliance:*
 - Office of the Dean of Students [Protect Purdue Compliance Plan: Ask, Offer, Leave, Report](#)
 - Office of the Dean of Students [Managing Classroom Behavior and Expectations](#)

ACADEMIC GUIDANCE IN THE EVENT A STUDENT IS QUARANTINED/ISOLATED

If you become quarantined or isolated at any point in time during the semester, in addition to support from the Protect Purdue Health Center, you will also have access to an Academic Case Manager who can provide you academic support during this time. Your Academic Case Manager can be reached at acmq@purdue.edu and will provide you with general guidelines/resources around communicating with your instructors, be available for academic support, and offer suggestions for how to be successful when learning remotely. Importantly, if you find yourself too sick to progress in the course, notify your academic case manager and notify me via email or Brightspace. We will make arrangements based on your particular situation. The Office of the Dean of Students (odos@purdue.edu) is also available to support you should this situation occur.

ATTENDANCE POLICY DURING COVID-19

Students should stay home and contact the Protect Purdue Health Center (496-INFO) if they feel ill, have any symptoms associated with COVID-19, or suspect they have been exposed to the virus. In the current context of COVID-19, in-person attendance will not be a factor in the final grades, but the student still needs to inform the instructor of any conflict that can be anticipated and will affect the submission of an assignment or the ability to take an exam. Only the instructor can excuse a student from a course requirement or responsibility. When conflicts can be anticipated, such as for many University-sponsored activities and religious observations, the student should inform the instructor of the situation as far in advance as possible. For unanticipated or emergency conflict, when advance notification to an instructor is not possible, the student should contact the instructor as soon as possible by email, through Brightspace, or by phone. When the student is unable to make direct contact with the instructor and is unable to leave word with the instructor's department because of circumstances beyond the student's control, and in cases of bereavement, quarantine, or isolation, the student or the student's representative should contact the Office of the Dean of Students via [email](#) or phone at 765-494-1747. Our course Brightspace page includes a link on Attendance and Grief Absence policies under the University Policies menu.

EMERGENCY PREPAREDNESS

Purdue University is actively preparing for natural disasters or human-caused incidents with the ultimate goal of maintaining a safe and secure campus. Please review information (and sign up for emergency alerts) at: https://www.purdue.edu/epps/emergency_preparedness/.

General procedures:

- For any emergency call 911 (from a Purdue "land line", 911 operator will know the phone's location; from a cell phone, you will need to tell the operator your location)
- There are nearly 300 Emergency Telephone Systems throughout campus that connect directly to the Purdue Police Department (PUPD). If you feel threatened or need help, push the button and you will be connected to the PUPD.
- **Fire alarm:** In the event of a fire alarm, we will immediately stop lecture, evacuate the building and proceed to SE corner of POTR. In inclement weather, the shelter location is the lobby inside POTR.
 - Do not use the elevator.
 - Notify others on your way out
 - If possible, help those needing assistance



The chart below indicates the recommended options/considerations for various types of **Shelter in Place** requirements. If we are notified of a **Shelter in Place** requirement, we will immediately stop lecture and move to the recommended location.

Emergency	Shelter in Place Options/Considerations
Weather-Related - Tornado Warning	Basement corridors, basement offices, basement restrooms Or the lowest level of the building (stay away from windows and doors)
Hazardous Materials (HAZMAT) Release	Remain or find an unaffected office or work area and close windows and doors.
Active threat, such as a shooting	Seek a safe location, preferable a room without windows that can be locked or secured by barriers.

ECE 69500: Ideas to Innovation Project Spring 2024

Week	Date	Topic	Notes
1	01/8	Course Overview Design, build, test phase kickoff	Team Exercise Engineering Hypothesis
	01/10	Goals/Gates and Project Deliverables	Team Exercise Goals/Gates
	Recitation	End of Semester Feedback/ Revised focuses, scope (incl Δ personnel)	
2	01/15	No Class	MLK Holiday
	01/17	Demonstration/Testing Plan Deliverables Document	Team Exercise Final Demo
	Recitation	Revised focuses, personnel, goals; functionalities/metrics	
3	01/22	Stages of Design/ Project Management/Timeline	Team Exercise Project Management
	01/24	Benchmarking – Testing and Proving Concept	Team Exercise Benchmarking
	Recitation	Project Plan Presentations	Presentation/Feedback in Lab
4	01/29	Project Plan De-brief	
	01/31	Presentation Skills -1	Team Exercise Presentation Skills
	Recitation	“Stand-Up Meeting”	
5	02/05	Presentation Skills -2	
	02/07	Accuracy, Precision, Sensitivity and Selectivity	Team Exercise Presentation Skills
	Recitation	“Stand-Up Meeting”	
6	02/12	Design Review - Pre-meeting/Q&A	
	02/14	TBA	
	Recitation	Design Review I	Presentation/Feedback in Lab
7	02/19	Status Assessment (Design Review and mid-course corrections)	Team Exercise
	02/21	Design Trade-Offs – In Class Exercise	Team Exercise
	Recitation		Presentation/Feedback in Lab
8	02/26	Project Management/Teamwork/ Resolving conflicts/Dangers to Team	Team Exercise
	02/28	TBA	Team Exercise
	Recitation	“Stand-Up Meeting”	
9	03/04	Stakeholder Analysis	
	03/6	TBA	Team Exercise
	Recitation	“Stand-Up Meeting”	
	03/11- 03/13	Spring Break – No Classes	
10	03/18	TBA	
	03/20	TBA	

	Recitation	Design Review II/ Interim demo	Presentation/Feedback in Lab
11	03/25	Status Assessment (Design Review and Timeline/Milestones)	Team Exercise
	03/27	TBA	
	Recitation	“Stand-Up Meeting”	
12	04/01	TBA	
	04/03	TBA	
	Recitation	“Stand-Up Meeting”	Recitation
13	04/08	Overview of “approved” courses for Project Track requirements	
	04/10	TBA	
	Recitation	“Stand-Up Meeting”	
14	04/15	TBA	
	04/17	TBA	
	Recitation		
15	04/22	TBA	
	04/24	TBA	
	Recitation	Final demo/Design Review III	Presentation/Feedback in Lab
16	04/29		Finals Week
	05/01		Finals Week

Note: A modified schedule will be distributed at a later date (e.g. to specify topics of “TBD” lectures and/or as required based on modifications in university academic calendar/policies)