

TO: The Faculty of the College of Engineering

FROM: Elmore Family School of Electrical and Computer Engineering

RE: New Graduate Course, ECE 60006 Ideation Catalyst: Mastering Creative Thinking and Innovation

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 60006 Ideation Catalyst: Mastering Creative Thinking and Innovation

Sem. 1, Lecture 2, Cr. 2.

Prerequisite: graduate student standing

Description:

In this course, we will teach students to unlock their creative potential and master the art of generating innovative ideas addressing important societal problems by leveraging emerging technologies. Students will explore a diverse toolbox of ideation techniques, from brainstorming to SCAMPER, and discover how to apply them effectively in real-world scenarios. We will dive into the psychology of creativity, learn to think laterally, and harness imaginative thinking to tackle complex problems. Whether an aspiring entrepreneur or more inclined to innovate within an established company (intrapreneur), this course will empower students to transform ideas into tangible solutions. The course is a combination of lectures, recitations, discussions, and activities during which students will receive critical feedback from the instructor and peers on their idea assignments. Students start with idea harvest, i.e., the generation of multiple ideas in a short problem/solution format around an important societal problem such as climate change, environment, health/wellness, aging, automation, and AI. After critical evaluation, the most promising idea will be turned into a one pager, a format targeted for a manager or CTO. The one pager is focused on answering important questions about the problem, its scale, customer needs, proposed solution, and market potential. After a second round of critical evaluation, the one pager will be turned into a longer proposal/document (six-pager) targeted to a senior VP or potential investors. Other topics discussed in this course include opportunity recognition and customer discovery, competitive analysis, customer story and press release, user interface and user experience (UI and UX), critical evaluation of ideas and red teaming.

Reason:

This course is intended as a professional master's program (PMP) "elective" that can also be taken by students not in the PMP program.

Course History: Spring 2024 – 9, Fall 2024 – 8



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

IDEATION CATALYST: MASTERING CREATIVE THINKING AND INNOVATION

Fall 2024

CREDIT HOURS: 2

INSTRUCTIONAL MODALITY: WebEx/recorded lecture.

INSTRUCTOR: Prof. Babak Ziaie, Email: bziaie@purdue.edu

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

LECTURE/DISCUSSION FORMAT:

The weekly lecture and discussion will be on Tuesday and Thursday 4:30-5:20. Regular attendance is strongly encouraged.

Topics for lectures and discussions are included in the schedule at the end of this document. Exceptions to this schedule and changes to the posted lecture/discussion topics will be announced, with advance notice if circumstances permit.

Lectures will cover the core material and will be supplemented by invited speakers from academia and industry. In discussions, students will present their assignment and will receive critical feedback from instructor and their peers. Students are expected to participate in lively brainstorming discussions on the topics and presented ideas.

PRE-REQUISITES BY TOPIC:

Graduate standing in ECE and enrollment in ECE project-track MSECE program.

COURSE DESCRIPTION (from Purdue Catalog):

In this course, students learn to unlock their creative potential and master the art of generating innovative ideas addressing important societal problems by leveraging emerging technologies. Students will explore a diverse toolbox of ideation techniques, from brainstorming to SCAMPER, and discover how to apply them effectively in real-world scenarios. We will discuss the psychology of creativity, learn to think laterally, and harness imaginative thinking to tackle complex problems. Whether an aspiring entrepreneur or more inclined to innovate within an established company (intrapreneur), this course will empower students to transform ideas into tangible solutions. The course is a combination of lectures and discussions during which students will receive critical feedback from the instructor and peers on their ideas. Students start with idea harvest, i.e., the generation of multiple ideas in a short problem/solution format around an important societal problem such as climate change, environment, health/wellness, aging, automation, and AI. After critical evaluation, the most promising idea will be turned into a one pager, a format targeted for a manager or CTO. The one pager is focused on answering important questions about the problem, its scale, customer needs, proposed solution, and market potential. After a second round of critical evaluation, the one pager will be turned into a longer proposal/document (six-pager) targeted to a senior VP or potential investors. Other

topics discussed in this course include opportunity recognition and customer discovery, competitive analysis, customer story and press release, user interface and user experience (UI and UX), critical evaluation of ideas and red teaming.

LEARNING RESOURCES, TECHNOLOGY & TEXTS:

- **Brightspace** is the official course page and will be used for:
 - Posting of course materials (lecture material/recordings, assignments, announcements, etc.)
 - Submission of assignments listed in the “grading” section
 - Posting of grade sheets (with feedback) and recording of grades
 - Login with your PU account.
- **Course Text:** Handouts and other reference material; additional reading on innovation ecosystems will be assigned.
- **Recommended References:** There are numerous good books on innovation, ideation, and entrepreneurship. List below are a sample of the recommended ones,

- 1- Think Bigger: How to Innovate_ by Sheena Iyengar
- 2- Working Backwards: Insights, Stories, and Secrets from Inside Amazon_ by Colin Bryar, Bill Carr
- 3- The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail_ by Clayton M. Christensen
- 4- Where Good Ideas Come From: The Natural History of Innovation Paperback_ by Steven Johnson
- 5- The Inevitable: Understanding the 12 Technological Forces That Will Shape Our Future_ by Kevin Kelly, George Newbern
- 6- How Innovation Works: And Why It Flourishes in Freedom Paperback_ by Matt Ridley
- 7- The Ten Faces of Innovation: Strategies for Heightening Creativity_ by Tom Kelley
- 8- The Art of Innovation: Lessons in Creativity from IDEO, America's Leading Design Firm_ by Thomas Kelley, Jonathan Littman
- 9- The Eureka Factor: Aha Moments, Creative Insight, and the Brain Paperback_ by John Kounios, Mark Beeman
- 10- Think Again: The Power of Knowing What You Don't Know_ by Adam Grant
- 11- Think Like a Rocket Scientist: Simple Strategies You Can Use to Make Giant Leaps in Work and Life_ by Ozan Varol
- 12- Inventology: How We Dream Up Things That Change the World_ by Pagan Kennedy.
- 13- Invention and Innovation: A Brief History of Hype and Failure_ by Vaclav Smil.

COURSE OVERVIEW

This is a highly interactive course with lectures and discussions. Students will master the art of generating innovative ideas addressing important societal problems by exploring a diverse toolbox of ideation techniques. Discussions are designed in the form of lively open give and take format and activities around idea generation and refinements using techniques and

approaches used in leading tech industries. Students will move beyond generating novel ideas to transforming them into tangible solutions through customer discovery, competitive analysis, and product or service design based on user interface and user experience (UI and UX). One pager and six pager assignments are meant to guide students honing their ideas and structuring their argument in a format targeted to senior managers or potential investors.

ASSIGNMENTS

In addition to weekly short assignments, during the initial stages of this course, students will identify one or more big societal problems of their interest and generate multiple ideas in a compact problem-solution format (idea harvest). These will be discussed in the discussion sections and will be critically evaluated, and students will be provided with constructive feedback. One of the better ideas is then turned into a one-pager focusing on answering key questions on the need, customer, and market potential. The one-pagers are meant to contain enough information for a quick evaluation by managers or senior leaders in a company to decide whether the idea is warranted a deeper dive and more detailed analysis. These one-pagers will also be subjected to critical evaluation in the discussion sections. Finally, students will turn the one-pagers into a longer proposal/document (six-pagers) in a format that can be used to convince senior leadership or an investor to fund the proposed idea.

For each assignment, a more detailed set of guidelines will be posted on Brightspace 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.

GRADING

Weekly assignments	10%
Problem-solution ideas (idea harvest)	15%
One-pager assignment	30%
Final assignment (six pager)	45%

Grades for assignments will be posted on Brightspace. Class averages for assignments will generally be posted on Brightspace; these are intended to allow students to evaluate their relative performance in class. Final grades will be assigned based on total points in course, including instructional staff assessment of Basecamp Participation. Course grading will utilize +/- grade scale (i.e., A/A-/B+/B/B-...). Grading will generally use a “curve”, rather than a 90/80/70... scale.

ECE 60006 LEC Fall 2024

Weeks	Topics
1	Introduction to invention, innovation, and ideation
2	How to identify good problems
3	How to identify good problems
4	Trend Spotting/Opportunity Recognition
5	Ideation techniques
6	Ideation techniques
7	Idea Harvest (PS Pair)
8	Competitive Landscape (Competition Analysis)
9	Competitive Landscape (Competition Analysis)
10	(One pager)
11	Customer Discovery/Customer Interview/Survey Design
12	IP and patent
13	Customer Story and Press Release
14	User Interface and User Experience
15	User Interface and User Experience
16	Critical Evaluation and Red Teaming

COURSE POLICIES

- **Join lectures/discussion sessions on time.**
- **Use of devices** (e.g. cell phones, laptops) **during lecture/discussion 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.

ATTENDENCE 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/ehps/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 the location stated below.
 - Do not use the elevator.
 - Notify others on your way out
 - If possible, help those needing assistance

The Emergency Assembly Area for Industrial Engineering personnel is the East end of the Main Aisle of Stewart Center on the First Floor (Near the doors that go to Purdue Memorial Union).