

SYLLABUS: ECE 5078: Empowering the Entrepreneurial Engineer

Semester: Spring 2022

Course Instructor:

Prof. Sanjay Krishna, 377 Caldwell Lab krishna.53@osu.edu

Lecture Times: MWF, 3:00-3:55PM, Enarson 014

Office Hours: Wednesdays 4-5PM, Caldwell 377

Teaching Assistant:

Maya Tamaskar (tamaskar.6@buckeyemail.osu.edu)

Course Description:

This course will teach entrepreneurial minded engineers the process of value creation of electrical and computer engineering products to serve a market. Topics covered will include:

- Self-assessment (as an entrepreneur and innovator)
- Analysis and validation of new venture opportunities
- Creation, management, protection and evaluation of intellectual property
- New venture planning and project management
- Leadership and team building
- Venture financing and allocation of resources
- Effective oral presentations and written communication

This class will emphasize the importance of the market and need, customer validation, teamwork, funding and technology. Guest lecturers will be invited to present their perspectives. This will be a highly interactive class and will require significant amount of individual and team activities involving preparation and participation. The course will end with a “shark-tank style” team presentation to a mock venture capitalist panel.

Units: 3 credit hours.

Class size cap: 20 students (additional students allowed per instructor approval)

Prerequisite: At least one of these classes: ECE 3010, ECE 3020, ECE 3030, ECE 3040 or ECE 3050 or graduate standing in ECE or related disciplines

Course Delivery:

Mode of delivery: This course is intended to be in-person and will be delivered synchronously. The lectures will take place on Mondays, Wednesdays, and Fridays from 3:00 pm to 3:55 pm. It is recommended that you attend the lectures for this course during the scheduled class time.

However, the university is closely monitoring the COVID situations and the use of hybrid/remote options may be warranted to keep the students, faculty and staff safe. In case, we have to go hybrid, we will use this link and deliver the lecture synchronously. Please be prepared to attend the lectures with your video camera on to enable efficient class participation.

<https://osu.zoom.us/j/8906116294?pwd=T2lFb1RXQ2tqbWtmVU1vb1VnQjRCQT09>

Meeting ID: 890 611 6294

Password: 3MaJyr

Pace of online activities: This course is divided into modules and lecture slides will be posted on Carmen prior to the lectures. Lecture videos will be posted on Carmen after the class lecture. Students are expected to keep pace with weekly deadlines but may schedule their efforts freely within that time frame.

Credit hours and work expectations: This is a 3-credit-hour course. According to Ohio State policy (go.osu.edu/credit hours), students should expect around 3 hours per week of time spent on direct instruction (instructor content and Carmen activities, for example) in addition to 6 hours of homework (reading and assignment preparation, for example) to receive a grade of (C) average.

Attendance and participation requirements: Your attendance is recommended for the lectures and you are expected to participate in activities during class.

The following is a summary of students' expected participation:

- Participating in lectures for attendance: HIGHLY RECOMMENDED
 - You are expected to login to the course on Carmen every week, however most weeks you will probably login many times.
 - **If you have a situation that might cause you to miss an entire week of class, discuss it with me as soon as possible.**
- Office hours: OPTIONAL
 - All office hours are optional, however engaging with the instructor and teaching assistant will help with you to be successful in this course and with your overall learning experience.
- Participating in discussion forums: 2+ TIMES PER WEEK
 - This class features a substantial amount of class discussion, including discussion board posts.

Course Technology:

CarmenCanvas will be used as the learning management system (LMS). All information related to the course including syllabus, learning modules, announcements, quizzes, discussions, grades, etc., will be on CarmenCanvas.

Technology skills needed for this course

- Basic computer and web-browsing skills
- Navigating Carmen (go.osu.edu/canvasstudent)

- CarmenZoom virtual meetings (go.osu.edu/zoom-meetings)
- Recording slide presentations with audio narration (go.osu.edu/video-assignment-guide)
- Recording, editing, and uploading videos (go.osu.edu/video-assignment-guide)

Required equipment

- Computer: current Mac (MacOs) or PC (Windows 10) with high-speed internet connection
- Webcam: built-in or external webcam, fully installed and tested
- Microphone: built-in laptop/ tablet mic or external microphone
- Other: a mobile device (smartphone or tablet) to use for BuckeyePass authentication

Required software

- Microsoft Office 365: All Ohio State students are now eligible for free Microsoft Office 365. Full instructions for downloading and installation can be found at go.osu.edu/office365help.

Carmen access

You will need to use BuckeyePass (buckeyepass.osu.edu) multi-factor authentication to access your courses in Carmen. To ensure that you are able to connect to Carmen at all times, it is recommended that you take the following steps:

- Register multiple devices in case something happens to your primary device. Visit the BuckeyePass - Adding a Device help article for step-by-step instructions (go.osu.edu/add-device).
- Request passcodes to keep as a backup authentication option. When you see the Duo login screen on your computer, click Enter a Passcode and then click the Text me new codes button that appears. This will text you ten passcodes good for 365 days that can each be used once.
- Download the Duo Mobile application (go.osu.edu/install-duo) to all of your registered devices for the ability to generate one-time codes in the event that you lose cell, data, or Wi-Fi service

Technology support

For help with your password, university email, Carmen, or any other technology issues, questions, or requests, contact the Ohio State IT Service Desk. Standard support hours are available at ocio.osu.edu/help/hours, and support for urgent issues is available 24/7.

- Self-Service and Chat support: ocio.osu.edu/help Phone: 614-688-4357(HELP)
- Email: servicedesk@osu.edu TDD: 614-688-8743 If none of these options will meet the needs of your situation, you can contact the IT Service Desk at 614-688-4357(HELP) and IT support staff will work out a solution with you.

Course Objective

Address skill gaps of students at the intersection of engineering, business, social and legal disciplines and their connections.

Course Goals and Learning Outcomes

Course Goals	Learning Outcomes
Goal A: Students will be able to organize, articulate and communicate their ideas, opportunities and plans	<ol style="list-style-type: none"> 1. Students will be able to summarize their key or central idea and opportunity by clearly expressing their thoughts in verbal and written communication 2. Students will be able to tell a story for a successful outcome defined by their shareholders 3. Students will be able to evaluate the potential of an idea or opportunity presented to them
Goal B: Students will be able to understand, evaluate and create a business model and the basic financial constructs of a new venture firm	<ol style="list-style-type: none"> 1. Students will be able to create a business model for a new venture firm 2. Students will be able to assess the financial status of a new venture firm 3. Students will be able to evaluate various sources of capital
Goal C: Students will be able to understand engineering principles that form the basis of a new product or service	<ol style="list-style-type: none"> 1. Students will be able to create a realistic project management plan 2. Students will be able to weigh make-buy decisions considering the financial, social and environmental impact of their decisions 3. Students will be able to document the uses of resources and identify tasks, milestones and deliverables for evaluating the progress of the project
Goal D: Students will be able to understand the organizational structure and legal protection for a new venture firm	<ol style="list-style-type: none"> 1. Students will learn the various legal structures of new venture firms 2. Students will create and evaluate different forms of intellectual property protection 3. Students will differentiate between various types of patents and claims
Goal E: Students will develop interpersonal skills to work together in a team while respecting and caring for diversity of thoughts, abilities, culture, gender, race, class etc	<ol style="list-style-type: none"> 1. Students will be able to assess their own entrepreneurial abilities and risk tolerance and identify their strengths and weaknesses 2. Students will present their work to their peers and develop public speaking skills 3. Students will appreciate the importance of working together as a team and acquire interpersonal skills to handle difficult situations

Textbook

- Technology Ventures: From Idea to Enterprise by Thomas Byers, Richard Dorf and Andrew Nelson, McGraw Hill, 4th Edition 2014
- Class Notes, Handouts and Discussion

The textbook and/or courseware for this course is being provided via CarmenBooks. Through CarmenBooks, students obtain publisher materials electronically through CarmenCanvas, saving them up to 80% per title. The fee for this material is included as part of tuition and is listed as CarmenBooks fee on your Statement of Account. In addition to cost-savings, materials provided through CarmenBooks are available immediately on or before the first day of class. There is no need to wait for financial aid or scholarship money to purchase your textbook. Unless you choose to opt-out of the program, you do NOT need to purchase any materials for this course at the bookstore. For more information on the program or information on how to opt out, please visit the CarmenBooks website. (<https://affordablelearning.osu.edu/carmenbooks/students>)

Reference Material and Recommended Reading:

- Principles: Life and Work by Ray Dalio, ISBN-13 : 978-1501124020
(Download the free app at principles.com)
- Empowered: Ordinary People, Extraordinary Products, Marty Cagan and Chris Jones, (<https://svpg.com/empowered-ordinary-people-extraordinary-products/>) ISBN: 978-1-119-69129-7
- Range: Why Generalists Triumph in a Specialized World, David Epstein, ISBN-13 : 978-0735214507
- Toward Establishing a Successful Technology Business Entrepreneurship, Milton Chang, <http://miltonchang.com/>
- Early Exits: Exit Strategies for Entrepreneurs and Angel Investors (But Maybe Not Venture Capitalists) by Basil Peters
- The Lean Startup by Eric Ries
- The Effective Executive by Peter Drucker
- How Breakthroughs Happen: The Surprising Truth About How Companies Innovate by Andrew Hargadon
- The 7 Habits of Highly Effective People By Stephen Covey
- The Real-Life MBA: Your No-BS Guide to Winning the Game, Building a Team, and Growing Your Career by Jack and Suzy Welch
- Inside the Tornado: Marketing Strategies From Silicon Valley's Cutting Edge by Geoffrey Moore
- Managing for the Future: The 1990s and beyond by Peter Drucker
- The Innovator's Solution: Creating and Sustaining Successful Growth by Clayton Christensen, Clayton and Michael Raynor
- The Portable MBA in Entrepreneurship by William Bygrave
- The Startup Owners Manual by Steve Blank and Richard Dorf
- Four Steps to the Epiphany by Steve Blank
- The Art of the Start, Guy Kawasaki, Portfolio
- The MouseDriver Chronicles: The True-Life Adventures of Two First-Time Entrepreneurs, John Lusk & Kyle Harrison, Perseus Books Group
- The Map of Innovation, Kevin O'Connor, Crown Business

Course Content

Module 1: What qualities make me an Entrepreneur?

Self-Assessment

- **Topics:** Chapter 1: The technology entrepreneur. Characteristics of a technology entrepreneur. Personal assessment of your personality, experiences, desires, strengths, weaknesses, etc. that will influence whether or not you will be a successful entrepreneur. Several factors include: genetics, family, culture, values, personality type, goals and motives. All of these factors listed above, combined with your sense of passion, mission and purpose, will drive your decisions.
- **Assessment:** A short personal essay evaluating your strengths and weaknesses. This analysis should include a description of the type of team you will need to bring together in order to launch a successful venture and your evaluation of your 'risk profile'. Single slide presentation of "You: The Product". The presentation/personal essay will be shared with the class and used to select your teammates.
- **Resource:** Principles: Life and Work by Ray Dalio, ISBN-13 : 978-1501124020 (Download the free app at principles.com)

Module 2: What will the engineer do? *Product Development/Project Management*

Topics: Chapter 2, 8, 13, and 14: Opportunity and Concept; Critical elements of organization, core competency, allocation of resource, program and project management partnerships to evaluate make-buy; Discussion of various ideas and evaluation in terms of market potential, impact, feasibility, risk, etc. Many of these ideas will arise from your daily encounters or casual conversations, so keep your eyes and ears open to opportunities that might represent potential entrepreneurial ventures.

- **Assessment:** Customer Discovery Report/Team Contract
- **Resource:** Empowered: Ordinary People, Extraordinary Products, Marty Cagan and Chris Jones, (<https://svpg.com/empowered-ordinary-people-extraordinary-products/>) ISBN: 978-1-119-69129-7

Module 3: Where will I find the money?

Financial Plan and Sources of Capital

- **Topics:** Chapter 16, 17 and 18: Sources of capital, financial planning, profit and loss statements, balance sheet, bill of materials, preferred and common stock, negotiating with a financier
- **Assessment:** Homework/Assignment
- **Resource:** Finance for Non-Finance Managers (<https://www.coursera.org/learn/finance-for-non-financial-managers>)

Module 4: Why do I need a lawyer?

Legal Constructs and Intellectual Property

- **Topics:** Chapters 10 and 11: Types of ventures, Intellectual property: patents, trade-secrets and technical know-how. Invention disclosures, provisional patents, utility

patents, definition of inventor, claims and different types of claims. International protection versus domestic protection.

- **Assessment:** Homework/Assignment
- **Resource:** Guest lecture from TCO/patent attorney

Module 5: What will my CEO do?

Business Model and Strategy (3 Weeks)

- **Topics:** Chapter 3-7, 19-20: Understanding market/need and development of business model, competitive strategies and advantage, innovation strategies, equity sharing, develop basics of a business plan, deal presentation and negotiations, leading ventures to success
- **Assessment:** Presentation/Narrative

Module 6: How has my perspective changed?

Me 2.0 !

- **Topics:** Personal assessment of your personality, experiences, desires, strengths, weaknesses, etc. and your views on entrepreneurship. What aspects about you have changed during this course?
- **Assessment:** Review the short personal essay that you wrote at the beginning of the course evaluating your strengths and weaknesses and rewrite it with the new you!

Course Grading:

Personal Assessment Essays: 10%
Individual Presentation: 10%
Homework and Assignments: 15%
Team Contract: 5%
Customer Discovery Report: 10%
Interim Slide Deck/Written Narrative: 10%
Final Presentation: 20%
Final Written Narrative: 20%

Extra Credit:

Extra credit is not required and must be earned. You can submit up to 5 executive summary one-page papers, each worth up to 2% of the overall grade based on quality. The executive summary should personalize your assessment and evaluation of (a) one of the books on the recommended reading list or (b) a live public speaking event or webinar by an entrepreneur that you attended during the course this semester.

Team Work

This course lays emphasis on team work. *Each team will consist of a minimum of 2 and maximum of 3.* You are free to choose your team mates. However, do not fall into the trap of choosing your friends. This is an opportunity for you to find a team mate who has complimentary skills, expertise, abilities etc and make a new set of friends.

Policy on Late Homeworks: Homework is to be turned in at the beginning of class on the due date. No late work will be accepted without prior arrangement. Late work (with arrangements) will be docked 10% per day.

Working together: Students are encouraged to work together on homeworks but each student should hand in his or her individual solution.

Reaching me: You may reach me during office hours, or make an appointment by email if you cannot make my office hours.

Disabilities Statement

Any student who feels s/he may need an accommodation based on the impact of a disability should contact the instructor privately to discuss specific needs. Please contact the OSU Office for Disability Services for assistance in verifying the need for accommodations and developing accommodation strategies.

Academic Misconduct Statement

Any student found to have engaged in academic misconduct, as set forth in the Code of Student Conduct Section 3335-23-04, Prohibited Conduct, will be subject to disciplinary action by the university. Academic misconduct is any activity that tends to compromise the academic integrity of the university, or subvert the educational process.

Student Conduct

Students are expected to abide by the provisions in the Code of Student Conduct. The University's Code of Student Conduct and Sexual Harassment Policy are available on the OSU Web page

Course Schedule

This is a rough outline of the course schedule. This may change depending on the pace of the lectures and class discussion.

DATE	Lec #	Topics To be Covered (The topics are meant to be a guide. We may adjust the pace of the class based on student feedback)	Reading Assignment	Assessment/Milestones (* indicates Team Assignment)	Learning Outcomes
Module 1: What qualities make me an Entrepreneur? Self Assessment					
Mon, Jan 10th 2022	1	Knowing and dealing with one's own personality	Chapter 1	Personal Essay 1 Assigned	
Wed Jan 12th 2022	2	Empowering the Entrepreneurial Engineer	Chapter 1	Marty Cagan Book	
Fri Jan 14th 2022	3	Role and promise of technology entrepreneurship	Chapter 2	Personal Essay 1 Due	E1
Wed, Jan 19th 2022	4	Ideas and Opportunities: Market Pull Vs Product Push	Chapter 2	Single Slide Summary Due	A1-A3, E2
Fri, Jan 21st 2022	5	Individual Presentation (Part 1)			
Mon Jan 24th 2022	6	Individual Presentation (Part 2)			
Wed Jan 26th 2022	7	Individual Presentation (Part 3)			
Module 2: What will the Engineer Do? Product Development and Project Management					
Fri Jan 28th 2022	8	Creativity and Invention: Product Design and Development	Chapter 8	Customer Discovery Assignment	
Mon Jan 31st 2022	9	Customer Discovery	Chapter 8	Team Formation Decisions Due	
Wed Feb 2nd 2022	10	Engineering Process: Concept to Requirements to Specs	Chapter 13		
Fri Feb 4th 2022	11	Project Management: Scope, Schedule and Cost	Chapter 13	Team Project Assigned	C1-C3, B2
Mon Feb 7th 2022	12	Management of Operations	Chapter 14		
Wed Feb 9th 2022	13	Risk Management	Chapter 7		
Fri Feb 11th 2022	14	Execution Strategy	Chapter 7	Team Contracts Due*	
Mon Feb 14th 2022	15	Guest Lecture Art Gooray			
Module 3: Where will I find the money? Financial Plan and Sources of Capital					
Mon Feb 14th 2022	15	Revenue and Profit Model	Chapter 16	Homework 1 Assigned	
Wed Feb 16th 2022	16	Cost Model and Value	Chapter 16	Customer Discovery Report Due	
Fri Feb 18th 2022	17	Company Ownership/Cap Table Building a Financial Plan	Chapter 16/17		
Mon Feb 21st 2022	18	Funding the Cap Table and Harvest Plan	Chapter 16/17		B1-B3
Wed Feb 23rd 2022	19	Balance Sheet, Income/Cash Flow Statement/Financial Statement Asses	Chapter 17		
Fri Feb 25th 2022	20	Sources of Capital: Dilutive (VC) and Non-Dilutive Funding (SBIR)	Chapter 18		A1-A3
Mon Feb 28th 2022	21	Deal Presentation and Negotiations	Chapter 19	Homework 1 Due	
Wed Mar 2nd 2022	22	Guest Lecture: Dr. Tom Burns, Entrepreneur			
Module 4: Why do I need a lawyer? Legal Constructs and Intellectual Property					
Fri Mar 4th 2022	23	Types of Ventures: C-Corp, S-Corp, Sole Proprietorship, LLC	Chapter 10	Homework 2 Assigned	
Mon Mar 7th 2022	24	Intellectual Property: Trade Secrets and Patents	Chapter 11		C1-C3, D1, E3
Wed Mar 9th 2022	25	Guest Lecture: Dr. Art Gooray, OSU TCO	Chapter 2,4,5,6,9		
Fri Mar 11th 2022	26	Guest Lecture: Dr. Art Gooray, OSU TCO	Chapter 2,4,5,6,9		
Mon Mar 21st 2022	27	Writing Patent Applications	Chapter 11		
Wed Mar 23rd 2022	28	Licensing and University Technology Transfer	Chapter 11		C3, D1-D3
Fri Mar 25th 2022	29	Patent Claim Drafting		Homework 2 Due	
Mon Mar 28th 2022	30	Guest Lecture : Dean Howard, Faculty Entrepreneur		Interim Slide Deck/Written Narrative Due	
Module 5: What will my CEO do? Business Model and Strategy					
Wed Mar 30th 2022	31	Vision and Mission Statement/Value Proposition and Business Model	Chapter 3		A1-A3, E1-E3
Fri Apr 1st 2022	32	Competitive Strategy: Core Competency and Market Analysis	Chapter 4		
Mon Apr 4th 2022	33	Business Story and Plan/Elevator Pitch and Concept Summary	Chapter 6		
Wed Apr 6th 2022	34	Innovation Strategies: First Movers vs Fast Followers	Chapter 5		
Fri Apr 8th 2022	35	Marketing and Sales/Customer Relationship Management	Chapter 9		
Mon Apr 11th 2022	36	The Business Plan Presentation	Chapter 19		
Wed Apr 13th 2022	37	Leading Ventures to Success: Exit Strategies	Chapter 20	Final Pitch Deck and Written Narrative Due	
Fri Apr 15th 2022	38	Shark Tank Style Pitch to Mock Venture Capitalists (Team 1-3)		Personal Essay 2 Assigned	All Outcomes
Mon Apr 18th 2022	39	Shark Tank Style Pitch to Mock Venture Capitalists (Team 4-6)			All Outcomes
Wed Apr 20th 2022	40	Shark Tank Style Pitch to Mock Venture Capitalists (Team 7-8)			All Outcomes
Module 6: How has my perspective changed? Me 2.0!					
Fri Apr 22nd 2022	41	Reflection and Perspectives on Values, Abilities and Skills		Personal Essay 2 Due	E1
Mon Apr 25th 2021	42	Course Review			All Outcomes