PURDUE UNIVERSITY

WELDON SCHOOL OF
BIOMEDICAL ENGINEERING

Syllabus

Entrepreneurship in BME

BME TBD, Fall 2025

Professor:
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Meeting time and place:
TBD

Course Description and Objectives:
Learning objectives: this course teaches the foundation of entrepreneurship in engineering in general and in particular in the biomedical field. The course is designed to create a successful path from an idea, or from a research product, and transform it into a product that can be marketed and sold to customers. The course will engage students on the motivations and goals of starting a business, on the path from idea, prototype and business plan. It will explore how to find customers and how to interview customer for identifying customer problems to solve and product fit. The course will provide a general initial business training and then delve into minimum product definition and development of a business plan. The course will also explore financial models and cost-planning, including revenue models. The course will focus on biomedical applications by helping define clinical utility and advantage, introduce clinical trials, regulations, reimbursement processes, and clinical sales. We will also review ethical issues involved in starting a business and examples of what to do and not to do.
We also provide examples of successful startups, in areas as: applied machine learning, biomedical imaging, biomedical instrumentation, software for medical and biomedical applications -- to name a few.
Lectures will include an overview of the state-of-the-art entrepreneurial process, new opportunities and ideas for innovation and commercial success.

Nature and purpose of the course: Students are interested in alternative career paths where they can build their own business based on ideas and projects conducted during their studies. This course provides a path to commercializing research ideas and teaches how to entice customers and provide useful products while navigating the market and regulatory issues.

Main topics to be covered: The main topics are: motivation and goals of starting a business, general business training, ideation, minimum product definition, business development plans, customer discovery, customer interviews, business models, basic financial models and startup planning, revenue models, define clinical utility and advantage (biomedical focus), clinical trials, regulations, reimbursement processes (biomedical focus), clinical sales (biomedical focus).

Any special aspects of the format: The course will include a series of lecture by the instructor and will also feature selected presentation by the instructor. In addition, the class will feature final practical projects based on the application of the learned material. The projects will be tailored to student projects and entrepreneurial goals. Presentations will be provided by the instructor and/or suggested by the students themselves. The

Learning outcomes: students will be able to ideate, create a plan, commercialize research products and ideas, and be able to study the market. The final business plan will be a summary of these topics, and will include: customer discovery, teaming, financial planning, and how to prepare business presentations.

Course Schedule:

Week 1: introduction: entrepreneurship and startups

Week 2: motivation and goals of starting a business, ethical issues

Week 3: comparing large company, startup, academia, research labs

Week 4: general introductory and basic business training, ideation

Week 5: minimum product definition

Week 6: development plan and business plan

Week 7: customer discovery and planning

Week 8: customer interviews and reporting

Week 9: introduction to financial models

Week 10: drafting initial financial models

Week 11: clinical utility and advantage (biomedical focus)

Week 12: medical and biomedical applications

Week 13: Scaling up the business, business ethics

Week 14: clinical trials, regulations, reimbursement processes, clinical sales (biomedical focus)

Week 15: Final project reports and presentations

Prerequisites:
Basic knowledge of biology, biomedical engineering and engineering process is useful but not required.
No previous experience of knowledge in business, startups or commercialization is required.
You can ask permission of the instructor if you have taken similar courses elsewhere or wish to be advised.

Strongly recommended related courses:
This is a list of course that are not required, but help can help in the course:

- Senior Design Project
- Biomedship
- Biomedical Entrepreneurship and Innovation

You can ask permission of the instructor if you have taken similar courses elsewhere or wish to be advised.

Attendance Policy:
No lecture is available in the textbooks or online in its complete form. In-class attendance is required because of the interactive nature of the course. If students miss a class, they will need to make an appointment with fellow students to review the missed material. Part of the course features some online lectures that can be enjoyed anytime, but class presence is still required for the full course. Participation is tested with quiz and question in class.

Collaboration Policy:
Students are encouraged to talk to classmates about the homework problem sets, assignments, and final project. The write-up and background work must be the student's own work.

Required Readings:
The class online schedule will provide a weekly list of reading material that complements the lecture and online-modules. Reading material progress is tested with quiz and question in class.

Projects:
The final project will consist on the design of a business and plan for a startup based on students ideas. We use project in this course because it is the best way to stimulate class discussions and also problem-solving abilities, and to understand the theoretical concepts. Projects will require the use of a laptop and some basic computing devices. The project can be collaborative within a group (groups of 2-4 students), but a final report is required for each individual student. Projects are the final component of this course and require significant amount of time (~6 weeks or more) and also reflect in a large portion of the grade (see: Evaluation). We will devote multiple lectures to help students chose the projects and feedback choices to the whole class. Also, we will have at least one mid-project review to monitor progress.

Homework:
The weekly homework will be a portion of the business plan, presentation, interviews, and background material.
Please note that no late assignments will be accepted (less extenuating circumstances discussed in advanced with the teaching crew).

Evaluation:
Class participation: 30% (in-class quiz, questions to instructors / students, insights)
Project: 70%, of which:

20% problem analysis and initial steps
30% business plan implementation
20% business presentation and material

Students with special needs:
If you have a disability of any kind that could affect your work for the course, please contact me by email or in person as soon as possible, so that we can arrange appropriate accommodations in consultation with Purdue's Disability Resource Center.

Academic Integrity:
This course is designed at an introductory level for undergraduates and graduate students of ANY level. Both are required to show engagement and reading material well above the basic one provided in the course.
It is important to cite carefully ideas and information that you have obtained by any means other than your own engagement with primary reading (i.e. papers/texts/materials) or from class lectures/discussion. I encourage you to share and discuss your work with your peers in the course, but if you receive help from anyone, it's important to provide a detailed acknowledgment of that help when you turn in your assignment.
See http://www.purdue.edu/odos/osrr/integrity.htm for guidelines on academic integrity. If you are caught cheating in any way you will receive an F for the course.

What do letter grades mean in this class?
A 'B' grade means doing just what was asked of you, a 'C' grade means doing very nearly what was asked, and an 'A' grade means doing a really good job and showing creativity. Creativity doesn't mean making an observation that nobody has ever expressed, but it does mean thinking independently and working steadily so as to sustain your independent thought and design, within the context of the course. In your final portfolio, it's important that you show that you have seriously engaged with novel design aspects and with the questions/ideas at stake in the course, and that you have done your best to explain your responses clearly and persuasively to your peers and instructors.

A: You have shown strong command of the course material and skills involved, showing knowledge, understanding, and independent thought. We expect that you will have very little difficulty in extending these skills in other contexts.

B: You have shown satisfactory command of the course material and skills involved. We expect that you will be able to use and extend the knowledge and skills acquired, and we see potential for development if you pursue this subject and/or continue to develop the skills involved.

C: You have shown some command of the course material. We see some potential for development if you wish to increase your command of the material and analytical skills involved in the course, but there is much room for improvement.

D: You have shown a barely adequate command of the material and skills. We fear that you are unlikely to be able to apply this knowledge at any level or continue studies in this direction unless you drastically change your study techniques.

F: You have not shown enough command of the material to be given credit for learning.

+ and – signs adjust grades within this overall pattern (e.g. a B+ often reflects promising and substantial command of the course materials, but without the independent thought needed for an A- or an A; alternatively a B+ can indicate that the student has shown signs of creativity and understanding, but without the solid basis in knowledge that would result in an A- or A; a B- suggests that there is clear promise for development, but that there are significant areas of weakness that need to be addressed in order to show a solid command of the course material/skills.) An A+ doesn't affect GPA, but it will be used to honor exceptional work.

There is no grading curve in this class. Everyone in the class could potentially achieve at least an A-, if everyone works steadily on their reading week by week (achieving good quiz, homework and project

grades and participating thoughtfully in class discussion), and if everyone puts detailed thought into their papers, presentations and project final documents.