

## Taking Products to Market: The Next Step in Chemical Product Design

ChE 314

Fall Semester, 2017

Benedum 309, [Mon/Wed/Fri 12-1]

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**Office Hours:** Mondays 1-3pm, Wednesdays 3-4pm  
(Additional meetings can be made by appointment!)

**Course Website:** [www.wilmerlab.com](http://www.wilmerlab.com) (see "Teaching" section)

**TA:** Jenna Gustafson [JAG227@pitt.edu](mailto:JAG227@pitt.edu), Benedum 1143c  
**TA Office Hours:** Mondays 1-2pm, Thursdays 12-1pm

**Course Textbook:** None

### Course Overview:

This course is designed to introduce chemical engineering undergraduates to the entrepreneurial approach of solving engineering problems. By the end of the semester, it is expected that student groups will demonstrate the ability to innovate and come up with viable product concepts that can be pitched in a professional and compelling manner.

### Assignments & Grading Structure:

All grades will be assigned to groups of 4-5 students (no individual grades). Groups must be formed by Sept. 1<sup>st</sup>. A summary of the three graded components of the class are listed below (with more details on the following pages):

- **InnoCentive Assignments** **40%**
  - InnoCentive assignment #1 (**Due: Sept. 13**)
  - InnoCentive assignment #2 (**Due: Oct. 13**)
  - Can be either weighted evenly (20% + 20%) or split (10% for #1, 30% #2), whichever gives a higher overall grade
- **Startup Pitches** **55%**
  - Pitch attempt #1 (**Due. Sept. 29**)
  - Pitch attempt #2 (**Due. Dec. 1**)
  - Can be either weighted evenly (22.5% + 22.5%) or split (15% for #1, 30% #2), whichever gives a higher overall grade
- **Participation** **5%**
  - Groups will be asked to contribute small tasks during class through the course (e.g., background research), for which participation credits will be earned

For all assignments there will be no unique "correct" solution and grading will be partly based on aspects that are inherently subjective (e.g., creativity of product solution). This reflects how products/ideas are assessed in the real world. The best strategy to get the highest grade is to (a) make a compelling case as to why your idea is the best (most creative/effective, etc.) and (b) to get early feedback from many people and iteratively refine your solution.

## Forming Groups

You are free to choose your own groups, but choose your group members carefully. Your group will need:

- Someone who is a great presenter
- Someone who is a great editor
- Someone who is creative and likes to come up with ideas
- Someone who likes doing background research
- Someone who likes detailed engineering calculations
- Someone who has an interest in business/markets

Not everyone needs to be interested in all of these things, but a group where no one has one of these interests (e.g., background research) will have a difficult time.

Once you have formed a group, please decide on a group name (e.g., “Cooler Than Absolute Zero”) and email the instructor and CC the TA. Please follow this email template exactly:

Subject line:

*CHE314 GROUP [GROUPNAME]*

Body of email:

*First name, last name, email*

*First name, last name, email*

*First name, last name, email*

*etc.*

## InnoCentive Assignments

InnoCentive ([www.innocentive.com](http://www.innocentive.com)) is an online marketplace where science and engineering challenges are posted along with rewards/prizes for anyone that solves them. “Solvers” compete to get the reward by submitting the best solution to the problem. The competition is open to anyone in the world (not just students).

Some InnoCentive challenges require physical prototypes to be constructed, or experimental measurements to be taken, however many simply require describing an idea in a 3-5 page written report. A typical format for a good InnoCentive submission is given below (however each InnoCentive challenge may have unique requirements, read the details carefully!).

- Title
- Abstract / executive summary [if longer than 3 pages]
- Introduction / background
- Body
- Explicit bullet-by-bullet explanation of how solution meets each challenge criteria
- Very brief conclusion
- References

For the class, assignments will be graded on 10 point scale using the following rubric:

- Meeting/addressing technical requirements **/4**  
Make sure to address each one, even if your solution doesn't meet the requirement
- Clarity of writing / diagrams **/3**  
Spelling/grammar/consistent citation formatting  
Logical presentation of ideas
- Creativity of solution **/3**  
Distinct from competing solutions? (make sure to compare to competing solutions)  
Does the reader learn something new when they read your solution?

## Startup Pitches

Being able to pitch a new idea for a company is a key skill to be developed in this course. The key difference from the InnoCentive assignments is that startup ideas are higher up on the uncertainty/reward spectrum. Whereas for InnoCentive, someone has identified the problem for you, in the Startup Pitch you must identify a (big) problem yourself. This is very challenging; expect it to be one of the hardest parts of the course.

The format of the Pitches will include both oral and written components (e.g., presentation in class and a 5-10 page business plan). The exact format details are to-be-determined as they will be matched (as closely as possible) to the requirements of real upcoming pitch competitions. Please stay tuned as more details will become available later in the semester.

Independent of the exact format details, pitches will be evaluated using the following rubric:

### Oral Pitch

- Opportunity and market /10  
Is this a big opportunity? What is the market size?
- Competition and intellectual property /10  
Who are the closest competitors? What are the IP barriers? What IP do you have?
- Product design and cost /10  
Talk about the product, what it costs to develop/produce. Is it compelling?
- Team /10  
Talk about your team. Why should potential investors bet on your team succeeding?
- Budget /10  
How much money do you need to raise to pull this off?
- Delivery of visual presentation multiplier **(x0.7; x0.8; x0.9; x1.0 x1.1)**  
x0.7 = unreadable slides, display errors (i.e., blurry image, frozen animation), failure to connect to projector in timely manner, poorly organized content  
x1.0 = compelling visual presentation, easy to follow  
x1.1 = audience blown away, super clear, compelling visuals
- Delivery of spoken presentation multiplier **(x0.7; x0.8; x0.9; x1.0 x1.1)**  
x0.7 = quiet, mumbling, unrehearsed  
x1.0 = loud, rehearsed, compelling  
x1.1 = exciting, enthusiastic, flawlessly rehearsed
- Timeliness multiplier **(x0.9; x1.0)**  
x0.9 = went over time limit  
x1.0 = stayed under time limit

Oral maximum score =  $50 * 1.1 * 1.1 * 1.0 = 60/50$

### Written Pitch (i.e., business plan)

- Opportunity and market /10
- Competition and intellectual property /10
- Product design and cost /10
- Team /10
- Budget /10
- Writing effectiveness multiplier **(x0.7; x0.8; x0.9; x1.0 x1.1)**  
x0.7 = spelling and grammar errors, citation formatting errors, poor organization  
x1.0 = well written, clearly edited, properly formatted, suitable figures/diagrams  
x1.1 = clear and succinct, compelling, nicely formatted with beautiful diagrams/figures

Written pitch maximum score =  $50 * 1.1 = 55/50$

**Overall pitch maximum score = 60 + 55 = 115/100**

Note that even if an otherwise perfect pitch is poorly presented (either in writing or in a presentation), it will get a very low score. This is because that is how it works in the real world. A poorly written document (like a poorly written resume/CV) is usually thrown in the trash without any time spent reading it.

To ensure fairness for all of the students, both oral and written pitches must be submitted at the same time, even if groups present their slides on different days.

Dates for pitch submissions:

- Pitch #1: Written pitch + Slides for oral pitch due Sept. 29<sup>th</sup> at the beginning of class.
- Pitch #2: Written pitch + Slides for oral pitch due Dec. 1<sup>st</sup> at the beginning of class.

## Participation

Although it is not required to attend 100% of the classes to get full participation credit, you are strongly encouraged to attend as many of the classes as you can. Groups will earn participation points by carrying out tasks during certain classes (e.g., brainstorming product ideas, or doing background research on a particular topic). Each group has the potential to earn up to 8 participation points, for which 5 are needed to obtain a perfect score (maximum score is 8/5). Opportunities to earn participation points will be distributed evenly over the duration of the course.

## Class Outline and Schedule

A high level outline of the course is given below:

### 0. Intro to ChE314: Chasing big uncertain opportunities

#### 1. Engineering Innovation

- a. Innovation marketplaces (InnoCentive)
- b. How to write a winning solution for InnoCentive challenges
- c. Guest speakers (past InnoCentive winners)
- d. Examples of winning solutions

#### 2. Starting a Business

- a. The difference between innovation and commercialization
- b. Brief summary of how to launch a startup (as a student)
- c. Coming up with ideas and the importance of market size
- d. Designing molecules to solve big problems, the ChemE secret weapon
- e. Case studies: NuMat, SiNode, Spanx, others
- f. Guest speakers (entrepreneurs who started businesses)
- g. How to deliver a winning pitch

Please note that there will be no class on the following dates:

- Sept. 1 & Sept. 4 (Labor day)
- Oct. 25
- Oct. 30 – Nov. 8 (AIChE week)
- Nov. 20 – Nov. 29 (Thanksgiving)

## Fairness (and late assignment) policies

It is very important for the class to treat all students fairly. For this reason, late assignments will be deducted 25% if less than one week late, and will get a 50% deduction if submitted thereafter. Please be considerate of your fellow students in class and avoid distracting behavior. Members of groups that willfully do not contribute to their group risk getting a lower grade than their group at the discretion of the instructor.

**Disability Concerns**

If you have a disability for which you are or may be requesting accommodation, you are encouraged to contact both the instructor and Disability Resources and Services (DRS) as early as possible in the semester. DRS is located at 216 William Pitt Union and can be contacted at (412) 648-7890 / (412) 383-7355 (TTY). DRS will verify your disability and determine reasonable accommodations for this course.