

BIOE 614

Technology Ventures: From Concept to Commercialization

Class Meetings:
Mon/Wed 12:15-1:45

Professor:
Andrew Nelson
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Office Hours:
Mon 1:45-3:00 and by appointment

Course Overview

This course introduces and develops the vocabulary and skills necessary to successfully translate research discoveries into successful ventures. Students will identify challenges and trends that signal promising opportunities. They will practice market research skills, including the collection and analysis of primary and secondary market data. They will learn and apply the fundamentals of competitive strategy, including intellectual property protection. They will develop business and financial models, including exploration of different sources of funding. And they will learn fundamental leadership skills necessary to transform an idea into an enterprise.

Course Approach

Generally, this course follows an arc from idea generation through idea evaluation through execution. The course relies on a combination of lectures, projects, and case studies that highlight key strategic decisions connected to science commercialization and that enable the application of key frameworks. Fundamentally, this is a hands-on course that requires students to apply readings and insights to actual plans and actions.

This course also incorporates both individual and group efforts: You'll work alone to practice some of the approaches that we discuss in class and to submit short cases responses; you'll work with a group to pursue a term-length assessment of an opportunity and to present your findings to your peers. Finally, your individual preparation and participation in connection with our class discussions will shape both your grade and the value that you derive from this course.

Course Calendar

Session	Topic	Reading Assignments
1. Jan 4	Course Overview Vision and Values	BDN <i>Table of Contents</i> and Ch. 1 BDN 3.1-3.3
2. Jan 6	Problems, Solutions and Creativity	BDN Ch. 2.1, 2.4 BDN Ch. 8.1

3. Jan 11	Customer Observation and Design Thinking	BDN Ch. 2.2 Brown, "Design Thinking"
4. Jan 13	Technology-Push Idea Generation	BDN Ch. 2.3 BDN Ch. 5 Case: Trexel
Jan 18	No Class – Martin Luther King, Jr. Holiday	
5. Jan 20	Customer Development and Pivots	BDN Ch. 2.2 (Review) BDN Ch. 8.2, 8.3 BDN Ch. 9 (especially 9.1 – 9.3, 9.8 – 9.9) Blank, "Why the Lean Startup Changes Everything" Case: Biodiesel, Inc.
6. Jan 25	Data Workshop 1: Gathering and Analyzing Qualitative Data	VentureWell, "Customer Interviews: Tips, Do's, and Don'ts" Caesar, "Why Qualitative Market Research Belongs in Your Startup Toolkit"
7. Jan 27	Opportunity Evaluation and Business Models	BDN Ch. 2.5 BDN Ch. 3.4 – 3.5 BDN Ch. 6 Sahlman, "How to Write a Great Business Plan" Browse the "Business Model Canvas" website: www.businessmodelgeneration.com/canvas/bmc
8. Feb 1	Industry Structure and Network Effects	BDN Ch. 7 BDN Ch. 14.1 – 14.3 Porter, "The Five Competitive Forces That Shape Strategy"
9. Feb 3	Data Workshop 2: Industry and Market Research Databases	Browse the "business research guide" website: http://researchguides.uoregon.edu/business

10. Feb 8	Differentiation and Competitive Advantage	BDN Ch. 4 Porter, "What is Strategy?" Case: Method Products: Sustainability Innovation as Entrepreneurial Strategy
11. Feb 10	Intellectual Property	BDN Ch. 11 Browse the UO Innovation Partnership Services website: https://research.uoregon.edu/manage/innovation-impact Skim: Greguras, "Guide to Starting a Corporation" Guest speaker: Chuck Williams (Innovation Partnership Services)
12. Feb 15	Negotiations and Partnerships	BDN Ch. 4.7 (Review) BDN Ch. 13.2, 13.4, 13.6 BDN Ch. 15 Case: Sample6
13. Feb 17	Financial Projections	BDN Chs. 16 and 17 Merrill Lynch, "How to Read a Financial Report"
14. Feb 22	Raising Money	BDN Ch. 13.1 BDN Ch. 18 Weekly, "An Introduction to Stock and Options" Mulcahy, "6 Myths about Venture Capitalists" Guest speaker: Ann Carney Nelson (Inpria)
15. Feb 24	Pitching	BDN Ch 6.4 (Review) BDN Ch. 19 Hoffman, "LinkedIn Series B pitch deck" Jacobs, "Good Leaders are Great Storytellers"
16. Mar 1	Hiring and Organizational Culture	BDN Ch. 12.5 – 12.8 BDN Ch. 13 (Review segments assigned earlier) Reeves, "How Gusto Built Scalable Hiring Practices Rooted in Tradition" Case: Nanogene

17. Mar 3	Leadership and Team Dynamics	BDN Ch. 12.1 – 12.4 Guest speaker: Mohan Nair (Cambia Health)
18. Mar 8	Ethics	BDN Ch. 20.4 BDN Ch. 13.2 (Review) Hanson, “The Ethical Challenges Facing Entrepreneurs” Lowenstein, “‘Bad Blood’ Review: How One Company Scammed Silicon Valley. And How It Got Caught” Case: Theranos
19. Mar 10	Opportunity Project Presentations	
	Wrap-up and Summary	

Course Materials

Book

Thomas Byers, Richard Dorf, and Andrew Nelson (2018), *Technology Ventures, 5th edition* (McGraw-Hill).

Articles/Readings

Brown, “Design Thinking” *Harvard Business Review*, June 2008, Vol 86, No 6, pp 84-92

Blank, “Why the Lean Startup Changes Everything” *Harvard Business Review*, May 2013, Vol 91, No 5, pp 63-72.

VentureWell, “Customer Interviews: Tips, Do’s, and Don’ts” May 2020

Caesar, “Why Qualitative Market Research Belongs in Your Startup Toolkit” *First Round Review* 2019

Sahlman, “How to Write a Great Business Plan” *Harvard Business Review*, July-August 1997, Vol 75, No 4, pp 98-108

Porter “The Five Competitive Forces That Shape Strategy” *Harvard Business Review*, Jan 2008, Vol 86, No 1, pp 78-93

Porter, “What is Strategy?” *Harvard Business Review*, Nov-Dec 1996

Greguras, “Guide to Starting a Corporation” *Fenwick & West LLP* 2002

Merrill Lynch, “How to Read a Financial Report” 2000

Weekly, “An Introduction to Stock and Options for the Tech Entrepreneur or Startup Employee” May 2011.

Mulcahy, “6 Myths about Venture Capitalists” *Harvard Business Review*, May 2013

Hoffman, “LinkedIn Series B pitch deck”

Jacobs, “Good Leaders are Great Storytellers” *First Round Review* 2019

Reeves, “How Gusto Built Scalable Hiring Practices Rooted in Tradition” *First Round Review* 2018

Lowenstein, “‘Bad Blood’ Review: How One Company Scammed Silicon Valley. And How It Got Caught” *The New York Times*, 21 May 2018

Hanson, “The Ethical Challenges Facing Entrepreneurs” *The Wall Street Journal*, 23 November 2015

Websites

Business Model Canvas: <http://www.businessmodelgeneration.com/canvas/bmc>

Business research guide: <http://researchguides.uoregon.edu/business>

UO Innovation Partnership Services: <https://research.uoregon.edu/manage/innovation-impact>

Cases

All of the selected cases highlight strategic decisions surrounding science- and technology-based companies, many of which are/were based on university research.

Trexel (chemistry) – Harvard

Biodiesel (chemistry) – textbook

Method Products (chemistry) – textbook

Sample6 (biology) – Harvard

Nanogene (biology) – Harvard

Theranos (biology) – separate

Assignments and Policies

Observation Exercise (140 points)

I will describe this activity in detail during Session 4. You should allot two hours for the activity itself, along with additional time for planning and for preparation of the email submission.

Case Assignments (90 points)

This class is highly interactive and depends on everyone being prepared for each session. Our case discussions, in particular, will be successful only if everyone comes prepared to argue a perspective on the issue at hand. The course website lists a short prompt in connection with each case. (Please note that this prompt may be different from the questions listed at the end of the case itself.) Your task is to provide an intelligent initial reaction to the prompt. There is rarely a “right” answer in these responses, though better responses will draw upon or reference relevant class concepts and/or frameworks.

In managing case assignments, I try to balance the benefit of having you prepare responses in advance against the obvious “cost” (in time and effort) of preparing these responses. Thus, I am not asking you to complete a full case analysis. Instead, I’m looking for a succinctly justified recommendation in about 1-2 paragraphs.

Each case is worth 15 points and most submissions will receive the full 15 points. To manage my outbound email, I will not email those students who receive the full 15 points, since this is the most common outcome. Conversely, if you receive fewer than 15 points or if you fail to submit a case altogether, I will email you individually. Particularly exceptional case submissions will count towards improving your individual participation grade (though such submissions are most valuable when the insights are actually shared in class discussion and not just with me).

Analyses and responses should be submitted to me by email (ajnelson@uoregon.edu) no later than 9am. I regret that I cannot accept late submissions out of fairness to other students.

Preparation, Participation and Attendance (270 points)

Attendance is mandatory at all sessions as there’s simply no way to make up for missed engagement in a discussion. It’s also extremely difficult for me to arbitrate between different reasons that someone may miss a class and to judge whether some reasons are more appropriate than others. Our attendance policy, therefore, is simple: Each class is worth up to 15 points. You can miss one class without penalty. Beyond that, if you miss a class, you do not earn any points for that class.

Of course, class is about much more than attendance. This class is only successful if you actively engage in discussion with your classmates and publicly wrestle with the material, cases and presentations. Thus, if you sit in back and appear to be more focused on your phone than on your classmates, your participation grade will suffer.

Finally, in grading your participation, please note that I will *not* be grading on “air time” nor on your “rightness” (which would be difficult given the complexity and subjectivity of our subjects). Rather, I’ll focus on the quality of your questions/comments and the logic and facts used to support them. Of course, even with these guidelines in place, the grading of classroom participation is difficult because of its inherent subjectivity. Thus, please feel free to check in with me at any point during the quarter as to your current standing with regards to participation.

Opportunity Project Journal (400 points)

(See below)

Opportunity Project Presentation (100 points)

(See below)

Opportunity Project

"Entrepreneurship is a contact sport. It's extreme. You can't learn it by sitting down in a classroom."

– Tina Seelig

I don't expect you to build a company in the span of an academic term (though that would be cool!). I do expect you, however, to take the concepts and frameworks that we discuss in class into the "real world" by engaging deeply with an opportunity. Specifically, you will gather primary and secondary data to "test" core elements of your idea. I will grade you *not* on the overall quality of your idea, but rather on your ability to obtain outside information, to appropriately test your assumptions, and to consider how you might overcome challenges that arise. Thus, you will be graded on *process*, not on *outcome*. To facilitate this grading approach, you will keep a detailed journal that describes your activities and learnings. I will provide further guidance on the format and expected contents of this journal in class.

At the end of the term, you will share your key findings and proposed next steps with the class.

Journal Guidelines

Your journal will consist, broadly, of two parts. In the first part, you will track your responses to a variety of questions (listed below), along with your efforts to gather relevant data and to consider changes to your idea that are informed by these data. In the second part, you will offer an assessment of your idea based on what you learned.

Your journal is both a venue in which to keep track of your work and an opportunity to demonstrate to me the steps you took to evaluate and execute upon an idea. Thus, the journal should "show your work." Include *lots* of detail. For example, rather than saying, "I interviewed five people this week," write down who they were, how you identified them, how/where you spoke, and for how long. Also, include notes from each interview and an analysis of what you learned and how it influenced your assessment of your idea. Generally speaking, "good" journals have frequent entries and lots of detail; "not-so-good" journals appear to be a rush job put together in the last couple weeks of the term. Keep in mind that I am grading on the basis of your work and process, not the outcome; you're encouraged to detail failures and missteps, and not to "sanitize" your journal.

Your journal should address the questions detailed below, which are tied to Osterwalder's business model canvas. In each area, you should detail your "hypotheses," the ways in which you "tested" these hypotheses (e.g., the data you gathered and what you learned), and what you learned. As appropriate, you might also contemplate changes that you'd make in order to address unproven hypotheses (e.g., "pivots"). I will provide an Excel template for you to use to organize your journal, though you can supplement this spreadsheet with additional materials if appropriate. We will discuss more detailed expectations in class during Session 7.

Your responses to the questions below should be informed by numerous and frequent engagements with the "real world." If you sit in a study room and brainstorm answers to these questions, guided perhaps by a generic research database through the library, you will have missed the point. If you engage with potential customers and other insiders on a frequent basis and you use their input to craft your answers, then you'll do well. Thus, it is absolutely essential that you talk with lots of people. You might also make use of surveys and other tools to garner feedback (though keep in mind the limitations of surveys, as we'll

discuss in class). The guiding point is that you must engage with people relevant to your specific idea (e.g., potential customers, suppliers, employers, competitors, etc.). Although it is difficult to provide generic guidelines since ideas vary considerably, the most successful projects tend to speak with at least 20 people over the term. Obviously, identifying, reaching, and engaging with so many people requires considerable time. Thus, I strongly encourage you to start early.

To motivate you to start early, you will submit your current journal/spreadsheet on a weekly basis, starting on February 8. I will not grade these weekly submissions. At the end of the term, however, reviewing your weekly progress will enable me to better understand your process. Because the second part of the journal (the final assessment) requires the first part of the journal (the raw data tied to the questions), I will not expect to see this assessment until your final Opportunity Project submission.

Class Presentation Guidelines

Each Opportunity Project team will be assigned a presentation slot during our last class session. This presentation is not a pitch for your product/service. Instead, it's an opportunity to share your journey with your classmates. Thus, at a minimum presentations should address:

- Your idea and how you generated it
- Your key assumptions
- How you tested these assumptions
- Your assessment of appropriate next steps
- Commentary on what you learned overall (e.g., given what you know now, what might you have done differently?)

Grading/Assessment

Written Journal

In grading the final opportunity project, I will assess:

- The extent and clarity with which your team addresses the questions below
- The breadth and depth of your engagement with external sources
- The incorporation of class concepts and materials in your analysis
- The thoroughness and logical underpinnings of your analysis

Class Presentation

Presentations will be graded on:

- How thoroughly and convincingly the presentation addresses the points listed under the guidelines above
- The depth, professionalism and honesty/accuracy of responses given during the Q&A
- Peer feedback (each classmate will fill out a brief evaluation of each presentation, except that of their own team)

Peer Evaluation

Each team receives a common grade for the written journal and the video and class presentation. After the project is submitted, however, I'll ask you to conduct a peer evaluation of each of your teammates. This exercise provides you with an opportunity to provide candid and confidential feedback on the contributions (or lack thereof) of your fellow teammates. If there is a pattern among responses around a

particular teammate (e.g., every teammate writes that “Bob” dropped an important part of the project or that “Sally” went above and beyond to deliver a quality component), I will adjust that teammate’s individual project grade up or down accordingly. Please note that I also save these evaluations and refer to them when writing letters of recommendation.

There is no specific format for the peer evaluations. Generally, if things went well and everyone contributed equally, a short email to that effect will suffice; by contrast, if you have an outlier team member (good or bad), then much more detail is appropriate.

Questions to Consider in the Opportunity Journal

Your first step is to choose an idea. This idea need not be unique (e.g., it can be similar to an existing product or service) and need not be “good.” In fact, as we’ll discuss, most ideas are not good – at least to start – and you are graded on process, not on the quality of your idea. Your idea, however, must facilitate the primary data gathering (e.g., interviews with potential customers) that lies at the heart of the project. In other words, do not spend a great deal of time attempting to “pre-assess” ideas before settling on one. It is far more important to get started early and to engage lots of data.

Your journal will consist of answers and data addressing each of the questions below. Thus, you should craft an initial answer to each question and you should recognize the assumptions/hypotheses that accompany these initial answers. You’ll then gather data to test this initial answer and you’ll report on how you gathered these data and what you learned. Finally, you may propose how you could change your idea to address assumptions that prove unfounded (and that, therefore, present a challenge to your initial idea).

1. Value Proposition

What value do you deliver to the customer? What problem are you solving? How painful is this problem for those who have it? How many people have it? What are these people doing to address the problem today (e.g., in lieu of your product/service)? What is your proposed solution? What makes your solution particularly compelling?

2. Competition

Who else serves this customer need? What’s your differentiation? What advantages and weaknesses do these competitors and would-be competitors have? What switching costs, if any, would potential customers face in adopting your product/service?

3. Customer Relationships and Segments

For whom are you creating value? Who are your most important customers? What type of relationship does each customer segment expect you to establish and maintain with them? How will you reach your customers? What is their buying process?

4. Key Partners

Where do you sit in the value chain? Who are your key suppliers, distributors, investors, and other partners? Why do you need these partnerships (e.g., what are the benefits)? What are the costs and potential risks of these partnerships to you? Why will these people/organizations partner with you (e.g., what are the costs and benefits from their perspectives)?

5. Key Activities

What key activities does your value proposition require? What's the timeline for these activities?

Overall Assessment and Next Steps

Is your "idea" a good "opportunity"? Why or why not? If you cannot reach a conclusion at this stage, what else would you need to know in order to do so? What problems do you see with your idea, and what are the risks and challenges associated with your idea? How would you rank these risks (including the "white hot risk") and why? How would you address the top risk or risks? Are the overall risks primarily financial, technical, people, or market risks? What next steps make sense with regards to this idea? Would this idea be more feasible if pursued within an existing company?

Note that this section is your opportunity to apply class and textbook concepts and frameworks to your idea and to demonstrate your ability to recognize challenges/problems as well as opportunities – and the extent to which challenges/problems are surmountable or not (and if so, how!). Think of this section, therefore, as an objective analysis of your idea and potential next steps based on the data gathered for sections 1-5.

Additional Information

Plagiarism and Academic Misconduct

The University Student Conduct Code (see <http://dos.uoregon.edu/conduct>) defines academic misconduct. Students are prohibited from committing or attempting to commit any act that constitutes academic misconduct. By way of example, students should not give or receive (or attempt to give or receive) unauthorized help on assignments or examinations without express permission from the instructor. Students should properly acknowledge and document all sources of information (e.g. quotations, paraphrases, ideas) and use only the sources and resources authorized by the instructor. If there is any question about whether an act constitutes academic misconduct, it is the students' obligation to clarify the question with the instructor before committing or attempting to commit the act. Additional information about a common form of academic misconduct, plagiarism, is available at researchguides.uoregon.edu/citing-plagiarism

Accessible Education

The University of Oregon is working to create inclusive learning environments (see <https://aec.uoregon.edu/>) Please notify me if there are aspects of the instruction or design of this course that result in disability-related barriers to your participation. You are also encouraged to contact the Accessible Education Center in 164 Oregon Hall at 541-346-1155 or uoaec@uoregon.edu.

Help for Victims and Survivors

If you are a victim or survivor of sexual assault, sexual harassment, dating or domestic violence, gender-based harassment or bullying, and/or stalking and need help, start here: <https://safe.uoregon.edu/>. There is staff available 24-hours a day for confidential advice and assistance. Even if you are unsure what to do, call 541-346-7233 (SAFE) and you'll be connected with somebody who will listen to you and help guide you as you figure out what you want to do next. We are here to support you and help provide the assistance and services you need.

Bias Education and Response Team

The University of Oregon Bias Education and Response Team (BERT), <http://dos.uoregon.edu/bias>, based

in the Office of the Dean of Students, works to provide those who have witnessed, or themselves become a target of an act of bias, an opportunity to be heard and supported. The fundamental role of BERT is to respond to situations that affect the larger University of Oregon community through education about current and historical issues surrounding bias. Utilizing best practices in our field, the BERT provides services to witness(es), bystander(s), targeted individual(s), offender(s), or a member(s) of the community in order to create change in a timely, effective, and comprehensive way. It is through our education services and initiatives that we hope to eliminate acts of bias within our community. If you have witnessed or experienced bias and would like more information or would like to report it, please visit <http://dos.uoregon.edu/bias>.

Title IX

If you or someone you know (student, faculty, or staff) has experienced gender discrimination, sexual harassment, or sexual violence, the university can offer assistance, support, and resources: <http://titleix.uoregon.edu/how-report>

Prohibited Discrimination and Harassment Reporting

Any student who has experienced sexual assault, relationship violence, sex or gender-based bullying, stalking, and/or sexual harassment may seek resources and help at safe.uoregon.edu. To get help by phone, a student can also call either the UO's 24-hour hotline at 541-346-7244 (SAFE), or the non-confidential Title IX Coordinator at 541-346-8136. From the SAFE website, students may also connect to Callisto, <https://uoregon.callistocampus.org/>, a confidential, third-party reporting site that is not a part of the university.

Students experiencing any other form of prohibited discrimination or harassment can find information at respect.uoregon.edu or aaeo.uoregon.edu or contact the non-confidential of Affirmative Action and Equal Opportunity (AAEO) office at 541-346-3123 or the Dean of Students Office at 541-346-3216 for help. As UO policy has different reporting requirements based on the nature of the reported harassment or discrimination, additional information about reporting requirements for discrimination or harassment unrelated to sexual assault, relationship violence, sex or gender based bullying, stalking, and/or sexual harassment is available at [Discrimination & Harassment](#).

Specific details about confidentiality of information and reporting obligations of employees can be found at titleix.uoregon.edu.

Emergency Response

Active shooter

In the unlikely event of an active shooter on campus, all students should “run – hide – fight.” Our first line of defense will be to run from the classroom and away from campus. (You are to get yourself to safety. There will be no class meeting spot in this emergency.) If running is not an option, we will attempt to hide in the classroom by turning off the lights and getting on the ground. If hiding is not an option, we will fight the active shooter by throwing objects at his/her eyes (books, laptops, water bottles, etc.) and then tackling him/her until help arrives.

Earthquake or fire

Students should leave the building by the nearest, safe exit and gather in an open area.