Commercializing Innovations/NUvention Materials Science
Course syllabus

Instructors:

- Samir Mayekar: Co-founder of SiNode Systems (now NanoGraf Corporation)
- Aaron Chockla, Ph.D.: Venture capitalist at True North Venture Partners

Course overview: “Commercializing Innovations” (aka NUvention: Materials Science) is a project-based course that provides Northwestern/Kellogg students with a foundation for developing high-impact, physical science-based ventures. Interdisciplinary teams identify and develop high-potential concepts that they will research, analyze, and refine using tools and frameworks provided during the course with the ultimate goal of developing an investment-ready venture.

Course Learning Goals:

1. Analyze technical, economic, and political drivers underlying a vexing, socially-relevant challenge that can be solved by a solution derived from the physical sciences.
2. Synthesize insights from research, analysis, and external engagements into a compelling value proposition that could form the basis of a new venture.
3. Evaluate and iterate to either validate or disprove fundamental assumptions underlying the venture plan.

Class Structure: The class will meet once per week on Tuesday evenings from 6:30 - 9:30 pm. In addition, each team will organize a 30-minute meeting with the instructors or mentors before class every other week.

Weekly Assignments: The evening before class the following will be expected:

- Develop slides as per class topic
- Create agenda for mentor meeting (bi-weekly meeting w/ instructor or mentor)
- Interview at least 2 external experts and potential customers per team member
- Record what you learned each week, update your presentation slides and report progress back to the class
- Read background materials and prepare questions for class

Course Materials: Each team will utilize a Dropbox or Google Drive folder, which will store agendas for teaching team meetings, engagement interview progress, and presentations. Class materials, lecture slides, and guest speaker slides will be posted on Canvas. Suggested readings and other source materials will be placed on Canvas.

Professor Office Hours: Each team will have 30-minute bi-weekly meeting with the instructors or mentoring team. Additional Professor Office Hours may be made by appointment. Please email the professor individually to schedule.

Attendance: Given there are only 10 class meetings, full participation and attendance is expected. Please notify the Professor if you will be missing class ahead of time. Students are allowed one excused absence, and a second absence will require a brief make-up assignment. Please contact the Professor if you expect to miss more than two class periods.
Course Evaluation Criteria:

| Thoroughness of research and analysis | • Identify key research questions to investigate  
| • Filter for relevant and reliable information resources  
| • Depth of understanding and quality of the analysis |
| Clarity and effectiveness of presentations | • Develop convincing work product  
| • Clearly communicate a compelling thesis and action plan |
| Creativity and insights | • Frame a unique opportunity  
| • Thorough analysis of options for solving a deep problem  
| • Clearly articulating conclusions through presentation |
| External engagement | • Efficient and effective identification and communication with subject matter experts and outside stakeholders (e.g. consumers, businesses, regulators and other contributors) in defining the problem and evaluating solutions |
| Potential for real-world impact | • Based on feedback from reviewers on the quality of the analysis, evaluation, refinement, and final proposal and launch plan for a high-impact venture |
| Team collaboration | • Organize and manage members of a team with high-achievement potential |

Grading:

— **Final Project Deliverable (60%)**: Student teams will deliver a final presentation describing their new venture proposal to an expert panel. Each team member must participate in the final presentation.

— **Weekly Assignments (20%)**: Students will be evaluated for effective use of the weekly team-instructor meetings, personalized development of needed skills through course reading materials, quality and level of engagement with external experts, and quality and completion of assignments (see Class Schedule for details)

— **Engagement & Participation (20%)**: You are expected to be prepared and to constructively participate in class discussion. All students will be required to complete a participation self- and peer-assessment, wherein you will be asked to evaluate your class participation along with that of your team members. Students who do not complete the participation self-assessment on time will receive no credit for the class participation component of their own grade.
Course framework: The goals of this course will be accomplished by providing content and frameworks that will enable students to synthesize insight obtained throughout the course into an investor-ready pitch deck based on a concept for a new venture. The following slides will be covered in detail during the course:

1. **Problem**: Start with why: What is the problem and why is it a problem worth solving?

2. **Competition 1**: What is the current status quo and who are the key players? What are the potential alternatives or substitutes to the existing solution?

3. **Solution**: How are you going to solve the problem (explain the approach, not the widget)?

4. **Product**: What are you going to use to solve the product (introduce your product or process, if only conceptually, and describe how it works)?

5. **Features and benefits**: What is your core value proposition and what are the key defining features and benefits of your product / process?

6. **Competition 2**: What is your competitive advantage (the secret sauce that makes you special as a venture)? Why is your solution better than the existing incumbents? Why is your solution better than substitutes and alternatives? Why is your solution better than others currently in the R&D stage seeking to address the same problem?

7. **Timing**: Why is this the right time? Why hasn’t anyone tried to do before what you are trying to do now?

8. **Business Model**: How will you make money?

9. **Market/Go-to-Market Strategy**: Define your beachhead market--who will buy from you, why will the buy, and how will they buy (e.g., direct sales vs distribution)? Sketch a market migration path from your beachhead to the mass market consumer.

10. **Traction**: What proof do you have that customers want / need / love your product?

11. **Financials and Plan**: How much money are you seeking and how will the money be used?

12. **Team**: Who are the key team members, what relevant experience does each hold, and why is this the right team to solve the problem? What core competencies does your existing team lack and what is your plan to address these deficiencies?

• **What unique learnings will students gain in this class?**
  1. How to make best-in-class investor pitch deck
  2. Frameworks for building companies based on applied physical science innovations
  3. Tools for customer & partner discovery
  4. Techno-economic modeling
  5. IP strategy development & licensing
6. Global perspectives (especially Asia & EU)

**Course Schedule**

<table>
<thead>
<tr>
<th>Week</th>
<th>Pitch Focus</th>
<th>Class Content</th>
<th>Reading &amp; Assignments</th>
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| 1:   | N/A         | Course Introduction<br>Intros/Team Building<br>Anatomy of an Investor Pitch Deck<br>Business Model Canvas<br>Entrepreneur perspectives | ● Cyclotron Road pitch template.  
● Garage Ventures pitch guide  
● Assignment #1: Finalize team, Draft template presentation, define objectives and team responsibilities |
| 2    | Slide 1: “Problem” | Customer & Partner Discovery<br>Best Practices<br>Mastering Partnerships | ● Steve Blank ARPA-E University  
● ICorps Customer Discovery Best Practices  
Assignment #2: Conduct engagement interviews and include progress in presentation |
Assignment #3: Complete problem, solution, product slides, Conduct engagement interviews |
● IP Strategy Overview  
● 7 Sins of IP  
● Licensing 101  
Assignment #4: Update investor presentation, Complete features and benefit slide, Conduct engagement interviews |
| 5    | Slide 2/6: “Competition” | Team Update Presentations<br>Strategic Partnering<br>Global Partnerships | ● Proposal Template  
● Term Sheet Template  
Assignment #5: Update investor presentation, Complete competition slide, Conduct engagement interviews |
ARPA-E University Cost Modeling  
Assignment #6: Submit/present update presentation for Initial External Feedback Session, Conduct engagement interviews |
| 7    | Slide 9: “Go to Market” | Team Dynamics<br>Initial Feedback Session Presentations<br>Inventor Perspective | ● Confidentiality, Consulting, and Employee agreements  
● 5 Deadly Sins and 5 Best Practices of Proposal Writing  
Assignment #7: Submit/present update presentation, complete go to market slides, Provide feedback for other teams’ interim presentation, Conduct engagement interviews |
| 8    | Slide 11: “Financials and Plan” Slide 12: “Team” | Sources of Startup Funding<br>CEO Perspective | ● Assignment #8: Submit/present dry run presentation, including financials slides |
| 9    | Slide 10: “Traction” | Team Update Presentations | ● Assignment #9: Submit, practice, and present final presentation with all slides |
| 10 | FINAL PRESENTATION | External judges | Reception to follow presentations |