# AI Innovation Lab

**Northwestern**

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| **COURSE** | **AI Innovation Lab (ECE 495/395)** |
| **TEXT** | *Disciplined Entrepreneurship*, Bill Aulet |
| **TIME** | Mondays, 6-9PM |
| **LOCATION** | TBD |
| **FACULTY** | **Prof. David Zaretsky**<br>david.zaretsky@northwestern.edu |
| **OFFICE HOURS** | TBD, By Appointment: https://calendly.com/davidzaretsky |
| **TEACHING ASSISTANT** | **TBD** |
| **COURSE OVERVIEW** | **AI Innovation Lab** focuses on the intersection between software (AI), hardware (IoT), data (analytics), and business (entrepreneurship). This course is a unique opportunity for passionate students and future entrepreneurs to journey through the formation of a commercial technology startup.<br><br>The course is designed to expose students to all aspects of creating a technology start-up, covering a wide range of topics in AI, IoT, data analytics, IT infrastructure, cyber security, and business development. Students will develop AI technologies that leverage computer vision, natural language processing, and machine learning to build smart IoT devices, cloud infrastructure, process real-time data, and produce analytics applications. |

Throughout the term, students will work with a team to build a plan for a new enterprise using a proven framework, the Disciplined Entrepreneurship process. Students will develop and evaluate their technology as a commercial product, identify target commercial market(s), and develop business and financial plans to launch the business. Student will also work on lab assignments to build practical AI applications that focus on data analysis and classification. Student teams will be mentored by faculty and advisory board members to ensure they have an opportunity to build a compelling business case.

This course is designed for anyone who wants to understand firsthand the process of launching a new venture in AI. While this course obviously fits the "ready to go" entrepreneur who is looking to launch a startup or join one in the near future, it is also a good course for those who are simply curious to learn about entrepreneurship, or those looking to join a startup. This course will give you a solid understanding of what it takes to launch a new venture and a common language for future entrepreneurial endeavors.

The primary goal is to learn the process of launching your startup and understanding the nuances in developing your business and AI technology. In many ways, the class is also designed to be a business accelerator. Although launching a startup is not necessarily a planned outcome, it could certainly happen.

**COURSE GOALS**    In this course you will gain an in-depth understanding of how to
- Launch a lean startup
- Build a management team and manage responsibilities
- Develop a business model for a product, service, or analytics that uses AI
- Identify key customer market segments
- Develop a pitch deck for investors
- Create a sales pitch for the product or application
- Identify tools and infrastructure to run your business
- Understand technology requirements & risks
- Build a pro-forma financial model
- Provide the starting point for students to launch an AI company

**DELIVERABLES**    At the completion of this course, you will have completed the following requirements:
- Technology / Product Concept or Demo
- Executive business summary
- Investor pitch deck
- Pro-forma financial model
- Market research & competitive analysis

**GRADING**    Grading is team-based, and is composed of the following:
- Assignments (8): 80%
- Tech Talk Discussions (8): 5%
- Team Updates (8): 5%
- Labs (5): 10%

**CLASS FORMAT**    The course in intended to balance entrepreneurship skills as well as technical skills necessary for any commercial AI technology. Guest speakers will cover a particular aspect of technology in the business realm. Student teams will also be expected to make regular presentations of their business model to the class.

**ADVISERS** The Adviser's role is to provide mentorship and networking for student teams in all areas of business, technology, and course deliverables. Teams are encouraged to meet with their assigned Advisor at least once per week to provide feedback on their deliverables.

**PREREQUISITE KNOWLEDGE** Design thinking skills, or prior exposure to business or entrepreneurship is preferred. Students with background in Computer Science, Computer Engineering, or similar areas are highly encouraged.

**CLASS SCHEDULE** Week 1:
- Introduction to Entrepreneurship
- Tech Topics: Artificial Intelligence
- Develop Teams
- Identify Technology & Commercial Product

Week 2:
- Market Segmentation
- Identify Beach Head Market
- Tech Talks: Cyber Security
- Tech Topics: Regression Analysis
- Lab 1: Regression

Week 3:
- Primary Market Research
- Customer Interviews
- Tech Talks: Business Strategy & AI
- Tech Topics: Internet of Things
- Lab 2: Sentiment Analysis

Week 4:
- Customer Persona Development
- Total Addressable Market (TAM)
- Tech Talks: Data Privacy & AI
- Tech Topics: Computer Vision
- Lab 3: Edge Detection

Week 5:
- High-level product specs
- Product Life Cycle
- Quantified Value Proposition
- Tech Talks: AI Ethics
- Tech Topics: Machine Learning
- Lab 4: Image Classification (CNN)

Week 6:
- Customer Acquisition Process
- Competitive Positioning
- Customer Decision Making Unit (DMU)
- Sales Funnel & Processes
- Tech Talks: Internet of Things (IoT)
- Lab 5: Large Language Models (LLMs)

Week 7:
- Unit Economics
- Cost of Consumer Acquisition (COCA)
- Customer Lifetime Value (LTV)
- Pro-Forma Financial Model
- Tech Talks: Design Thinking & AI

Week 8:
- o Define Minimum Viable Product (MVP)
- o Investor Pitch Deck
- o Tech Talks: Investors & Fundraising
- o Tech Topics: Agile & Scrum

Week 9:
- o Present & Refine Pitch Deck
- o Executive Summary
- o Tech Talks: Business Startup & Legal

Week 10:
- o Final Presentations
- o Deliverables
  - o Pitch deck
  - o Executive summary
  - o Pro-forma financial model

**ACADEMIC INTEGRITY**  Students in this course are required to comply with the policies found in the booklet, "Academic Integrity at Northwestern University: A Basic Guide". All papers submitted for credit in this course must be submitted electronically unless otherwise instructed by the professor. Your written work may be tested for plagiarized content. For details regarding academic integrity at Northwestern, please view or download the guide.

**DISABILITY ACCOMMODATIONS**  Northwestern University is committed to providing the most accessible learning environment as possible for students with disabilities. Should you anticipate or experience disability-related barriers in the academic setting, please contact AccessibleNU to move forward with the university's established accommodation process (e: accessiblenu@northwestern.edu; p: 847-467-5530). If you already have established accommodations with AccessibleNU, please let me know as soon as possible, preferably within the first two weeks of the term, so we can work together to implement your disability accommodations. Disability information, including academic accommodations, is confidential under the Family Educational Rights and Privacy Act.

**ATTENDANCE POLICY**  All students must attend each week in person. Participation in team presentations, lectures, and guest speakers are required. Zoom will be available only for advisors and guest speakers, and to record the lectures which will be posted to Canvas. A student may only attend on Zoom with prior permission.

**EXCEPTIONS TO CLASS MODALITY**  Class sessions for this course will occur in person. Individual students will not be granted permission to attend remotely except as the result of an Americans with Disabilities Act (ADA) accommodation as determined by AccessibleNU.
Maintaining the health of the community remains our priority.  If you are experiencing any symptoms of COVID do not attend class and update your Symptom Tracker application right away to connect with Northwestern's Case Management Team for guidance on next steps. Also contact the instructor as soon as possible to arrange to complete coursework.

Students who experience a personal emergency should contact the instructor as soon as possible to arrange to complete coursework. Should public health recommendations prevent in person class from being held on a given day, the instructor or the university will notify students.

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| **CLASS RECORDINGS** | This class or portions of this class will be recorded by the instructor for educational purpose and available to the class during the quarter. Your instructor will communicate how you can access the recordings. Portions of the course that contain images, questions or commentary/discussion by students will be edited out of any recordings that are saved beyond the current term. |
| **PROHIBITION OF CLASS RECORDINGS BY STUDENTS** | Unauthorized student recording of classroom or other academic activities (including advising sessions or office hours) is prohibited. Unauthorized recording is unethical and may also be a violation of University policy and state law. Students requesting the use of assistive technology as an accommodation should contact AccessibleNU. Unauthorized use of classroom recordings – including distributing or posting them – is also prohibited. Under the University's Copyright Policy, faculty own the copyright to instructional materials – including those resources created specifically for the purposes of instruction, such as syllabi, lectures and lecture notes, and presentations. Students cannot copy, reproduce, display, or distribute these materials. Students who engage in unauthorized recording, unauthorized use of a recording, or unauthorized distribution of instructional materials will be referred to the appropriate University office for follow-up. |
| **SUPPORT FOR WELLNESS & MENTAL HEALTH** | Northwestern University is committed to supporting the wellness of our students. Student Affairs has multiple resources to support student wellness and mental health.  If you are feeling distressed or overwhelmed, please reach out for help. Students can access confidential resources through the Counseling and Psychological Services (CAPS), Religious and Spiritual Life (RSL) and the Center for Awareness, Response and Education (CARE). Additional information on the resources mentioned above can be found here:<br>• https://www.northwestern.edu/counseling/<br>• https://www.northwestern.edu/religious-life/<br>• https://www.northwestern.edu/care/ |
| **RELIGIOUS OBSERVANCE** | Northwestern is committed to fostering an academic community respectful and welcoming of persons from all backgrounds.  To that end, the policy on academic accommodations for religious holidays stipulates that students will not be penalized for class absences to observe religious holidays. If you will observe a religious holiday during a class meeting, scheduled exam, or assignment deadline, please let me know as soon as possible, preferably within the first two week of class. If exams or assignment deadlines on the syllabus fall on religious holidays you observe, please reach out so that we can discuss that coursework. |
| **THE USE OF AI** | Highly encouraged.<br><br>As part of our class activities, students will be asked to create personal accounts for artificial intelligence services and/or software. Students should familiarize themselves with the Terms of Use for these services as well as the expectations around data privacy and use. Students should not share private, or otherwise sensitive information or data, about themselves or others, with these tools, as there is often no guarantee of data privacy. |
| **CHANGES TO SCHEDULE** | Please note that the specifics of this course syllabus are subject to change in the case of unforeseen circumstances. Instructor will notify students of any changes as soon as possible. Students will be responsible for abiding by the changes. |