

# X Machine

## 4.s24

X Machine

Thursdays 10a– 12p

[Credit hours: 2-0-6 G/U](#)

Location: 10-485

October 5 at 4-251

## Instructors

John E. Fernandez

Norhan Bayomi

Svafa Grönfeldt

## Course Description

AI technology is being developed, deployed, and used in a growing number of domains to perform complex tasks such as driving cars and speech recognition; actions that could only have been performed in the past by humans. A recent study by McKinsey Global Institute estimates that about 70% of companies will have adopted at least one type of AI technology by 2030, and that 60% of current occupations can be automated in the next 10 years. Therefore, AI could potentially become the most disruptive technology in human history and will have profound impacts on every aspect of our lives, especially on the technology design and labor market.

Recognizing the critical role that AI will play in defining the future not only of technology, but also geopolitical interactions, many countries now regard AI as a national priority. The United States launched the American Artificial Intelligence Initiative in 2019 with the mission to promote its leadership in AI research, development, and application. One of the eight national strategies identified in this initiative is to "provide education and training opportunities to prepare the American workforce for the new era of AI".

X Machine is a mini accelerator workshop course designed to unite computer science and design/architecture together to create innovative and impactful technological solutions to problems in the built and human environment. This half semester course promotes the development of strategic thinking and technical exploration in the realm of AI, with a focus on problem framing and early-stage ideation. The course will provide students with an opportunity to extend a foundational knowledge of AI within an interdisciplinary context. Working in small teams, students will incorporate design thinking approaches that put the user at the center of the creative process as they develop AI-empowered technological solutions. Teams will work on the ideation and conceptualization of either a product, process, or service-based solution that solves real world problems. Students will learn how to design and create a prototype, learn how to maximize their engage with their users/customers, and learn how to determine the value proposition that will make the startup successful.

## Course Objectives

There are five main objectives / steps in the course.

1. **XPLORE** - Understand the drivers that power successful AI startups including the concepts of first-to-market, scale and unfair advantages.
2. **IDEATE**- How to brainstorm and ideate AI-based solutions using a design thinking approach.
3. **CREATE** – Understand the benefits of prototyping.
4. **ENVISION** – Learn how to test your idea so that valuable time and money are not spent chasing ideas that are not viable; Understand the fundamentals of business models and funding mechanisms.
5. **VALIDATE** - Learn how to test and communicate your ideas.

## **Prerequisites/Co-requisites**

- Interest in AI applications and the development of real-world solutions.

## **What to expect in this course**

The core objective of this course is based around a better understanding of how AI can be used in developing human-centered technology solutions. Through this course, students will develop theoretical knowledge of AI theories and applications in the startup space and use that knowledge towards developing a technology solution where AI is best suited.

The course will investigate these core objectives throughout the following sessions.

### **Course Introduction**

Introduction to the course and the teaching team. Students will submit information and detailed description of their interest in joining the class and their ideas.

## **PHASE 1: XPLORE**

### **Topic 1: AI-Based Entrepreneurship**

#### **What is AI? What can AI do / not do? How to apply AI to problems.**

In the first part of this session we will discuss the latest state-of-the-art AI technologies and their application within organizations, advances in computing technology that contributed to the evolution of AI, the core technologies associated with AI and the types of data these technologies use.

### **Topic 2: Opportunities in AI**

The second part of the session will provide an overview of AI opportunities in the design space. Using a number of case studies on successful startups working in the AI space, students will learn about how these technologies are used in real-world applications to solve problems.

## **PHASE 2: IDEATE**

### **Topic 1: Understand**

#### **What is the need/problem we aim to solve and who will benefit from the solution?**

This session will focus on identifying the need/problem for which an AI solution will be developed. Material will include needs analysis, market segmentation and stakeholder mapping.

### **Topic 2: How to Build an AI Solution**

This session will investigate untapped opportunities in AI and how to come up with an idea. We will also discuss the importance of 'big data', 'cloud computing' and the 'internet of things', along with legal, moral and ethical implications that may arise.

## **PHASE 3: CREATE**

### **Topic 1: Building and Developing Core AI Technology**

In this session, students will learn how to de-risk their ideas using scientific formulation and testing of business hypotheses. We will cover topics such as what data sets you need to develop your solution, how to acquire that data and who "owns" it.

### **Topic 2: Solve**

#### **What is our solution and why is it beneficial to stakeholders?**

In the second part of this session, we look at problem-solution fit, value proposition, prototyping and solution specification.

## **PHASE 4: ENVISION**

### **Topic 1: Does the AI solution work?**

In the first half of this session, students will learn how to develop a viable business model for their proposed solution. We will examine a variety of operational concerns including ethics, stakeholder implications, long-term costs, and business impact versus technical feasibility.

## **PHASE 5: VALIDATE**

### **Topic: Pitch Preparation**

In the second half of the session we will discuss pitch preparations and slide decks to communicate your ideas.

The main goal of this session is to conclude the 4 previous steps and give feedback to students as they develop their AI enabled solutions. Presentations will be given to external reviewers with experience in AI and an understanding of entrepreneurship. Students will be in a good position to apply to accelerators and support programs across MIT such as **DesignX, Sandbox, Creative Arts**, etc.

Date	Topic
Thursday, September 7 <sup>th</sup> (10a-12p)	<b>First Meeting (Info session)</b> Course introduction, structure, outline Prepare your initial proposals for the class
Thursday, September 14 <sup>th</sup> (10a- 12p)	<b>PHASE 1- XPLORE</b>  <b>Topic 1: AI-Based Entrepreneurship</b> <b>Topic 2: Opportunities in AI</b> How to apply AI to problems? <b>Guest Speaker: X Machine 2022</b>
Thursday, September 21 <sup>st</sup> (10a- 12p)	<b>PHASE 2- IDEATE</b>  <b>Topic 1: Understand</b> <b>Topic 2: How to Build an AI Solution</b> What is the need/problem we aim to solve, and who will benefit from the solution? <b>Guest Speaker: AirWorks</b>
Thursday, September 28 <sup>th</sup> (10a- 12p)	<b>PHASE 3 – CREATE</b>  <b>Topic 1: Building and developing core AI technology</b> <b>Topic 2: Solve</b> What is our solution, and why is it beneficial to stakeholders? <b>Guest Speaker: Hosta</b>
Thursday, October 5 <sup>th</sup> at (4-251) (10a- 12p)	<b>PHASE 4 – ENVISION</b> <b>Topic: Business Model Innovation?</b> Does the AI Solution work?
Thursday, October 12 <sup>th</sup> (10a- 12p)	<b>PHASE 5 – VALIDATE</b> <b>Topic: Pitch Preparation</b> <b>Guest Speaker: DesignX</b>
Thursday, October 19 <sup>th</sup> (10a- 12p)	Demo Day – Final Pitch

### Assessments

Participation in the class will be essential to the success of this course as it will help you shape and develop the core technological solution for the class project; your grade is weighted accordingly, with 40% of your grade dependent on thoughtful and consistent participation. This portion of your grade will come from weekly participation in class sessions and interacting with your classmates. The other portion of your grade will be based on the class assignments and your final pitch, as described below.

### Weekly Participation: 40%

Weekly participation is designed to assist in developing your technology solution. Each week, you will develop a specific component of your solution and pitch it to the class by the end of each session. You will also be paired with classmates to work on specific components of your solution collaboratively. The goal of the weekly participation is to help you learn how to interact actively with your classmates, give feedback, and share ideas that will all be linked to the development of your final solution.

## **Class Assignment: 30%**

Three key class assignments are critical to the development of your final solutions.

### **A. Assignment (1): Problem of Interest (5%)**

Identify a need or a problem you are interested in solving where you envision AI will be best suited. Each student will have 1 min to pitch the idea to the class and work on this solution throughout the course. Students have the freedom to bring three ideas but will need to pick only one to work on for the entire period of the class.

### **B. Assignment (2): Need Analysis (10%)**

Identify the problem urgency, how the solution fits best to this problem, and outline how AI will be implemented to develop the technology solution. You will develop a Need/Problem hypothesis statement and incorporate outputs from assignment 1. This assignment should assist you in developing your slide deck for the final pitch.

### **C. Assignment (3): Prototypes (15%)**

Design and create a prototype that will reflect the value of your solutions. You will identify key features, outline the general specifications of technology, how it works and how clients will interact with your solution, building on a user journey analysis in class.

## **Final Pitch: 30%**

In this assignment, you will present your final technology solution in a 5 mins pitch. We will work with you to design your final slide deck, how to tell your story and the best sequence for your slide deck.

## **Course Expectations and Policies**

**Attendance:** Regular class attendance and active engagement in class are essential and will help you better develop your final technology solution project. The three-class assignments will be used further to determine your engagement level in class. More than two missed class sessions will be considered excessive, resulting in an NC grade. Your participation in the feedback sessions is important to the course's success. We welcome your thoughts throughout the course on how we might improve class processes that will encourage effective communication and dialogue.

**Late Assignments:** Late assignments will not be accepted; however, we understand that the semester can get hectic. Therefore, you will have two 48-hours extension periods to use for any late submission during the semester. Please let the teaching team know at the time the assignment is due that you will be using the extension period. If you use all your extension periods (two extensions periods allowed) and you have an emergency and need another, come talk with the teaching team and we will find an alternative for your situation. This policy does not apply to the final pitch.

## **Inclusivity Statement**

MIT values an inclusive environment. Our intent for this class is that students from all backgrounds and perspectives to be equally-served by this course. We hope in this course to develop a supportive learning community that will foster rich discussions that are respectful for diversity, gender, identity, sexuality, religion, and culture. Any student who has difficulty in the class environment and believes this may affect their performance in the course is urged to contact us directly.

## **Special Accommodations and Disability Support Services**

If you need disability-related accommodations, we encourage you to meet with me early in the semester. If you have not yet been approved for accommodations, please contact [Student Disability Services](mailto:sds-all@mit.edu) at sds-all@mit.edu.

We look forward to working with you to assist you with your approved accommodations.

## **Mental Health**

As a student, you may experience a range of challenges that can interfere with learning, such as strained relationships, increased anxiety, substance use, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may impact your ability to attend class, concentrate, complete work, take an exam, or participate in daily activities.

Undergraduates: Please discuss this with [Student Support Services](#) (S3). You may consult with Student Support Services in 5-104 or at 617-253-4861.

Graduate Students: Please reach out to the deans for personal support in the [Office of Graduate Education](#).