# Course Syllabus

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Spring 2019

05.317/617 | Design of *AI* Products and Services

Class meets at 300 South Craig Street in room 172 on Mondays and Wednesdays from 9a to 10:20a.

## Course Description

Artificial Intelligence (AI) – often in the form of machine learning (ML) – is increasingly being used to improve people's interactions with products and services. Computationally intelligent systems curate people's news feeds, recommend criminal sentences, filter spam from email inboxes, fly planes and drones, predict the weather, and autocorrect words in real-time as people author text messages.

While AI has been having a big impact on the creation of new products and services, it has also proven to be incredibly difficult to work with. Design innovators typically envision new products and services by engaging in a conversation with materials. Communication designers "converse" with paper, industrial designers converse with wood, clay, or plastics, and user experience designers converse with narrative. Designers draw on their tacit knowledge of a material's capabilities in order to imagine new ways for it to form a product or service that fits into people's lives. This is not easy to do with AI. Designers struggle to engage AI in a conversation around what it might be.

We live in a world where the coolest things that can be made with AI are most often envisioned by someone with a PhD in machine learning. These may not be the most creative people, and they rarely have expertise on giving form to new things that people experience as valuable or meaningful. Designers have expertise in envisioning new things people might want or need. Generally, designers don't consider using AI. They rarely recognize a situation that might benefit from these emerging capabilities. In the occasional cases, when designers do consider it, they most often think of it like magic, and they envision things that cannot be made.

This course focuses on making students more effective at having a conversation with AI; more effective at working with it as a design material in order to envision and give form to new AI enhanced products and services. Students will work from a number of different starting points and work with a variety of AI technologies They will gain a broad overview of what AI can do and a felt understanding of design processes that support working with AI as a design material.

# Instructors

**John Zimmerman**, Professor, HCI Institute

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Office hours by appointment. Please email me to schedule a time to meet.

**Qian Yang**, PhD student, HCI Institute

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Office hours by appointment. Please email me to schedule a time to meet.

# Learning Objectives

By the end of class, students will be able to:

- Explain that there are different kinds of machine learning that work differently.
- Explain how designers engage in a conversation with material through reflection in and on action.
- Engaged machine learning as a design material in order to effectively envision new products and services that people desire and that can be technically achieved.
- Conduct matchmaking design process to move from a dataset, capability, and platform to a targeted set of customers and product and service offerings they want..
- Design an adaptive mobile interface that collapses navigation and automates selection.
- Explain how machine learning functions to enable an AI product or service.
- Describe why AI is a difficult design material.
- Envision new products and services using matchmaking.

- Work with natural language processing in order to fit its capabilities into new contexts and activities.
- Present design work that describes both the human need and the technical capability.

# Course Structure

This course will involve lectures, discussions, design sprints, design projects, critiques, and presentations. It will not require any software development.

The class has four projects:

## Project 1: Matchmaking  (Individual)

Students will follow a matchmaking process and ideate AI products and services based on a data set, a technical capability, and a platform + technical capability.

## Project 2: Crowd as AI Proxy (Team)

Students will work on teams of 3. They will develop a concept from for a new AI enabled service that  employs crowd labor as a type of AI.

## Project 3: Adaptive UI (Team)

Students will work on teams of 3. They will redesign a popular mobile app that can benefit from an adaptive user interface, which collapses the navigation and selection actions as it learns the actions users typically take.

## Project 4: Natural Language Service (Team)

Students will work on teams of 3. They will generate the design for a novel service that employs NLP to provide new value for users. The proposed system must either leverage an existing dataset or it must generate its own dataset for training the NLP system.

# Reading Reflections

For each assigned reading, students must write a short reflection piece. This does not need to be more than one paragraph per reading. The reflective writings MUST be more than a summary.

Analyze the article. Think about how it fits in with the other readings assigned for that day, or make connections to things you have previously read and discussed in class. State if you agree with the author, or if you think they might be way off base. Try out new ideas and think creatively. There are no "correct" answers for these reflection pieces. We will be reading them and looking for thoughtful engagement with the material (it is not enough to simply say you "like" this reading, or that you found something "boring.")

Stylistically, the reflection pieces should feel like a social media post that might accompany a link to a posted article.

Reflective writing statements are due at midnight prior to the class where the reading will be discussed. Each appears as a discussion in Canvas. Once you have posted your statement, you will be able to see and comment on statements other students have posted.

# Grading

P1: Matchmaking 10%

P2: Crowd as AI Proxy 15%

P3: Adaptive UI 20%

P4: NLP Service 35%

Class Participation 20%

Design work, like much of life, is highly subjective. Grades will be based on the instructors' subjective assessment of the work that students turn in and presentations of work during class. Project grades will be graded based on both the learning outcomes and the

grading rubric provided in each project description.

This course has a mixture of individual and team projects. For team projects, instructors will collect peer evaluations that will impact a project grade by up to 10%.

Class participation is based on the work students do before and during class. This includes reading reflections, efforts during design sprints, attention given to classmates presenting work, and the quality of verbal feedback given to classmates during critiques and presentations that help them improve their work. Design work is highly social, so instructors will most strongly focus on the effort students make to help their classmates improve their designs.

# Appropriation, Plagiarism, Cheating, and Acknowledgement

Design work often has students drawing images, elements, video, music, and even text from many different sources. When you use pieces of work that you did not create, you MUST acknowledge this. Use elements such as endnotes, footnotes, citations, or screen credits to indicate the elements your work has appropriated. You MUST be clear to the instructors which elements you created and which elements were taken from other sources.

# Recording Policy

No student may record or tape any classroom activity without our express written consent. If a student believes that he/she is disabled and needs to record or tape classroom activities, he/she should contact the Office of Disability Resources to request an appropriate accommodation.

# Taking Care of Yourself: A Message to Our Students

Do your best to maintain a healthy lifestyle this semester by eating well, exercising, avoiding drugs and alcohol, getting enough sleep and taking some time to relax. This will help you achieve your goals and cope with stress

All of us benefit from support during times of struggle. You are not alone. There are many helpful resources available on campus and an important part of the college experience is learning how to ask for help. Asking for support sooner rather than later is often helpful.

If you or anyone you know experiences any academic stress, difficult life events, or feelings like anxiety or depression, we strongly encourage you to seek support. Counseling and Psychological Services (CaPS) is here to help: call 412-268-2922 and visit their website at http://www.cmu.edu/counseling/. Consider reaching out to a friend, faculty or family member you trust for help getting connected to the support that can help.

# Course Summary:

| Date | Details | |
|------|---------|---|
| Wed Jan 30, 2019 | 📝 **P1: Matchmaking** [(https://canvas.cmu.edu/courses/7792/assignments/122642)](https://canvas.cmu.edu/courses/7792/assignments/122642) | due by 5pm |
| Wed Feb 20, 2019 | 📝 **P2: Crowd as AI Proxy** [(https://canvas.cmu.edu/courses/7792/assignments/143681)](https://canvas.cmu.edu/courses/7792/assignments/143681) | due by 12:01pm |
| Fri Mar 22, 2019 | 📝 **P3: Adaptive Mobile UI** [(https://canvas.cmu.edu/courses/7792/assignments/148004)](https://canvas.cmu.edu/courses/7792/assignments/148004) | due by 11:59pm |
| Mon Apr 29, 2019 | 📝 **P4: Making NLP Useful** [(https://canvas.cmu.edu/courses/7792/assignments/152450)](https://canvas.cmu.edu/courses/7792/assignments/152450) | due by 9am |