

# Computer Science and Engineering 518A: Human-in-the-Loop Computation

Washington University in St. Louis, Fall 2019

**Instructor:**

Chien-Ju Ho   chienju.ho at wustl dot edu

**Class times:**

Mondays and Wednesdays   4:00PM to 5:20PM   Cupples II / 230

## 1 Course Description

### 1.1 Overview

This course is an exploration of the opportunities and challenges of human-in-the-loop computation, an emerging field that examines how humans and computers can work together to solve problems neither can solve alone yet. We will explore ways in which techniques from machine learning, game theory, optimization, online behavioral social science, and human-computer interactions can be used to model and analyze human-in-the-loop systems such as crowdsourcing markets, prediction markets, and user-generated content platforms. We will also look into recent developments in the interactions between humans and AIs, such as learning with the presence of strategic behavior and ethical issues in AI systems.

### 1.2 Prerequisites

Prerequisites: CSE 247, ESE 326, Math 233, and Math 309. Students are expected to have a strong background in calculus, probability, and linear algebra. Students should also be comfortable with computer science concepts through at least a class in data structures and algorithms.

### 1.3 Format

Class sessions will be a mix of lectures and student presentations. Students will need to present research papers and submit short paper reviews during the semester. There will be four homework assignments and one final project. There will be no exams.

### 1.4 Textbooks

There is no required textbook for this course. Instead, we will post reading materials on the course website.

## 1.5 Preliminary List of Topics

This course surveys the state of the art in human-in-the-loop computation. The preliminary topics of interests include: introduction of crowdsourcing / human computation and the applications quality control of human-generated data for AI systems, interactions between humans and AI, considerations of ethics in AI systems with humans in the loop.

## 1.6 Grades (Subject to Change)

Grades will be based on the following components (preliminary and subject to change).

- Paper Reviews and Class Participations: 20%  
For the majority of the semester, we will be discussing research papers. Students are required to complete the required reading and submit a short review (including giving a summary and answering a few questions) before the midnight of each class using the form provided on the website. You may not need more than a few sentences in each review, but it should be clear that you have put thought into the review.
- Homework Assignments: 20%  
There will be four homework assignments, including both programming assignments and math problems.
- Presentation and Leading of Discussion: 20%  
Students will be required to present research papers and lead the discussion (once or twice) during the semester. Depending on the size of the class, presentations might be done in groups of two or three. The frequency of presentations and group size will be announced after the size of the class is finalized.
- Final Project: 40%  
Each project consists of a proposal early in the semester, an in-class presentation, and a written report. Each project could be an original research work, implementations (and improvements) of prior work, or an extensive literature survey on a relevant topic. Depending on the size of the class, students might be required to complete the project in groups of two to three students. Detailed guidelines will be announced later in the semester.

## 2 Policies

### 2.1 Announcements and Course Website

The instructor will maintain a course website (will be announced before the semester starts). All announcements related to the class will be made either in lecture or on the website. **We will assume that any announcement made on the website is known to everyone in class within 24 hours of it being posted.** It is important to check the website regularly! You are responsible for all announcements made in lecture or on the website. We will use Piazza for all questions and discussions related to the class.

### 2.2 Assignments and Late Days

No late submissions will be accepted for submissions related to course projects (including proposals, milestone reports, and project reports).

Each student is allowed to miss up to two paper reviews without penalties. For homework assignments, each student will be given a budget of 4 *late days* that they can use to turn in homework assignments late. A late-day can be used without explanation and without penalties to extend a homework submission deadline by 24 hours, but **no more than two late-days can be used on any one homework**.

Any part of a late day that you use counts as a full late day. For example, if you do not submit your homework until 11PM if it is due at 10PM, that counts as a full late day. If you submit 26 hours late, you will have used two late days. You are responsible for keeping track of your usage of late days. **Use your late days wisely, if at all.** This late-day policy is intended to cover unanticipated things like minor sickness, exams in other classes, etc. so that you do not have to ask for extensions. Once you have used up your budget of late days you will not be allowed to turn in homeworks late for any reason other than true medical or family emergencies.

## 2.3 Collaboration and Academic Integrity

In this class, you are allowed to collaborate on assignments to the following extent. You are welcome to discuss problems with each other and to take your own notes during these discussions. However, you must write up solutions on your own. **You must write, in your submission, the names of students you discussed each problem with, and any external sources you used in a significant manner in solving the problem. Lack of citation of a source is a serious violation of this policy.** You may not use any solution keys or guides, however obtained, from previous versions of the class, similar classes, or the textbooks. You may not give or receive help from other students in the class on exams.

Submitting an assignment or exam that is in violation of this policy will automatically lead to receiving no credit for the assignment and a reduction of at least one grade modifier (e.g. from B to B-) beyond that in the overall course grade. However, depending on the circumstances, it could also lead to harsher penalties, for example, a failing grade in the class and initiation of the school's formal academic integrity review process. If you have any questions about the level of collaboration permitted, or any other aspect of this policy, please speak with the instructors about it before handing in the assignment!

## 2.4 Other accommodations and resources

**Accommodations based upon sexual assault** The University is committed to offering reasonable academic accommodations to students who are victims of sexual assault. Students are eligible for accommodation regardless of whether they seek criminal or disciplinary action. Depending on the specific nature of the allegation, such measures may include but are not limited to: implementation of a no-contact order, course/classroom assignment changes, and other academic support services and accommodations. If you need to request such accommodations, please direct your request to Kim Webb ([kim\\_webb@wustl.edu](mailto:kim_webb@wustl.edu)), Director of the Relationship and Sexual Violence Prevention Center. Ms. Webb is a confidential resource; however, requests for accommodations will be shared with the appropriate University administration and faculty. The University will maintain as confidential any accommodations or protective measures provided to an individual student so long as it does not impair the ability to provide such measures.

If a student comes to us to discuss or disclose an instance of sexual assault, sex discrimination, sexual harassment, dating violence, domestic violence or stalking, or if we otherwise observe or become aware of such an allegation, we will keep the information as private as we can, but as

faculty members of Washington University, we are required to immediately report it to our Department Chairs or Deans or directly to Ms. Jessica Kennedy, the Universitys Title IX Coordinator. If you would like to speak with the Title IX Coordinator directly, Ms. Kennedy can be reached at (314) 935-3118, [jwkennedy@wustl.edu](mailto:jwkennedy@wustl.edu), or by visiting her office in the Womens Building. Additionally, you can report incidents or complaints to Tamara King, Associate Dean for Students and Director of Student Conduct, or by contacting WUPD at (314) 935-5555 or your local law enforcement agency.

You can also speak confidentially and learn more about available resources at the Relationship and Sexual Violence Prevention Center by calling (314) 935-8761 or visiting the 4th floor of Seigle Hall.

**Bias Reporting** The University has a process through which students, faculty, staff and community members who have experienced or witnessed incidents of bias, prejudice or discrimination against a student can report their experiences to the Universitys Bias Report and Support System (BRSS) team. See: <http://brss.wustl.edu>

**Mental Health** Mental Health Services professional staff members work with students to resolve personal and interpersonal difficulties, many of which can affect the academic experience. These include conflicts with or worry about friends or family, concerns about eating or drinking patterns, and feelings of anxiety and depression. See: <http://shs.wustl.edu/MentalHealth>