Syllabus

Course Description

Sequential decision making (SDM) problems including online optimization, multi-armed and contextual bandits, reinforcement learning, and active learning are widely studied and used machine learning approaches. The course will provide a systematic and technically rigorous introduction to the topic. The course will cover both classical results and recent advances on the theme, including:

- Online Learning, Online Optimization
- Multi-Armed Bandits, Contextual Bandits, Neural Bandits
- Reinforcement Learning, Policy Optimization, Preference Models, Multi-Agent RL
- Active Learning, Bayesian Optimization
- Generative AI for Decision Making

Basic Information:

Classes: Tue, Thu 11:00 am - 12:15 pm
Location: 1043 Sidney Lu Mech Engr Bldg
Instructor: Arindam Banerjee, arindamb@illinois.edu
TA:

- Rohan Deb, rd22@illinois.edu

Office hours:

- Arindam Banerjee: Wed 11:00 am - 12:00 noon
- Rohan Deb: Mon 9:00 - 10:00 am, Fri 2:00 pm - 3:00 pm

Resources

- Canvas, main course page
- Slack, for discussions
- Gradescope, for homeworks

Coursework

- Homeworks: **30%** = 2 x 15%
  - Individual work
  - Due date: Specified due dates, same for the entire class
- Midterm Exam: **20%**
  - In-class exam
  - 4 pages of notes allowed
- Project: **50%**
  - Group work
  - Proposal: **5%**, 1 page + references
  - Mid-term report: **15%**, 4 pages + references + (optional) appendix
  - Presentation: **10%**, ~10 mins, in class
  - Final report: **20%**, 6 pages + references + (optional) appendix
  - Due date: Specified due dates, same for the entire class

Key Dates

- Individual Activity: Homeworks
  - Homework 1 (HW1): posted on Thu, Sept 18, **due Fri, Oct 3,** 11:59pm
  - Homework 2 (HW2): posted on Thu, Oct 23, **due Mon, Nov 10**, 11:59pm
- Individual Activity: Midterm exam
  - In-class, **Thu, Oct 9**, 11:00am-12:15pm
- Group Activity: Project
  - Decide groups: **Fri, Sept 12**
  - Proposals due: **Fri, Sept 26**
  - Mid-term report due: **Mon, Oct 27**
  - Project presentations (in-class): **Thu, Dec 4** or **Tue, Dec 9**
  - Final report due: **Wed, Dec 10**

Grades

Following cutoffs represent what will likely be used to generate letter grades:

A >= 94%
A- >=88% & < 94%

B+ >= 85% & < 88%

B >= 80% & < 85%

B- >= 75% & < 80%

C+ >= 70% & < 75%

C >= 65% & < 70%

C- >= 60% & <65%

D >= 50%& <60%

F < 50%

The above cutoffs are tentative and may be adjusted slightly; if there is any adjustment to the above cutoffs, we will NOT curve down your letter grades.

However, there will be no general curve-fitting in assigning the final grades. Also, there will be **no rounding** of any kind for the final score.

Textbooks

No textbook, the material will be based on papers posted on the class webpage.

Mental Health

Diminished mental health, including significant stress, mood changes, excessive worry, substance/alcohol abuse, or problems with eating and/or sleeping can interfere with optimal academic performance, social development, and emotional wellbeing. The University of Illinois offers a variety of confidential services including individual and group counseling, crisis intervention, psychiatric services, and specialized screenings at no additional cost. If you or someone you know experiences any of the above mental health concerns, it is strongly encouraged to contact or visit any of the University's resources provided below. Getting help is a smart and courageous thing to do -- for yourself and for those who care about you.

Counseling Center: 217-333-3704, 610 East John Street Champaign, IL 61820

McKinley Health Center:217-333-2700, 1109 South Lincoln Avenue, Urbana, Illinois 61801

Sexual Misconduct Reporting Obligation

The University of Illinois is committed to combating sexual misconduct. Faculty and staff members are required to report any instances of sexual misconduct to the University's Title IX Office. In turn, an individual with the Title IX Office will provide information about rights and options, including accommodations, support services, the campus disciplinary process, and law enforcement options.

A list of the designated University employees who, as counselors, confidential advisors, and medical professionals, do not have this reporting responsibility and can maintain confidentiality, can be found here: http://wecare.illinois.edu/resources/students/#confidential

Other information about resources and reporting is available here: http://wecare.illinois.edu

Academic Integrity

The University of Illinois at Urbana-Champaign Student Code should also be considered as a part of this syllabus. Students should pay particular attention to Article 1, Part 4: Academic Integrity. Read the Code at the following URL: http://studentcode.illinois.edu/

Academic dishonesty may result in a failing grade. Every student is expected to review and abide by the Academic Integrity Policy: https://studentcode.illinois.edu/article1/part4/1-401/. Ignorance is not an excuse for any academic dishonesty. It is your responsibility to read this policy to avoid any misunderstanding. Do not hesitate to ask the instructor(s) if you are ever in doubt about what constitutes plagiarism, cheating, or any other breach of academic integrity.

Religious Observances

Illinois law requires the University to reasonably accommodate its students' religious beliefs, observances, and practices in regard to admissions, class attendance, and the scheduling of examinations and work requirements. You should examine this syllabus at the beginning of the semester for potential conflicts between course deadlines and any of yourreligious observances. If a conflict exists, you should notify your instructor of the conflict and follow the procedure at https://odos.illinois.edu/community-ofcare/resources/students/religious-observances/ to request appropriate accommodations. This should be done in the first two weeks of classes.

Disability-Related Accommodations

To obtain disability-related academic adjustments and/or auxiliary aids, students with disabilities must contact the course instructor and the Disability Resources and Educational Services (DRES) as soon as possible. To contact DRES, you may visit 1207 S. Oak St., Champaign, call 333-4603, email disability@illinois.edu or go to https://www.disability.illinois.edu. If you are concerned you have a disability-related condition that is impacting your academic progress, there are academic screening appointments available that can help diagnosis a previously undiagnosed disability. You may access these by visiting the DRES website and selecting "Request an Academic Screening" at the bottom of the page.

Family Educational Rights and Privacy Act (FERPA)

Any student who has suppressed their directory information pursuant to Family Educational Rights and Privacy Act (FERPA) should self-identify to the instructor to ensure protection of the privacy of their attendance in this course. See https://registrar.illinois.edu/academic-records/ferpa/ for more information on FERPA.

Statement on anti-racism and inclusivity

The Grainger College of Engineering is committed to the creation of an anti-racist, inclusive community that welcomes diversity along a number of dimensions, including, but not limited to, race, ethnicity and national origins, gender and gender identity, sexuality, disability status, class, age, or religious beliefs. The College recognizes that we are learning together in the midst of the Black Lives Matter movement, that Black, Hispanic, and Indigenous voices and contributions have largely either been excluded from, or not recognized in, science and engineering, and that both overt racism and micro-aggressions threaten the well-being of our students and our university community.

The effectiveness of this course is dependent upon each of us to create a safe and encouraging learning environment that allows for the open exchange of ideas while also ensuring equitable opportunities and respect for all of us. Everyone is expected to help establish and maintain an environment where students, staff, and faculty can contribute without fear of personal ridicule, or intolerant or offensive language. If you witness or experience racism, discrimination, micro-aggressions, or other offensive behavior, you are encouraged to bring this to the attention of the course director if you feel comfortable. You

can also report these behaviors to the Bias Assessment and Response Team (BART) (**https://bart.illinois.edu/ (https://bart.illinois.edu/)**). Based on your report, BART members will follow up and reach out to students to make sure they have the support they need to be healthy and safe. If the reported behavior also violates university policy, staff in the Office for Student Conflict Resolution may respond as well and will take appropriate action.

Statement on CS CARES and CS Values and Code of Conduct (Approved by CS CARES Committee, January 13, 2022)

All members of the Illinois Computer Science department - faculty, staff, and students - are expected to adhere to the **CS Values and Code of Conduct (https://cs.illinois.edu/about/values)** . The **CS CARES Committee (https://cs.illinois.edu/about/cs-cares/)** is available to serve as a resource to help people who are concerned about or experience a potential violation of the Code. If you experience such issues, please **contact the CS CARES Committee (https://cs.illinois.edu/about/cs-cares/contact)** . The Instructors of this course are also available for issues related to this class.