

# ECE 47300: Introduction to Artificial Intelligence Syllabus

## Course Information

ECE 47300, Spring 2023  
CRN(s): 17248 (001)  
TR, 1:30pm-2:45pm ET  
Location: BHEE 170  
3 Credit Hours  
Prerequisite(s): ECE 368 (see expectations section)

Course website including tentative schedule, due dates, and important links:

<https://www.davidinouye.com/course/ece47300-spring-2023/>

Piazza for announcements and discussion (must signup ASAP):

<https://piazza.com/purdue/spring2023/ece47300>

## Instructor

David I. Inouye  
BHEE 332, 765-496-0238  
[dinouye@purdue.edu](mailto:dinouye@purdue.edu)  
Instructor office hours: TBD  
Instructor's Webpage: <https://www.davidinouye.com/>

## Teaching Assistants

### Graduate TAs

Dipesh Tamboli (Lead GTA), [dtamboli@purdue.edu](mailto:dtamboli@purdue.edu)

Wonwoong Cho, [cho436@purdue.edu](mailto:cho436@purdue.edu)

### Undergraduate TAs

Eshaan Minocha, [eminocha@purdue.edu](mailto:eminocha@purdue.edu)

James Zhu, [jczhu@purdue.edu](mailto:jczhu@purdue.edu)

Amritanshu Ranjan, [ranjan4@purdue.edu](mailto:ranjan4@purdue.edu)

Shashank Sridhar, [sridha26@purdue.edu](mailto:sridha26@purdue.edu)

TA Lab hours: TBD

## Course Description

This course will provide an introduction to artificial intelligence (AI), which is broadly defined as any method that enables intelligent behavior in computers. Because the AI field is so fast and rapidly expanding, this course will not be comprehensive but aims to provide some basic introductions to AI topics. Topics may include dimensionality reduction, machine learning, deep learning, generative models, natural language processing, computer vision, and Markov decision processes. The course will cover technical concepts, intuitions, and algorithms.

## Expectations / Prerequisites

While the official course prerequisite is ECE 368, **this course will assume knowledge of some material from other required courses such as Linear Algebra (e.g., Math 265), Python programming (e.g., ECE 20875), and probability (e.g., ECE 302).** In particular, the programming assignments will require significant Python programming knowledge. I will briefly review some of these concepts, but if you are not familiar with these subjects, this is not the right class for you; or, you will be expected to (re-)learn these concepts on your own.

I have posted a [prerequisite quiz on my website](#) to help you decide if you have the necessary background for this course or should consider taking at a future time. This quiz is entirely optional and will not count towards your grade in the class.

**This syllabus is required reading** and you will be required to know the policies outlined in this syllabus. Questions about the syllabus may appear on quizzes.

## Learning Outcomes

A student who successfully fulfills the course requirements will have demonstrated:

1. a practical and theoretical understanding of machine learning techniques.
2. an acquaintance with the fundamental difficulties involved in designing intelligent programs.
3. knowledge of key work in a broad range of artificial intelligence subareas.
4. an ability to write programs for AI techniques to solve problems.

## Topics and Course Schedule (tentative)

The tentative course schedule will be posted on the course website. The topics and dates are tentative and subject to change. Any substantive changes will be announced on Piazza.

1. Introduction to artificial intelligence
2. Machine learning basics
3. Deep learning basics
4. Dimensionality reduction
5. Deep generative models
6. Natural language processing
7. Markov decision processes
8. Special topics

## Course Assessment and Grading

No +/- for grades; only letter grades A, B, C, D, or F. Letter grades will be assigned at the end of the semester. The instructor will determine the final grade cutoffs, but the cutoffs will be equal to or lower than the standard cutoffs. The standard cutoffs are A if  $\geq 90\%$ , B if  $\geq 80\%$ , C if  $\geq 70\%$ , D if  $\geq 60\%$ , and F otherwise (e.g., if you have  $\geq 90\%$  you are guaranteed an A).

- 30% - Programming assignments (Drop lowest)
- 20% - Quizzes (Drop lowest)
- 50% - Exams
  - 15% - Midterm 1
  - 15% - Midterm 2
  - 20% - Final exam

### Programming Assignments

There will be programming assignments throughout the semester. The assignments are meant to reinforce the content and provide hands-on experience with the common tools of AI/ML. **All regrade requests must be submitted on Gradescope within one week of grade release.** Regrade requests over email will not be accepted.

### Quizzes

There will be 9-11 **timed quizzes** (usually 10-15 minutes) throughout the semester. The quizzes will focus on the content since the last quiz. All quizzes will be weighted equally.

### Exams

There will be two midterms and one final exam. They will be cumulative but will focus on the more recent content. I will allow you to bring a **single page (8 ½ x 11 inch) of handwritten notes** to the exams.

### Missed or Late Work

Quizzes: Quizzes will be released on or before class on Tuesday (1:30pm) and will be due **24 hours later at 1:30pm on Wednesday**. Given that a 24-hour window will be given, no late quiz submissions will be accepted. **Any late or missed quizzes will receive a 0.** To accommodate for exceptional circumstances (e.g., sickness), I will drop your lowest quiz grade (including a 0 if you missed a quiz).

Exams: **Any missed exam will receive a 0** (unless you have received prior approval from the instructor for exceptional circumstances).

Assignments are due **on or before 11:59pm ET (midnight)** on the day they are due unless otherwise specified.

- One day late: 20% penalty (of the max score)
- More than one day: Grade of 0

To accommodate for exceptional circumstances (e.g., sickness), I will drop your lowest assignment grade (including a 0 if you missed an assignment).

### DRC Accommodations

If you would like to use your DRC accommodations, **you must send me an email request at least 2 business days before the due/exam date to arrange for the accommodations.** If I receive a

notification from DRC, we will add the time extension on Gradescope for quizzes. However, any other accommodation must be **explicitly** requested by the student.

## Logistics and Technology Summary

- **Course material via course website**  
Slides, Jupyter notebooks, and links will be posted on the course website.
- **Discussion via Piazza**  
Any questions should be posted on Piazza rather than emailing TA or instructor so that students can help each other, and everyone can benefit from the questions and answers.
- **Quizzes and assignments via Gradescope**  
All quizzes and assignments will be turned in via Gradescope. Quizzes will be made available for a time window. Once started, however, the quiz will need to be finished in a short time period (probably 30s-1min per question). The quizzes will be open notes but no communication is allowed with other students during or after.
- **Grades on Brightspace**  
Brightspace will primarily be used to compile all grades.
- **Computing / GPU resources via Google Colab (<https://colab.research.google.com/>)**  
All programming assignments will be designed to execute on Google Colab, which includes GPU acceleration and the necessary packages. You will need a Google account to use Colab.

## Required Materials

### Google Colab Pro

**Google Colab Pro (\$10 per month, \$40 for semester) is required for the assignments in this course. (However, see notes below about how to possibly use free Colab.)**

While the free version of Google Colab may be enough for the assignments, we cannot guarantee the availability of the free version, especially GPU resources. Therefore, if you would like to save money, I would suggest using Colab free and avoid using the GPU runtime on Colab until you are done debugging your code. If you run into compute issues, you can then buy \$10 of compute units as needed instead of the Colab Pro monthly subscription.

You are also free to use your own Python notebook environment for completing the assignments, but the TAs will only support the Colab environment. The TAs will not be able to help with your Python environment setup.

### Textbooks

No required textbook. We will not follow any particular textbook but related reading will be posted if appropriate. Below are a few supplemental textbooks that may be useful.

(Optional) *Deep Learning* by Ian Goodfellow, Yoshua Bengio, and Aaron Courville, 2016. Available for free online at <http://www.deeplearningbook.org> or physical copy available on Amazon. - Part I is a good introduction to core concepts that covers the fundamental mathematical, computational, and machine learning concepts useful for the rest of this class.

(Optional) *Machine Learning: A Probabilistic Perspective* by Kevin P. Murphy, 2012. Available online via Purdue's library system:

<https://ebookcentral.proquest.com/lib/purdue/detail.action?docID=3339490>. - This is a good

reference book and some chapters may help supplement the lectures. Chapter 2 on probability may be a useful reference.

(Optional) *Python Data Science Handbook* by Jake VanderPlas, 2016. Available for reading online at <https://jakevdp.github.io/PythonDataScienceHandbook/>. - This could be a useful book for some of the Python tools used in this course.

## Attendance Policy

Students are expected to attend all class periods in person per Purdue's academic regulations. If a student misses a class, **the student** is still responsible for knowing all missed content including any announcements.

Please see the [Protect Purdue website](#) for the latest policies regarding quarantine and isolation with respect to COVID-19.

## Communication Policies

**All students are expected to sign up for the Piazza class the first day of class or earlier and regularly check for announcements.** Piazza will be used for all announcements and class discussions. Please post any questions to Piazza instead of emailing me or the TAs unless the issue is confidential in nature. This should help you receive answers faster. Additionally, you can post anonymously if you feel uncomfortable posting with your name. If you email the instructor or TA with a question, we will likely ask you to re-ask the question on Piazza if appropriate. We hope to reply to unanswered questions *within 1-2 business days (9am-5pm, Mon-Fri)*. Note this means that you may not receive an answer on Piazza on the day the assignment is due so I would encourage you to start early and ask early.

I will be available via email during normal business hours (9am-5pm, Mon-Fri), and try to respond as soon as possible (generally within 1-2 business days). When emailing me, please place the course number in the subject line of the email. This will help me locate and respond to your emails quickly. **Please use Piazza for asking questions whenever possible so that others can benefit from your questions.**

### Instructor Office Hours

I will expect that you have been attending lectures regularly and reviewing the notes before asking questions in office hours. Additionally, I will expect that you have put some effort into understanding the material. **I will give preference to conceptual questions** over assignment/debugging questions because assignment questions could be answered by the TAs.

### TA Lab Hours

To be reasonably fair to all students, the TAs plan to use an office hour queue system. The TA will answer **1 main question or code issue for up to 10 minutes** (but if your 1 question can be answered faster, they will move on before 10 minutes). You can rejoin the queue and they will circle back around when they are able.

## Academic Integrity

**Any cheating or academic dishonesty will be penalized with a failing grade in the course. All acts of cheating or dishonesty will be reported to the Dean of Students.**

Academic integrity is one of the highest values that Purdue University holds. Individuals are encouraged to alert university officials to potential breaches of this value by either emailing [integrity@purdue.edu](mailto:integrity@purdue.edu) or by calling 765-494-8778. While information may be submitted anonymously, the more information that is submitted provides the greatest opportunity for the university to investigate the concern. Please see [Purdue's student guide for academic integrity](#) for more information. When in doubt, please discuss with the instructor. It is far better to discuss difficult circumstances with the instructor, than to be dishonest.

### Academic Integrity Policy for Quizzes

While taking a quiz, you should not communicate with anyone in the class in any way including but not limited to text messaging, phone calls, hand signals, or smoke signals. After the quiz, you cannot discuss or share any information about the quiz or quiz questions. Any sharing of quiz information will result in failure of the course.

### Academic Integrity Policy for Programming Assignments

For programming assignments, feel free to talk with other classmates about the assignments. However, do not view, share, or copy code in any way (even just looking at someone's screen or writing on a whiteboard). **Only talk, no code.** Neither should you talk in such detail that you would both write the same programs. I reserve the right to run code similarity checks on all submitted code to find instances of academic dishonesty. Also, **sharing your code** with other students is also an academic integrity violation. Do not share code with anyone if they ask. You should refer them to the instructor if there are any extenuating circumstances.

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## Nondiscrimination Statement

Purdue University is committed to maintaining a community which recognizes and values the inherent worth and dignity of every person; fosters tolerance, sensitivity, understanding, and mutual respect among its members; and encourages each individual to strive to reach his or her own potential. In pursuit of its goal of academic excellence, the University seeks to develop and nurture diversity. The University believes that diversity among its many members strengthens the institution, stimulates creativity, promotes the exchange of ideas, and enriches campus life. Purdue's nondiscrimination policy [can be found here](#).

## Accessibility and Accommodations

Purdue University is committed to making learning experiences accessible. If you anticipate or experience physical or academic barriers based on disability, you are welcome to let me know so that we can discuss options. You are also encouraged to contact the Disability Resource Center at: [drc@purdue.edu](mailto:drc@purdue.edu) or by phone: 765-494-1247.

## Mental Health Statement

- If you find yourself beginning to feel some stress, anxiety and/or feeling slightly overwhelmed, try [WellTrack](#). Sign in and find information and tools at your fingertips, available to you at any time.
- If you need support and information about options and resources, please see the Office of the Dean of Students, <http://www.purdue.edu/odos>, for drop-in hours (M-F, 8 am- 5 pm).

- **If you're struggling and need mental health services:** Purdue University is committed to advancing the mental health and well-being of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of mental health support, services are available. For help, such individuals should contact [Counseling and Psychological Services](#) (CAPS) at (765)494-6995 during and after hours, on weekends and holidays, or by going to the CAPS office of the second floor of the Purdue University Student Health Center (PUSH) during business hours.

## Classroom Guidance Regarding Protect Purdue

Any student who has substantial reason to believe that another person is threatening the safety of others by not complying with Protect Purdue protocols is encouraged to report the behavior to and discuss the next steps with their instructor. Students also have the option of reporting the behavior to the [Office of the Student Rights and Responsibilities](#). See also [Purdue University Bill of Student Rights](#) and the Violent Behavior Policy under University Resources in Brightspace.

## Basic Needs Security

Any student who faces challenges securing their food or housing and believes this may affect their performance in the course is urged to contact the Dean of Students for support. There is no appointment needed and Student Support Services is available to serve students 8 a.m.-5 p.m. Monday through Friday. Considering the significant disruptions caused by the current global crisis as it related to COVID-19, students may submit requests for emergency assistance from the [Critical Needs Fund](#)

## Emergency Statement

In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances beyond the instructor's control. Relevant changes to this course will be posted onto the course website or can be obtained by contacting the instructors or TAs via email or phone. *You are expected to read your @purdue.edu email on a frequent basis.*

## Disclaimer

This syllabus is tentative and is subject to change. See course website for course schedule including due dates; the course schedule is also subject to change. Any substantive changes will be announced in class and on Piazza.