CS 484: Artificial Intelligence
Loyola University Maryland
Spring 2017

Instructor: Dr. Megan Olsen
Office: DS 124
Phone: 410-617-2852
Email: mmolsen@loyola.edu (note the 2 m’s)

Class: MWF 11:00-11:50PM, MH240

Office Hours: Take the Doodle poll the first week, then I will set hours; other times by appointment


Course Website: http://moodle.loyola.edu

Course Description: An introduction to basic concepts and techniques of artificial intelligence. Topics include search, logic for knowledge representation and deduction, and machine learning. Some current application areas such as natural language, vision, and robotics are surveyed.

Prerequisites: CS301 or CS312; ST210

Course Objectives: After completing this course, students should be able to:
1. The student is able to apply standard machine learning techniques.
2. The student can understand the algorithms of machine learning techniques.
3. The student has a basic understanding of current research topics in AI and how Ai is used in the real world.
4. The student can understand the debate about machine intelligence and the ethical questions surrounding AI systems.

University Learning Aims: This course supports the following university learning aims:
1. intellectual excellence,
2. critical understanding, and
3. eloquentia perfecta.

Required Software:
- Python 3 distribution, including the toolkits NumPy, SciPy, Scikit-learn, and matplotlib.

Extra Resources:
- AITopics: http://aitopics.org/
- Python tutorials: http://docs.python.org/3/tutorial/ (more than you want to know), http://www.learnpython.org/ (free interactive, but in Python 2 so be careful)
Learning Disabilities:
To request academic accommodations due to a disability, please contact the Disability Support Services Office at (410) 617-2062. The office now sends letters for accommodation to professors via email; if you have had such a letter sent to me, please schedule a time for us to discuss the accommodations that you might need in this class.

Topic Schedule:
This schedule is subject to change. The final schedule will be on Moodle each week. Use this as a reference for the general ordering of topics & what will be covered in the course.

<table>
<thead>
<tr>
<th>Week</th>
<th>Dates</th>
<th>Topic</th>
<th>Reading</th>
</tr>
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<tbody>
<tr>
<td>1*</td>
<td>1/17-20</td>
<td>What is AI?</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>1/23-27</td>
<td>Overview of Machine Learning and Statistics Reminders</td>
<td>Ch. 1-2</td>
</tr>
<tr>
<td>3</td>
<td>1/30-2/3</td>
<td>Neural Networks: Perceptron</td>
<td>Ch. 3</td>
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<tr>
<td>4</td>
<td>2/6-10</td>
<td>Multi-layer Perceptron</td>
<td>Ch. 4</td>
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<tr>
<td>5</td>
<td>2/13-17</td>
<td>Dimensionality Reduction</td>
<td>Ch. 6</td>
</tr>
<tr>
<td>6</td>
<td>2/20-24</td>
<td>Support Vector Machines</td>
<td>Ch. 8</td>
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<tr>
<td>7</td>
<td>2/27-3/3</td>
<td>Unsupervised Learning</td>
<td>Ch. 14</td>
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<tr>
<td></td>
<td>3/5-11</td>
<td>Spring Break!</td>
<td></td>
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<tr>
<td>8</td>
<td>3/13-17</td>
<td>Midterm Review and Midterm Test</td>
<td>Midterm</td>
</tr>
<tr>
<td>9</td>
<td>3/20-24</td>
<td>Optimization and Search</td>
<td>Ch. 9.4</td>
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<td></td>
<td></td>
<td>Evolutionary Learning</td>
<td>Ch. 10</td>
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<tr>
<td>10</td>
<td>3/27-31</td>
<td>Reinforcement Learning</td>
<td>Ch. 11</td>
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<tr>
<td>11</td>
<td>4/3-7</td>
<td>Decision Trees</td>
<td>Ch. 12</td>
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<tr>
<td>12*</td>
<td>4/10-14</td>
<td>Graphical Models</td>
<td>Ch. 16</td>
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<td></td>
<td></td>
<td>(Friday closed for Easter)</td>
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<tr>
<td>13*</td>
<td>4/17-21</td>
<td>Graphical Models</td>
<td>Ch. 16</td>
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<td></td>
<td></td>
<td>(Monday closed for Easter)</td>
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<tr>
<td>14</td>
<td>4/24-28</td>
<td>Ethics in AI &amp; the Future of AI</td>
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<td>Project Presentations</td>
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<tr>
<td>15*</td>
<td>5/1-3</td>
<td>Exam Review</td>
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<td>Exam on Wednesday 5/3 at 9AM in our classroom</td>
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* denotes a shortened week

Grading:
- Preparation/Participation: 10%
- Assignments: 45%
- Project: 15%
- Midterm exam: 10%
- Final Exam (cumulative): 20%

Final Grade Distribution:
Final letter grades will be no harder to achieve than the following:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>A</td>
<td>93%</td>
</tr>
<tr>
<td>A-</td>
<td>90%</td>
</tr>
<tr>
<td>B+</td>
<td>87%</td>
</tr>
<tr>
<td>B</td>
<td>83%</td>
</tr>
<tr>
<td>B-</td>
<td>80%</td>
</tr>
<tr>
<td>C+</td>
<td>77%</td>
</tr>
<tr>
<td>C</td>
<td>73%</td>
</tr>
<tr>
<td>C-</td>
<td>70%</td>
</tr>
<tr>
<td>D+</td>
<td>67%</td>
</tr>
<tr>
<td>D</td>
<td>60%</td>
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Course Procedures

1. Keeping up with the course
Your success in this course is my number one priority. Should you need extra help, please come visit me in my office, post a question on Prulu, or send me email (only if it’s something you can’t put on Prulu).

Moodle/Prulu will be used to make announcements. Moodle will be used to post course materials and schedule updates. All electronic assignment submissions should be done on GitHub unless otherwise noted. Be sure to check Moodle regularly.

2. Attendance
Class meetings will involve a mix of discussions, collaborative activities, and lecture. You are expected to be present and on time to each class meeting. If you know in advance that you will be absent for any reason, please notify me in writing in advance.

Our discussions benefit from your contributions. If you do miss a class, you should first talk to a classmate about any material that you may have missed and check Moodle for assignments. Watch the recorded lecture on Panopto, filling in the notes that you download from Moodle. After that, you may follow up with the instructor about any further questions or concerns.

3. Class Preparation
I expect you to come prepared to each class meeting. Each class will have an assigned preparation – working through a few problems, reading from the book, looking at a website, etc. This preparation ensures everyone is on the same page for class, as necessary background material has been reviewed.

Sometimes you will have a graded assignment to ensure that you’ve done the required preparation. These will vary, but may include short writing assignments in or out of class, mini quizzes, or questions. If it is to be completed before class it will be explicit in the preparation description.

You should check Moodle for updates and read/watch any material that has been assigned before coming to class. Reading a textbook should entail the following:

1. **Overview:** Try to understand the overall organization of the material to be covered by skimming through the reading and looking at subject headings & topics.
2. **In-Depth:** Next, read the material closely. Try to understand the techniques, approaches, and definitions provided. It is OK if there are a few things you don’t completely understand, but you should feel comfortable with most of the material. Taking notes or highlighting the book is a good idea.
3. **Final Notes:** After carefully reading the material, mentally review what you just learned; what do you think are the most important concepts being covered, and what questions do you have?

4. Assignments
There will be a midterm exam and a final exam in this course. The exams give you a chance to show what you have learned on the theory of AI; the focus will be on algorithms and analysis, not coding. The final exam is cumulative.

We will have approximately 1 assignment per week, as well as a final project. The assignments will generally both ask you to work through problems on paper, and write a Python script. The project will require you to program the algorithms we’ve learned, or apply a machine learning technique, to solve a larger problem than those in the assignments.

Assignments submitted on paper must be legible. Assignment files on GitHub must be well organized.
5. Late Work
For every 8 hours late I will deduct 5% from your final earned grade on that assignment (so, 11 hours late will be -10%); this includes hours over the weekend. This is the equivalent of 15% a day, but allows you to save some off that if you really only need a few more hours.

If you wish to turn it in after hours or when I am not on campus, you must submit it to me electronically. Typing assignments will make this easy to accomplish. You may ONLY submit an assignment via e-mail if it was meant to be turned in on paper during class; otherwise, submit it via the stated electronic method (GitHub or Moodle).

Of course, sometimes things happen. If you have an excused reason for needing more time (sickness, death of a relative, etc) come talk to me BEFORE the day the assignment is due and we can discuss your options.

Everyone will also have TWO late passes. Each pass will allow you to choose to turn in any assignment 1 class meeting day later without penalty (so if it was due on Monday, you can turn it in Wednesday, for instance). No explanation of why you are using a late pass is expected. The late pass does not apply to the A.I. in the News assignment.

6. Inclement weather policy
If Loyola is opening at 12PM or later (including being closed for the day) on a lecture day, we will have a virtual class unless the instructor sends an email stating otherwise by 11AM that day. Class will be conducted via Lync, in which you can participate in real time using a webcam and microphone. You will be expected to take notes, and will be held responsible for all material covered as if it was an in-person class meeting. Dr. Olsen will post the lecture notes on Moodle in time for you to print them before class, which is highly recommended. If you do not have Internet access during class time, you must watch the lecture at a later time via Panopto, before the next class meeting.

7. General Procedures
- No eating in class
- No cellphone or laptop use in class
- Be consider of others – walking in late, for instance, is distracting to everyone and rude to the instructor. If you end up walking in late, don’t disrupt class but quietly find a seat.
- Take advantage of office hours if you are stuck on an assignment or have more questions about the material than can be answered in class.

8. Academic Integrity
Loyola University Honor Code Statement:
"The Honor Code states that all students of the Loyola Community have been equally entrusted by their peers to conduct themselves honestly on all academic assignments.

The Students of this University understand that having collective and individual responsibility for the ethical welfare of their peers exemplifies a commitment to the community. Students who submit materials that are the products of their own minds demonstrate respect for themselves and the community in which they study.

All outside resources or information should be clearly acknowledged. If there is any doubt or question regarding the use and documentation of outside sources for academic assignments, your instructor should be consulted. Any violations of the Honor Code will be handled by the Honor Council.”

The Honor Code as it pertains to this class:
In general, any copying of an assignment, whether electronically or by hand is considered plagiarism.
Such students may be referred to the Honor Council for disciplinary action. At the very least, two or more students presenting assignments identical in all important aspects will share the points from a single grade.

- Preparation: You are welcome to discuss the reading with other students. However, you must formulate any answer to questions/quizzes/writing on your own.
- Assignments: Should be done individually. Feel free to talk to other students for clarifications, general approaches, or help understanding course material, but your final solution to the problems must be worked out on your own.
- Projects: The project may be worked on in groups. All work submitted for the project should be the work of only those students.
- Exams: Work on exams should be solely the work of the student whose name appears at the beginning of the exam, without use of reference material.

All tests will include the following statement with the signature of the student. By submitting any assignment (with or without this statement present) the student is agreeing with this statement: "I understand and will uphold the ideals of academic honesty as stated in the Honor Code."