

Computer Science 705
Machine Learning
Fall 2017 3:00 – 4:20 MW
Lindsay Lounge & Beyond

Instructor: Dr. Stephen Hughes
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Office Hours: 315 Stuart Hall
MTWRF 11:00 – 12:00
By Appointment or Open Door.

COURSE DESCRIPTION

Machine Learning algorithms power a range of technologies including speech recognition, computer vision and text mining. These technologies, in turn are foundational to a number of real-world applications such as optical character recognition, voice interfaces, fraud detection, recommender systems and even self-driving vehicles.

Unlike traditional programming techniques, machine learning approaches are not explicit; they support probabilistic outcomes that rely on recognizing patterns and interacting with data to improve performance. This course will explore multiple supervised and unsupervised learning algorithms. Students will learn the essential mechanics of these algorithms; assess their effectiveness; and ground them in practical applications.

LEARNING OUTCOMES

Upon completion of this course, students will be able to:

- Articulate a coherent theory of machine learning.
- Evaluate a range of machine learning techniques – assessing their overall strengths and weakness as well as judging suitability to a specific problem.
- Implement and explain examples of common machine learning approaches, including neural networks, decision trees, clustering and classifiers.
- Independently plan and apply machine learning principles to solve problems of moderate complexity.

CLASS ENVIRONMENT

This class will be taught as an exploratory seminar that is largely student led. A significant portion of your efforts in this class will involve discovering and interpreting material that you can use to contribute to the collective understanding of the class. As you work through the details of various machine learning techniques, you will be called upon to share your insights, highlighting barriers and breakthroughs that you have experienced along the way.

After a brief overview, the course will be broken into units lasting approximately two weeks each. Each unit will tackle a specific algorithm or approach and will have a designated leader. The leader will research a topic and work with the instructor to plan a presentation that will introduce the concept to the class. Class members will use the balance of the unit gain a deeper understanding of the topic; to implement a working demonstration; and to report on their findings. Time will also be reserved at the end of the course for you to develop a larger scale implementation.

This class is expected to consume a *minimum* of 150 hours of student work over the course of the term. To meet this expectation, you will need to work outside of our scheduled meeting time.

You should plan to dedicate a minimum of 10 hours per week to this class.

STUDENT ASSESSMENT

Your grades are considered confidential in accordance with FERPA

(See page 47 of the Coe College Catalog or online at: <http://www.coe.edu/academics/registrar/ferpa>).

20%	Unit Leader	Letter grades will be assigned based on the following scale.		
50%	Technique Demonstrations (Code)	90 ≤ A- < 93	93 ≤ A	
10%	Technique Assessments	80 ≤ B- < 83	83 ≤ B < 87	87 ≤ B+ < 90
20%	Final Project	70 ≤ C- < 73	73 ≤ C < 77	77 ≤ C+ < 80
		60 ≤ D- < 63	63 ≤ D < 67	67 ≤ D+ < 70
			F < 60	

COURSE MATERIALS

There are multiple online resources that will provide coverage of the course content. Electronic resources that survey the machine learning discipline will be made available on the Moodle site. Part of your role as a unit leader will be to identify additional resources that will be helpful in digesting your topic.

COURSE POLICIES

Attendance & Preparation

This is a small group and your participation is critical. The class sessions themselves will be relatively informal, but your contributions are still essential. Please come prepared to share your programs, ideas, expertise and perspective with other class members. They are counting on you as much as you are counting on them.

Academic Integrity

At Coe College, we expect academic integrity of all members of our community. Academic integrity assumes honesty about the nature of one's work in all situations. Such honesty is at the heart of the educational enterprise and is a pre-condition for intellectual growth. Academic dishonesty is the willful attempt to misrepresent one's work, cheat, plagiarize, or impede other students' academic progress. Academic dishonesty interferes with the mission of the College and will be treated with the utmost seriousness as a violation of community standards.

Please refer to the Coe College Academic Catalog for complete information regarding Academic Integrity:

<http://www.coe.edu/academics/dean/academicintegrity>

I believe that you can learn a lot from your peers, both in the class and in the broader community. Therefore, I strongly encourage collaboration with both. **However, do not mistake this as a license to cheat.** It is one thing to *learn* from and with your peers, it is another to pass their work off as your own. With respect to writing code for this class:

- You are required to document any collaboration that takes place.
- Absolutely no electronic transfer of code between students is permitted.
- Any code that you "find" on the Internet must be cited, with an active link to that code.
- While you are encouraged to engage in conversations in online forums, under no circumstances are you permitted to solicit other individuals to complete your work for you.

Ultimately, YOU are responsible for all aspects of your submissions. You should be able to explain each and every single line of code that you include with your submission. Failure to be able to defend any aspect of your submission to my satisfaction will be treated as a violation of academic integrity and result in failure of the assignment with a referral to the Vice President of Academic Affairs.

Office Hours

Office hours are an opportunity for you to clarify details you may have missed in class, discuss general computer science issues, or to have a profound conversation about the disturbing lack of compulsory whistling training at the elementary-school level. *It is time that is reserved for you*; I may appear busy, but you are not interrupting me – unless I am with another student. When you come to office hours with a problem on the assignment, you should come prepared to answer questions, as well as ask them. If you have questions regarding code, you should come prepared with access to an electronic version of your work.

Students with Disabilities

Coe College will make reasonable accommodations for persons with documented disabilities. If you have a disability which may have some impact on your work in this course, please contact the Learning Commons' Student Disability and Academic Services Coordinator. All arrangements for accommodations must be handled through the Learning Commons; I am not able to offer individual accommodations without documentation from the Student Disability and Academic Services Coordinator.

End of Course

This course officially ends with the scheduled Final Exam session.
No work for this class will be accepted beyond that point.