

CPSC 465: Machine Learning

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Class Meetings: MWF: 8:30am - 9:30am.

Office Hours: MTh: 1pm - 2pm; T: 2pm -3pm; and by appointment

Until Friday, January 28: All class and lab meetings, and all office hours will be via zoom. The zoom links to the class meetings and office hours are on the Inquire page for the course.

From Monday, January 31: All class and lab meetings will be in person in Trexler 363. All office hours will be in person.

Note that, depending on the college policy at the time, we may continue meeting synchronously on zoom after January 31.

Syllabus

In this course, we will study various machine learning techniques, including Neural Networks, Support Vector Machines, Decision Trees, Evolutionary Learning and Deep Learning. We will study the mathematical foundations of these techniques, and how to use these techniques effectively.

Required Text: *Machine Learning: An Algorithmic Perspective*, second edition, by Stephen Marsland.

Prerequisites: CPSC/DATA 170, MATH 131, MATH 121, STAT 210

Intended Learning Outcomes

At the end of the course, students will be able to

1. design, and fine tune the parameters of, machine learning models using each of the techniques of neuralnetworks, support vector machines, decision trees, and genetic algorithms,
2. articulate the mathematical basis for each of the above techniques,
3. prepare datasets as appropriate for use with models using each of the above techniques, run the modelson the datasets, and interpret the results, and
4. choose an appropriate technique for use with a given dataset.

Mechanics

The course will meet in class for three hours during the week. There will be two tests on **Monday, February 14, 2022** and **Monday, March 21, 2022** in class during the semester. **The final exam is scheduled for Tuesday, May 3, 2pm - 5pm.**

Make-up tests will be available *by pre-arrangement only* in case of scheduling conflicts. After the test, make-ups will be available only in case of documented medical emergencies.

Besides the exams, there will be regular quizzes in class, regular homework assignments, programming projects, and a co-curricular requirement.

This course expects you to spend *at least* 12 hours of work each week inside and outside of class.

Co-curricular Requirement: The Mathematics, Computer Science and Physics department offers a series of talks that appeal to a broad range of interests related to these fields of study. These co-curricular sessions will engage the community to think about ongoing research, novel applications and other issues that face these disciplines. Each student is required to attend at least *three* of these sessions, and turn in a short paper describing the contents of the session, and his/her *critical reflections* about the topic and content. These papers are due by email within a week of the session. A paper submitted beyond a week from the event being discussed in the paper will not be accepted. (Please also see the document “MCSP Reflections” on the course Inquire page).

Grading

The weights for the various components will be:

Component	Revised
Co-curricular	4%
Quizzes	5%
Homeworks	36%
Tests (15 + 15 =) 30% Final	25%

The final letter grade will be computed according to the following scale:

< 60	60 – 62	63 – 65	66 – 69	70 – 72	73 – 75	76 – 79
F	D-	D	D+	C-	C	C+
	80 – 82	83 – 85	86 – 89	90 – 92	> 92	
	B-	B	B+	A-	A	

Class Attendance and Policies

Regular attendance in class is highly recommended. Regardless of attendance, students are responsible for all material covered or assigned in class.

Cell phones should be kept in your backpacks or pockets (essentially, out of sight), and turned to the silent mode throughout the duration of the class (even when the class meets online). Please do not remove your cell phones until you are outside the classroom/lab. Similarly, during office consultations or consultations in the lab (even when it is not during regular class time), your cell phones should be out of sight and in the silent mode.

If you use an electronic device such as a tablet or a laptop for note-taking or to read the textbook, the content that is open on the screen should be strictly restricted to documents and pages of relevance to the class. For example, you should not have any social media websites open in your browser window, even if it is in a tab that is not currently in focus.

Please also see the document “Zoom Best Practices” on the course Inquire page.

Academic Integrity

Students are expected to adhere to the Academic Integrity policies of Roanoke College. All work submitted for a grade is to be strictly the work of the student unless otherwise specified by the instructor. The policies as outlined in the Academic Integrity handbook will be enforced in the course.

Graded programs are subject to the Roanoke College Academic Integrity policies. Copying a program or a portion of a program (even a single line) or reading another person’s program to obtain ideas for solving a problem is plagiarism. Other examples of integrity violation include writing code for someone else, using code written by someone else, telling someone else how to solve a problem or having someone tell you how to solve a problem (and using his/her method). These cases apply to any work that is handed in for a grade under the instructor’s assumption that the work is your own. Unless specified otherwise by the instructor, discussion among students should be limited to general discussion of concepts and language details, not specific aspects of a solution to the assigned problem.

COVID-19 Related Requirements and Exceptions

Covid-19 Policy If you have a temperature of 100.4° F or higher or other coronavirus symptoms, don't come to class. Call Health Services IMMEDIATELY. Do not come to class or go to any public area on campus. Do keep up with all readings, assignments, and deadlines. In order for your absence to be excused, you must give Health Services permission to notify me that you have consulted them about coronavirus symptoms. If Health Services informs you that you should isolate and not attend class for multiple days or weeks, inform me so that we can make a plan to keep you current in the course. All absences caused by consultation with Health Services about coronavirus symptoms or isolation ordered by Health Services will be excused, but you will need to do the work and graded assignments.

Masks : The College has issued a mask mandate for the start of the semester that requires masks to be worn in indoor common spaces such as our classroom. *In this class, throughout the semester, we will wear masks when indoors.* If you arrive without a mask, you will not be allowed to stay and may lose credit for attendance or in-class work. The Bookstore sells masks if you need to make a quick purchase. Please do not bring any food or drinks into the classroom.

If the college goes online mid-semester, we will continue meeting synchronously, at our usual class time, via zoom. I will work with you on an individual basis to make sure that you have all the appropriate software, etc. to complete all the assigned work. I will also make every effort to accommodate any logistical or personal difficulties you may have in case we go online; please let me know of your difficulties, and I will work with you on an individual basis to resolve them.

If I need to make modifications to the syllabus during the semester I will make the changes only after discussing them with the class.