

Course Syllabus

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INLS 772

Applied Machine Learning

Fall 2022

Class Format: remote asynchronous

Prerequisite(s): 1) COMP110, INLS 560, or equivalent; 2) INLS 570 or 761; 3) INLS 773

Instructor: Dr. Robert Capra

Office: Manning 210

Office Hours: by appointment: <https://go.unc.edu/rcapra-officehours> [. \(https://go.unc.edu/rcapra-officehours\)](https://go.unc.edu/rcapra-officehours)

Email: r<lastname> at unc dot edu

Required text:

Hands-On Machine Learning with Scikit-learn, Keras, and Tensorflow, 2nd edition. Géron, Aurélien.

O'Reilly. ISBN: 978-1492032649

Optional/supplemental text:

Python Data Science Handbook. VanderPlas, J. O'Reilly. ISBN: 978-1491912058

Course Webpage: UNC Canvas web site for INLS 772

Grade Weighting:

Class Participation	10%
Exercises	40%
Semester Project	50%

1. Welcome

As we start this course, the coronavirus pandemic is still affecting many aspects of our lives. It is likely that some of us may get sick, whether with COVID or with more “normal” things like colds and the flu. My goal for this semester is for us to have a rich, supportive, interactive learning community. I also understand that this is a challenging time for many people – I have designed the class to allow for flexibility and adjustment as needed. If you face personal challenges during this class, I encourage you to be in contact with me and I will be happy to talk through options (e.g., for turning in an assignment late, etc.).

I'm looking forward to this class with you all!

2. Course Description and Prerequisites

This course is an applied course introducing computational statistical analysis, machine learning, data exploration and communication with a focus on applied concepts as encountered within common data science applications.. Pre-requisites: 1) COMP 110, INLS 560, or the equivalent; 2) INLS 570 or 761; 3) INLS 773.

3. Course Objectives

- Learn key concepts of machine learning including supervised and unsupervised learning, batch and online learning, training data, over- and under-fitting, evaluating performance
- Gain experience applying ML concepts to real-world problems and datasets
- Learn concepts, strengths, and weaknesses of common ML algorithms including: regression, clustering, classification, and reinforcement learning.
- Learn about processes and best-practices for applied ML including: defining the problem, investigating the data, data cleaning, performance evaluation, iterative refinement, ML pipelines, and presentation of results
- Gain practical experience using matplotlib and scikit-learn to analyze data

4. Computing Requirements

Computer requirement: You are expected to have a laptop computer that meets CCI requirements. The course involves examples and exercises that will count as part of your course grade.

Development environment(s): For the programming assignments in this course, we will use **Python 3** and the **Anaconda Python/R Distribution** and development environment. It is available for download from: <https://www.anaconda.com/> (<https://www.anaconda.com/>)

5. Graded Work

Your grade will be based on participation, exercises, and a semester project. These will be weighted as shown on the table on the first page.

- **Participation:** Students are expected to regularly participate in class exercises and forums. Part of being prepared for class is that you are expected to read and interact with the assigned readings for each class week.
- **Exercises:** Most course modules will include a set of exercises designed to give students experience applying the concepts discussed in the module. Most of these assignments will require you to submit a solution or program via Canvas to get credit for the exercise.
- **Semester project:** Students will be required to perform their own individual data science projects as part of a semester project. This will require students to identify topics, frame them as data science problems, select and prepare data, perform analysis, and communicate results. Students are encouraged to select project topics that align with their major areas of study..
- **Exams:** There will be NO exams as part of this course.

6. Grading Policies

The following scales will be used as a GUIDELINE ONLY. The final grade scales may differ.

The following grade scale will be used AS A GUIDELINE for **undergraduates**:

Grade Range	Definition*
A 90-100%	Mastery of course content at the <u>highest level of attainment</u> that can reasonably be expected of students at a given stage of development. The A grade states clearly that the students have shown such <u>outstanding promise</u> in the aspect of the discipline under study that he/she may be strongly encouraged to continue.
B 80-89.9%	<u>Strong performance</u> demonstrating a high level of attainment for a student at a given stage of development. The B grade states that the student has shown solid promise in the aspect of the discipline under study.
C	A <u>totally acceptable performance</u> demonstrating an adequate level of attainment for a student at a given stage of development. The C grade states that, while not yet showing unusual promise, the student may continue to study in the discipline with

70-79.9%	reasonable hope of intellectual development.
D 60-69.9%	A <u>marginal performance</u> in the required exercises demonstrating a minimal passing level of attainment. A student has given no evidence of prospective growth in the discipline; an accumulation of D grades should be taken to mean that the student would be well advised not to continue in the academic field.
F 0-59.9%	For whatever reason, an <u>unacceptable performance</u> . The F grade indicates that the student's performance in the required exercises has revealed almost no understanding of the course content. A grade of F should warrant an advisor's questioning whether the student may suitably register for further study in the discipline before remedial work is undertaken.

* Definitions are from: <http://registrar.unc.edu/academic-services/grades/explanation-of-grading-system/>

(underlining is my emphasis)

For this course, graduate students will receive grades based on a pass/fail system. The following grade scale will be used AS A GUIDELINE (subject to any curve) for **graduate** students:

Grade Range Definition*	
P 70-100%	Pass
F 0-69.9%	Fail

These scales will be used as a GUIDELINE ONLY. The final grade scale may differ.

* Definitions are from: <http://registrar.unc.edu/academic-services/grades/explanation-of-grading-system/>

Due Dates and Late Work

Each assignment will have a due date and time and will include instructions for submission. A late penalty of 10% per day may be applied **unless prior arrangements have been made with the instructor**. Assignments submitted more than 5 days after the due date may not be graded unless prior arrangements have been made with the instructor.

Requests for Extensions and Absences

Any request for an extension must be made, preferably by email, at least 24 hours prior to the due date. Written documentation is required for illness. If a serious illness prevents you from taking any of the tests, send your instructor an e-mail message, or a friend with a note, describing your condition before the scheduled test.

Statute of Limitations

Any questions or complaints regarding the grading of an assignment or test must be raised within one week after the score or graded assignment is made available.

7. Course Communication

All enrolled students should have access to the UNC Canvas site for this course:

<https://canvas.unc.edu/>

We will use Canvas for many of the administrative aspects of the course.

- **Course Announcements:** I will often use the Canvas messaging feature to post announcements to the class. Usually these posts will also be sent via email to each student's email address of record. However, it is the responsibility of every student to check the Canvas site regularly for announcements and messages. The Canvas site is a reliable source for announcements and messages from the instructor.
- **Assignments:** In order for you to receive credit for an assignment, it must be submitted using the Canvas "Assignments" section. In my experience, Canvas is a reliable method to submit assignments. It is the responsibility of each student to make sure they have access to Canvas and can submit assignments when they are due.

If for some reason you are unable to submit an assignment to Canvas, as a last resort you may email it to the instructor along with a note about the problem you encountered. Then, **as soon as you are able to, it is your responsibility to submit the exact same assignment to Canvas.** The email serves as a record that you tried to submit the assignment on time, but to receive credit, your assignment must be uploaded to Canvas.

- **Grades:** I will use the Canvas "Gradebook" to record your course grades.

8. Honor Code

The UNC Honor Code is in effect for all work in this course. The "Instrument of Student Judicial Governance" gives examples of actions that constitute academic dishonesty:

<http://instrument.unc.edu/instrument.text.html#academicdishonesty>

Students often ask what is okay to talk about with other students and what is not. I do encourage you to help each other learn the course material – your fellow students can often be a great resource. However, you should NOT discuss the details of a solution to a particular assignment with other students, and should never copy or share answers for an assignment with other students. It is okay to talk about course material with other students, but you should not discuss detailed solutions to pending assignments. **All work you submit should be your own.** One way to help insure this is that if you do discuss course material with other students, do not take any written notes.

9. Accessibility Resources and Services (ARS)

The University of North Carolina at Chapel Hill facilitates the implementation of reasonable accommodations, including resources and services, for students with disabilities, chronic medical conditions, a temporary disability or pregnancy complications resulting in barriers to fully accessing University courses, programs and activities.

Accommodations are determined through the Office of Accessibility Resources and Service (ARS) for individuals with documented qualifying disabilities in accordance with applicable state and federal laws. See the ARS Website for contact information: <https://ars.unc.edu> or email ars@unc.edu.

(source: <https://ars.unc.edu/faculty-staff/syllabus-statement> (<https://ars.unc.edu/faculty-staff/syllabus-statement>))

10. Counseling and Psychological Services (CAPS)

CAPS is strongly committed to addressing the mental health needs of a diverse student body through timely access to consultation and connection to clinically appropriate services, whether for short or long-term needs. Go to their website: <https://caps.unc.edu/> or visit their facilities on the third floor of the Campus Health Services building for a walk-in evaluation to learn more.

(source: Student Safety and Wellness Proposal for EPC, Sep 2018)

11. Title IX Resources

Any student who is impacted by discrimination, harassment, interpersonal (relationship) violence, sexual violence, sexual exploitation, or stalking is encouraged to seek resources on campus or in the community. Please contact the Director of Title IX Compliance (Adrienne Allison – Adrienne.allison@unc.edu), Report and Response Coordinators in the Equal Opportunity and Compliance Office (reportandresponse@unc.edu), Counseling and Psychological Services (confidential), or the Gender Violence Services Coordinators (gvsc@unc.edu; confidential) to discuss your specific needs. Additional resources are available at safe.unc.edu.