

## Statistics & Machine Learning

### STAT 5171/6071, 2025 Spring Semester

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#### Course Objective/Description:

- The main objective of this course is to expose undergraduate/graduate students in the STEM fields to various methods developed in areas such as data mining, statistical learning, and big data analytics.
- This course will cover various modern statistical methods for supervised and unsupervised learning that are widely used in scientific and industrial fields.
- This is an in-person class. Course recordings or broadcasts will not be provided.

#### Prerequisites:

- Minimum grade of C- in STAT 5121/6021 and STAT5131/6031, or permission by instructor.

#### Textbook:

1. Understanding Deep Learning (2023) by Simon Prince (<https://udlbook.github.io/udlbook/>)
2. The Elements of Statistical Learning (2017) by Jerome H. Friedman, Robert Tibshirani, and Trevor Hastie
3. Deep Learning (2016) by Goodfellow, I., Bengio, Y., and Courville, A.

**Course Webpage:** All course-related information will be posted on Canvas. Please check the course website periodically.

- You can also install the "Canvas Student" app on your smartphone.  
<https://apps.apple.com/us/app/canvas-student/id480883488>  
[https://play.google.com/store/apps/details?id=com.instructure.candroid&hl=en\\_US&gl=US](https://play.google.com/store/apps/details?id=com.instructure.candroid&hl=en_US&gl=US)

#### Office Hours:

For an in-person meeting, please sign the form using the following link.

<https://www.signupgenius.com/go/10C0D4CA5AF2AA5FFC70-hang1>

- Please sign up at least 30 minutes before the meeting.
- Put your name, year, and program so I can prepare beforehand.
- Double-check that you successfully signed up
  - by pressing the "Save & Continue" button after selecting the session, then press the "Sign Up Now" button.
  - If you correctly signed up, you should receive a confirmation email from the signup genius.



**Semester Grade Calculation:**

Your final course grade will be assigned based on the total 100 points that you have accumulated from **Homework: 30 pts, Attendance: 10 pts, Midterm Exam: 30 pts, Final Project: 30 pts** according to the following grading scales:

## STAT5171 (Undergraduate students)

Grade	A	A-	B+	B	B-	C+	C	C-	D+	C	D-	F
Scores	93.0 - 100.0	90.0 - 92.9	86.0 - 89.9	83.0 - 85.9	80.0 - 82.9	76.0 - 79.9	73.0 - 75.9	70.0 - 72.9	66.0 - 69.9	63.0 - 65.9	60.0 - 62.9	0.0 - 59.9

## STAT6071 (Graduate students)

Grade	A	A-	B+	B	B-	C+	C	F
Accumulated Scores	93.0 - 100.0	90.0 - 92.9	86.0 - 89.9	83.0 - 85.9	80.0 - 82.9	75.0 - 79.9	60.0 - 74.9	0.0 - 59.9

**Homework:**

- Homework and its due date will be posted on Canvas throughout the semester.
  - Submit an electronic version of homework via Canvas. It will accept a PDF file generated from a photocopy of your handwriting or an electronic document produced from word-processor software.
- The code and output should be submitted along with your report through Canvas. The code and output may be graded with the report, depending on homework questions.
- Please note that your solutions must be presented in a clear, readable format with sufficient details. Solutions lacking details or that are difficult to read will not receive credit.
  - This applies to the R code and output as well.
- All students must submit the work written in their own words.
  - No academic misconduct** will be tolerated. See the “Academic Integrity Policy” section on the next page.
- No late assignments will be accepted unless there are extreme and documentable circumstances that are approved by the instructor.
- Quizzes may be given instead of homework assignments **with one-week prior notice**.

**Programming Language:**

- Our course uses the programming languages R and Python.
- For Python and Keras,
  - Install Anaconda: <https://www.anaconda.com/products/distribution>
  - After installation, follow this guide or similar: <https://www.logicalfeed.com/posts/1224/install-tensorflow-kerasand-theano-using-anaconda-for-deep-learning>
- Or use Google Colab
  - <https://research.google.com/colaboratory/>

**Attendance:**

- For the first unexcused absence, no point is deducted. **Starting the second, each unexcused absence counts for a one-point deduction up to the maximum of 10 points deduction.**
- Academic-/athletic-/medical-related absences may be excused upon prior notice to the instructor and permission.
- Please inform the instructor before/after the absence if you need to miss a class.
- **Grades for Auditing:** To get a “T” for auditing, students must attend classes with **at most four unexcused absences**. The students who audit the course are not required to turn in HW and take exams.
- **Students Sitting-in:** Students who sit in the classes must attend classes with at most four absences. After four absences, the students are not allowed to take the remaining classes.

### Midterm Exam:

- The midterm exam is open-book and administered through Canvas.
  - Students need a calculator and a webcam (or smartphone with a camera) for the test.
  - Students should NOT communicate with other people during the exam.
  - Students should NOT use any generative AI chatbot such as ChatGPT during the exam.
  - Academic misconduct, including acts of cheating, will not be tolerated.
- Tentative exam date: March 14th (subject to change depending on the progress)

### Final Project (subject to change):

- Students will be given a common dataset and work individually on a project. The project is graded based on the model's performance, the quality of the programming code, and the quality of the report.
- More details will be announced in class.

## Policies

**Academic integrity policy:** The University Rules, including the Student Code of Conduct, and other documented policies of the department, college, and university related to academic integrity will be enforced. Any violation of these regulations, including acts of plagiarism or cheating, will be dealt with on an individual basis according to the severity of the misconduct.

([http://www.uc.edu/conduct/Academic\\_Integrity.html](http://www.uc.edu/conduct/Academic_Integrity.html))

Note: Any misconduct may fail **the entire course (with a semester grade of F)**, not only the failure of a test or homework.

In this class, the academic misconduct includes, but is not limited to, the following actions:

1. copy **classmates' homework** or cheat **classmates' exams**,
2. copy **homework solutions** provided to students who took the same course **in previous semesters**,
3. copy **homework solutions** downloaded or available **from the internet** (even if there are no copyrights or warnings on the documents displayed) or an anonymous source,

4. as well as other misconducts which the Student Code of Conduct prohibits.

**Personal communication devices policy:** Cell phones must be turned off or in vibrate mode during class. Additionally, please make all efforts to refrain from using cell phones during class time.

**Email communication policy:** All communications must be via a **valid UC email**. The instructor will try to reply within a business day from receipt of emails. Any correspondence using a personal account, e.g., a Gmail account, will not be responded to.

**Policy about early/make-up exams:** The student must request the early/make-up test within a reasonable amount of time before/after one of the following **excusable** events occurs:

5. **Illness.** Need official certification from your doctor, typed on medical stationery (with their license # to practice medicine).
6. **Athletic event participation.** You need a signed letter from your coach no later than **one week before** the day of the exam.
7. **Attending the funeral of an immediate relative.** Need proof of attending the funeral with the date of the ceremony.
8. **Mandatory courtroom appearance.** Need a copy of your official court summons with the date.

Taking an exam early/late due to a **travel plan** will not be permitted.

**Special needs policy:** If you have any special need related to your participation in this course, including identified visual impairment, hearing impairment, physical impairment, communication disorder, and/or specific learning disability that may influence your performance in this course, you should meet with the instructor to arrange for reasonable provisions to ensure an equitable opportunity to meet all the requirements of this course. At the instructor's discretion, some accommodations may require prior approval by Accessibility Resources. To take advantage of those available accommodations, students should contact the Accessibility Resources Office (<https://www.uc.edu/accessibility>).

**Religion-related absence:** Ohio law and the University's Student Religious Accommodations for Courses Policy 1.3.7 permits a student, upon request, to be absent for reasons of faith or religious or spiritual belief system or participate in organized activities conducted under the auspices of a religious denomination, church, or other religious or spiritual organization and/or to receive alternative accommodations with regard to examinations and other course requirements due to an absence permitted for the above-described reasons. Not later than fourteen days after the first day of instruction in the course, a student should provide the instructor with written notice of the specific dates for which the student requests alternative accommodations. For additional information about this policy, please contact the Executive Director of the Office of Equal Opportunity and Access at (513) 556-5503 or [oeohelp@ucmail.uc.edu](mailto:oeohelp@ucmail.uc.edu)

**Regrading policy:** If a student believes that grading errors have occurred, the student should request for regrading **within the next four business days after receiving the graded work**. This will apply even if the student is absent on the day the work is returned unless prior permission was obtained from the instructor.

**Special Note:** *This syllabus is a guideline for the course. Except for changes that substantially affect the implementation of the evaluation (grading) statement, this syllabus is subject to change with advanced notice.*