**DSCI 102 (Spring 23; 32265): Foundations of Data Science 2**

# Course Description

This course expands upon critical concepts and skills introduced in DSCI 101. Students apply increasingly sophisticated computational and statistical techniques to data across numerous domains. Topics include the normal distribution, confidence intervals, regression, and classifiers. Ethical concerns resulting from use of the techniques in this course will be addressed.

# Instructor

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# GEs

**LAs**

Office Hours TBA

Meetings

Lecture: TR 1400-1520, 129 McKenzie Hall  
Lab 32267, F 0900-0950, 301 Chapman Hall  
Lab 32268, F 1000-1050, 122 McKenzie Hall

Lab 32269, F 1200-1250, 101 Villard Hall  
Lab 36433, F 1300-1350, 101 Volcanology Building

Course Materials

***Textbook:***

* (LDS) Ani Adhikari, John DeNero, David Wagner. Computational and Inferential Thinking: The Foundations of Data Science. Available online [here](https://inferentialthinking.com/chapters/intro.html).
  + The primary course textbook

**Software**: None. You will use the course’s JupyterHub to complete all assignments as in 101.

# Learning Outcomes

Upon successful completion of this course each student should be able to:

1. Implement computational techniques to perform statistical analyses across large datasets
2. Characterize the normal distribution, including the mean, median, and standard deviation
3. Define confidence intervals and employ the square root law to calculate required sample size for specified confidence intervals.
4. Make quantitative predictions using regression techniques including calculating linear regression line equations and numerical least-squares minimization
5. Apply nearest-neighbor classifiers to predict categorical and quantitative values
6. Be able to enumerate ethical concerns resulting from use of the techniques in this course.

# Assessment

Homework will be assigned weekly and unless otherwise noted will be due at the start of class one week later. Labs sections will meet on a weekly basis and a corresponding lab assignment should be completed by the end of the meeting period. Additionally, two course projects will be completed during the term.

The final course grade will be determined using the following weighted components:

* Homework 25%
* Lab Assignments 20%
* Course Project 15%
* Quizzes 10%
* Lab attendance 5%
* Final 25%

# The course will be graded on the following scale

A+ = 96.67-100% A = 93.34-96.66% A- = 90.0-93.33%

B+ = 86.67-89.99% B = 83.34-86.66% B- = 80.0-83.33%

C+ = 76.67-79.99% C = 73.34-76.66% C- = 70.0-73.33%

D+ = 66.67-69.99% D = 63.34-66.66% D- = 60.0-63.33

F = 0-59.99%

# Student Expectations

Each student will:

* read assigned readings before they are covered in lecture
* attend the live lectures
* attend 7 lab sessions and submit lab assignments
* submit 8 homework assignments
* submit 1 course project
* sit and submit a final exam

Workload expectations are 12 hours per week.

***Attendance*** Students are expected to regularly attend the weekly lectures and labs and to actively engage in classroom discussions.

***Absence***Any expected absences in the labs should be communicated to the instructor in advance. Excused absences include illness, extracurricular or university-sanction events, and others considered on a case-by-case basis.

***Behavior***: Students are expected to participate in lecture and lab discussions in a respectful manner. Students may follow along with lecture slides and notebooks on their laptops during class, but they should not be on their cellphones.

***Readings*** Students should come to class having already read the corresponding reading material. This will not only facilitate better assimilation of the lecture material but encourage more thorough and thoughtful discussions during the class.

***Homework*** The homework assignments are a valuable tool to solidify application of the material discussed in class, as well as for each student to evaluate their current comprehension of the material. Students are expected to show all work necessary to reach a solution. Partial credit will be awarded for proper procedure regardless of the final answer.

# Course Outline

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| --- | --- | --- | --- | --- |
| **Week** | **Date** | **Topic** | **Reading** | **Assignment** |
| 1 | 4/4 | Introduction, 101 review |  | Homework 9 |
| 4/6 | Normal Distribution, Central Limit Theorem | IT Chapter 13.2, Chapter 14 | Lab 9 |
| 2 | 4/11 | Correlation | IT Chapter 15.1 | Homework 10 |
| 4/13 | Regression | IT Chapter 15.2 | Lab 10 |
| 3 | 4/18 | Pandas and DataFrames |  | Homework 11 |
| 4/20 | Datascience to pandas |  | Lab 11 |
| 4 | 4/25 | Advanced pandas |  | Homework 12 |
| 4/27 | Matplotlib and Seaborn |  | Lab 12 |
| 5 | 5/2 | Inference vs Prediction | IT Chapter 16 | Homework 13 |
| 5/4 | Inference for regression | IT Chapter 16 | Lab 13 |
| 6 | 5/9 | Classification: distance; nearest neighbors | IT Chapter 17 | Homework 14 |
| 5/11 | Train/test; accuracy | IT Chapter 17 | Lab 14 |
| 7 | 5/16 | Probably, bayes’ theorem | IT Chapter 18 | Homework 15 |
| 5/18 | Decision Trees | IT Chapter 18 | Lab 15 |
| 8 | 5/23 | Multiple Linear Regression | IT 17.6; UMN: Multiple Linear Regression | Project 3 |
| 5/25 | TBA |  |  |
| 9 | 5/30 | Ethics: Privacy |  |  |
| 6/1 | Ethics: History of statistics | Nautilus article |  |
| 10 | 6/6 | Review |  |  |
|  | 6/8 | Review |  |  |

# Prohibited Discrimination and Harassment Reporting

Any student who has experienced sexual assault, relationship violence, sex or gender-based bullying, stalking, and/or sexual harassment may seek resources and help at [safe.uoregon.edu](http://safe.uoregon.edu). To get help by phone, a student can also call either the UO’s 24-hour hotline at 541-346-7244 [SAFE], or the non-confidential Title IX Coordinator at 541-346-8136. From the SAFE website, students may also connect to Callisto, a confidential, third-party reporting site that is not a part of the university.  
  
Students experiencing any other form of prohibited discrimination or harassment can find information at [investigations.uoregon.edu](https://investigations.uoregon.edu/aaeo.uoregon.edu) or contact the non-confidential Office of Investigations and Civil Rights Compliance at 541-346-3123 or the Dean of Students Office at 541-346-3216 for help. As UO policy has different reporting requirements based on the nature of the reported harassment or discrimination, additional information about reporting requirements for discrimination or harassment unrelated to sexual assault, relationship violence, sex or gender based bullying, stalking, and/or sexual harassment is available in the [Employee Reponsibilities section](https://investigations.uoregon.edu/employee-responsibilities#employee-obligations) of the Office of Investigations and Civil Rights Compliance website.  
  
Specific details about confidentiality of information and reporting obligations of employees can be found at [investigations.uoregon.edu/employee-responsibilities](https://investigations.uoregon.edu/employee-responsibilities).

Mandatory Reporting of Child Abuse  
UO employees, including faculty, staff, and GEs, are mandatory reporters of child abuse. This statement is to advise you that your disclosure of information about child abuse to a UO employee may trigger the UO employee’s duty to report that information to the designated authorities. Please refer to the following links for detailed information about mandatory reporting: [Mandatory Reporting of Child Abuse and Neglect](https://hr.uoregon.edu/policies-leaves/general-information/mandatory-reporting-child-abuse-and-neglect).

# Accessibility Accommodations

The University of Oregon is working to create inclusive learning environments. Please notify me if there are aspects of the instruction or design of this course that result in disability related barriers to your participation. You are also encouraged to contact the Accessible Education Center in 360 Oregon Hall at (541) 346-1155 or uoaec@uoregon.edu.

# Academic Misconduct

The University Student Conduct Code (available at [dos.uoregon.edu/conduct](https://dos.uoregon.edu/conduct)) defines academic misconduct. Students are prohibited from committing or attempting to commit any act that constitutes academic misconduct. By way of example, students should not give or receive (or attempt to give or receive) unauthorized help on assignments or examinations without express permission from the instructor. Students should properly acknowledge and document all sources of information (e.g. quotations, paraphrases, ideas) and use only the sources and resources authorized by the instructor. If there is any question about whether an act constitutes academic misconduct, it is the students’ obligation to clarify the question with the instructor before committing or attempting to commit the act. If plagiarism or cheating is suspected, you will be contacted by me or the GTF in charge of your lab section. I will assess the situation and determine the appropriate consequence, which can range from an F on an assignment to an F in the course. The situation will also be reported to the Office of Student Conduct and Community Standards.

Respect for DiversityThe University of Oregon affirms and actively promotes the right of all individuals to equal opportunity in education and employment at this institution without regard to race, color, sex, national origin, age, religion, marital status, disability, veteran status, sexual orientation or any other extraneous consideration not directly and substantively related to effective performance.