Regression Analysis for Data Science
DCS 620
Fall 2021 Syllabus

PROFESSOR: Jeong S. Sihm
Office Location: Deeds Hall 203-A
Office Hours: TR 3-6pm or by appointment
Phone: (336) 714-7998
Email Address: SihmJ@CarolinaU.edu

MISSION STATEMENT
Carolina University is a Christ-centered University committed to educating aspiring leaders worldwide through exceptional teaching, scholarly research, creative innovation, and professional collaboration.

COURSE DESCRIPTION
First, this course will cover Ordinary Least Squares regression analysis with various techniques associated with it. Regularization including Ridge regression and LASSO regression will be studied also. Bayesian linear regression will be covered too. The second half of the course will focus on Logistic regression as well as generalized linear models. Other advanced topics including mixed effects models and nonparametric regression models may be covered. The concepts, theories and programming skills of these methods will be studied thoroughly.

COURSE DELIVERY AND METHODS
The course will utilize assigned material reading, professor lectures, student interactions, and hands-on in-class programming activities & assignments.

COURSE MATERIALS
Required Texts:
Required Resources:
https://www.r-project.org/
https://www.rstudio.com/products/rstudio/download/

Recommended Resources:

COURSE OBJECTIVES
In this course, the professor will cover the following:
2. Logistic regression analysis with the focus on practical classification in Machine Learning paradigm.
3. Hands-on R code examples with real datasets.

COURSE LEARNING OUTCOMES (CLOs)
Upon completion of this course, students will be able to:
1. Understand the basic principles of Simple Linear Regression Analysis as well as Logistic Regression Analysis.
2. Apply these principles to real world datasets by using R statistical programming language.
3. Assess model fit and carry out diagnostics on various models.
4. Construct appropriate regression models to answer important scientific or business questions.

COURSE REQUIREMENTS AND ASSIGNMENTS
Participation: Students' attendance as well as class participation will be evaluated and included in calculating the final grade. Due to various modes of learning allowed in the Fall 2021 semester, the instructor may require all of R code students practiced for in-class examples to be uploaded for evaluation too.

Required demonstration of attendance includes *proctored viewing of asynchronous lectures and continual camera use during online synchronous sessions to verify students' presence*. To be counted present, students should complete proctored viewing before the start of the next synchronous class meeting.

Students who do not adhere to the processes for assessing attendance (whether synchronous or asynchronous) will be marked “Absent (Unexcused)” and fall under current CU attendance policies, including point deduction following the maximum number of allotted absences, regardless of class or program.
Quizzes (Online and/or in-person): Expect to have weekly quizzes. Formats may vary due to specific educational needs each time. Late submissions will not be accepted and result in a zero unless arrangements are made with the instructor prior to their due dates.

Homework Assignments: Regular homework assignments will be given. Details about each homework assignments will be announced in class including due dates, instructions, delivery methods, etc. Late submissions will not be accepted and result in a zero unless arrangements are made with the instructor prior to their due dates.

Midterms: NA

Final Exam: There will be a take-home final exam. Details about the exam will be announced in class.

Final Project: NA

COURSE SCHEDULE
The outline of major topics we will cover in class is listed below. Any dates and/or topics shown below may be subject to change due to interactive nature of the course.

(08/17) Syllabus, Regression Analysis for Statistical Learning
(08/19) Assessing Model Accuracy and R Basics

(08/24) Simple Linear Regression
(08/26) Multiple Linear Regression

(08/31) Logistic Regression and Generalized Linear Models
(09/02) Other Popular Classification Methods

(09/07) Cross Validation
(09/09) Bootstrap

(09/14) Linear Model Selection
(09/16) Shrinkage Methods and Regularization

(09/21) Moving Beyond Linearity I
(09/23) Moving Beyond Linearity II

(09/28) Hands-on R Programming Session with Real Datasets I
(09/30) Hands-on R Programming Session with Real Datasets II

ASSIGNMENT WEIGHTS
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<td>Take-home Final Exam</td>
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<td><strong>TOTAL</strong></td>
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**COURSE ASSESSMENT**

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<td>Take-home Final Exam</td>
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**GRADING SCALE**

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PROFESSOR/STUDENT INTERACTION

Carolina University institutional policy:

- By phone or by email within 24 hours.
- Grading of assignments is to be done within 3 days for regular assignments and 7 days for larger assignments.
- Some assignments may require additional time to grade due to the length of the project and the directive to provide substantive feedback that will assist you throughout the learning process. In cases where the assignment is not returned with feedback within the stated period, refer to communication from your professor to facilitate expectations on subsequent assignments. Students are not expected to apply adjustments on subsequent assignments in advance of returned grading and feedback.

In addition, students should expect the following interaction in this course:

- Students are encouraged to come by my office hours with questions either in person or online.
- There will be about two forms of substantive feedback (one quiz and a homework assignment) as well as two in-person lectures per week.
- The frequency of assignments is subject to change due to interactive nature of the course

COURSE SPECIFIC POLICIES

**Late Submission**: Late submissions will not be accepted and result in a zero unless arrangements are made with the instructor prior to their due dates. If the student must miss any of these assignments, one should consult with the instructor before the day in which it is due. An unexcused absence and/or failure in submitting an assignment on time will result in a zero on them.

**Email and Electronic Communication**

All CU faculty and students are provided means of electronic communication (e.g. email, video conferencing, chat features, discussion boards, etc.) All employees and students are required to use official university electronic accounts for official university correspondence. This policy is meant to include both synchronous and asynchronous communication. **Faculty and staff are not obligated to read, receive, or respond to communications where these guidelines are not followed.** Email must be checked regularly, especially when enrolled in an active course. Adhere to the following guidelines when communicating online with professors, university employees, and other students.

- Accounts: Only university email and related systems should be used for institutional communications. Do not use personal email or video conferencing accounts.
- Names: Refer to professors and CU employees by their last names with appropriate honorifics (e.g., “Dr.” or “Prof.”). For professors, if you cannot easily verify their degree or
status, “Prof.” is most appropriate—not “Ms.” or “Mr.” Under no circumstance should you use first names unless given explicit permission.

- Introductions: Use subject lines appropriately and begin any course-specific email with your first and last name, the course number, and your exact section number or meeting time (e.g., “101-05,” “9 am MW,” but not “this morning”).

- Grammar and Style: All written communications must conform to standard English. Emails and discussion board posts should not resemble text message, chat, or social media posts. Use complete sentences with correct capitalization, spelling, punctuation, and grammar.

- Coordination: All members of a synchronous, online interaction should participate by the same mode of interaction when possible. For example, join video conferences with video. This is especially true for one-on-one meetings with your professor and small group video discussions in or outside of class.

- “Class” Conduct: When participating in synchronous classes or meetings (especially when using video), conduct yourself as if in the classroom. Be on-time and mentally present. Be seated at a desk or table. Dress according to classroom standards. Do not introduce distractions into the interactions and be prepared to stay for the duration of the session per normal classroom behavior.

- Complexity: In general, asynchronous communication is appropriate for simple questions and activities. Complex questions that require more than one simple response should be addressed synchronously—during class is often best. If you are unable to ask your question during class, or it is too personal to do so, use an asynchronous method to arrange a synchronous meeting.

- Boundaries: Synchronous communication is less formal than asynchronous. However, the appropriate use of names, language, acronyms, and emojis must still conform to classroom standards. Since we do not all share the same online culture, be prepared to explain yourself if your acronym or emoji is not understood. Be polite and respectful when asking for clarification, and gracious when misunderstandings occur.

**ATTENDANCE AND PARTICIPATION**

All courses follow specific attendance policies found in the Student Handbook for that course level and format. These specific and extensive policies can be found at [https://my.carolinau.edu/ICS/Students/Handbooks__Forms.jnz](https://my.carolinau.edu/ICS/Students/Handbooks__Forms.jnz). It is the student’s responsibility to be familiar with these policies and to keep track of his or her own attendance.

Students may attend in-person, online synchronously, or online asynchronously, depending on the course and delivery mode offered each semester. Regardless of delivery mode, students must adhere to these policies, including any required demonstration such as proctored viewing of lectures to verify attendance. Per the university attendance policy, accrued absences may contribute negatively toward a student’s final grade.

Carolina University faculty will assess course participation and may assign grade points as deemed appropriate for the course and subject matter. Participation may be gauged by attending online or in-person classes, lectures, or labs, submitting coursework, engaging in workshops or other interactive computer-assisted teaching activities, engaging in group study or online discussions curated by the instructor, or otherwise interacting with an instructor about academic matters by Zoom or other means. Students should refer to the assignment weighting table and course specific policies for details on participation assessments.
Per the university attendance policy, accrued absences contribute negatively to a student’s final grade based on the times per week the class is scheduled.

Carolina University is committed to equitable treatment of students, regardless of their selected mode of delivery. Students may attend in-person, online synchronously, or online asynchronously, depending on the course and delivery mode offered for that class. The required demonstration of attendance includes **proctored viewing of asynchronous lectures and continual camera use during online synchronous sessions to verify students’ presence**. Proctored viewing will take place using ProctorFree, CU’s online proctoring platform.

**ACADEMIC INTEGRITY AND MISCONDUCT**

**Academic Integrity**

Academic integrity includes honest and responsible scholarship, research, information collection, and presentation. The University expects students to submit assignments that are original to them and that properly cite and reference peoples’ ideas using the prescribed style guide. Students at CU are expected to follow the letter and the spirit of academic integrity in all assignments. The very foundation of university success is academic integrity. Learning how to express original ideas, cite sources, work independently, and report results accurately and honestly are skills that carry students beyond their academic career. If a student is uncertain about an issue of academic honesty, he/she should consult the faculty member to resolve questions in any situation prior to the submission of the academic exercise.

Maintaining your academic integrity involves:
- Creating and expressing your own ideas in course work.
- Acknowledging all sources of information including verbal, written, digital, and graphic.
- Completing assignments independently or acknowledging collaboration.
- Accurately reporting results when conducting your own research or with respect to labs.
- Honesty during examinations.

Courses at Carolina University will utilize proctoring for select exams to ensure exam integrity. Per Carolina University directives, all exams that represent 25% or more of a course grade are required to be proctored. Carolina University utilizes the online proctoring service, ProctorFree, to ensure exam integrity and enables administration of remote online exams. All exam sessions will be reviewed as part of your final grade. Instances of cheating or inappropriate behavior will be considered violations of the Academic Integrity policy and will result in disciplinary action.

**Academic Misconduct**

The Student Handbook has a detailed list of different ways students show a lack of academic integrity, including academic technology misuse, cheating, complicity, fabrication or invention, falsification, forgery, multiple submissions, plagiarism, and sabotage. The Academic Integrity Policy and the consequences for infractions can be found in the Student Handbook at [https://my.carolinau.edu/ICS/Students/Handbooks__Forms.jnz](https://my.carolinau.edu/ICS/Students/Handbooks__Forms.jnz).

It is the student's responsibility to be familiar with these policies and to avoid academic misconduct in all assignments. To help students better understand the many facets of plagiarism in particular, that portion of the policy is included here.

Plagiarism is the use of another person’s distinctive ideas or words without acknowledgment. All researchers are expected to acknowledge the use of another author’s words by the use of
quotation marks around those words in the text of a paper and by appropriate citations. The failure occurs in an oral, written, or media project submitted for academic credit or some other benefit.

Examples of plagiarism include (but are not limited to), the following:
- Word-for-word copying of another person's ideas or words.
- The mosaic (interspersing of one's own words here and there while, in essence, copying another's work).
- The paraphrase (the rewriting of another's work, yet still using their fundamental idea or theory).
- Submission of another's work as one's own.
- Having another person write or correct a paper.
- Buying or procuring a ready-made paper from a research paper “service” on the Internet or from another such service.
- Neglecting quotation marks on material that is otherwise acknowledged.
- Fabrication of references (inventing or counterfeiting sources).

ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES
The policy and intent of Carolina University is to fully and completely comply with the Americans with Disabilities Act of 1990 (ADA), the Rehabilitation Act of 1973, and the Americans with Disabilities Amendments Act of 2008, to the extent that they apply to the university. Carolina University will not discriminate against an otherwise qualified student with a disability in the admissions process, or any academic activity or program, including student-oriented services. Carolina University will provide reasonable accommodations to the known physical and/or mental limitations of a qualified individual with a disability, unless it would impose an undue hardship on the operation of the university, or unless it would fundamentally alter a degree or course requirement. Qualified students must request reasonable accommodations for disabilities through the Disability Services Coordinator in Student Success Services.

BIBLIOGRAPHY
NA