

Syllabus

Code: MATH 132

Title: INTRODUCTION TO DATA SCIENCE
AND APPLIED STATISTICS

Institute: STEM

Department: MATHEMATICS

Course Description: This course begins by introducing data science with an overview of current trends in data science, the history of R, how to install R, and an introduction to R programming. Data structure concepts include exploring data visualization with numerical and categorical data, data transformation, and importing data. The course continues with exploring data analysis including variation, missing values, covariation, patterns, and models. This course concludes with statistical inferences including linear regression with simple/multiple predictors, confidence intervals, hypothesis testing, inference for single mean/proportion, comparing paired means/proportions, many means with ANOVA and machine learning.

Prerequisites: MATH 131 (Statistics) OR ECON 225 (Business Statistics)

Credits: 4

Lecture Hours: 4

Lab/Studio Hours:

Required Textbook/Materials:

1. Textbook (free download): Hadley Wickham and Garrett Golemund, R for Data Science, O'REILLY
2. Personal laptop recommended but not required.

Additional Time Requirements:

For information on Brookdale's policy on credit hour requirements and outside class student work refer to [Academic Credit Hour Policy](#).

- In addition to the regular class hours, you will need to set aside time each week for homework/labs. The weekly time will vary by topic and level of difficulty, but as an estimate, you should expect 2 homework/labs hours for each class hour per week. For example, if your class meets for four hours per week, you should expect to spend about eight hours per week on homework/labs
- If you are having any difficulty with the course material, you may need to allow time to see your instructor during office hours.

Course Learning Outcomes:

Upon completion of this course, students will be able to:

1. Demonstrate statistical and computer skills (R language) appropriate to this course.
2. Analyze real world data sets by using statistical concepts, theories, skills, and R language.
3. Understand data structure, data visualization, data analysis, and use statistical inferences to complete course projects and interpret results.

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Grading Standard:

In this course, you will be evaluated by means of tests, homework, labs, and other graded assignments specified by your instructor.

A. Tests

There will be two tests: a midterm (covering units 1 and 2) and a cumulative final. Each test has two components; 20% of the grade will encompass an in-class exam and 80% will encompass a project to be completed at home. The course project component of the final exam may require a presentation.

B. Labs

There will be computer lab assignments which provide hands-on experience on course concepts by using different real world data sets.

C. Homework

Homework will be assigned after each topic and will count towards your final course grade.

GRADING

Your final grade will be computed as follows:

Midterm	30%
Final	35%
Labs	25%
Homework	10%

Final Grade

Your final grade is determined as follows:

If your final course average is	Your final grade is
90 – 100	A
88 – 89	A-
86 – 87	B+
80 – 85	B
78 – 79	B-
76 – 77	C+
70 – 75	C
60 – 69	D**
Below 60	F

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Incomplete

INC is only given at the discretion of your instructor. This may occur in documented cases of hardship or emergency. In this case, you must meet with the instructor to discuss the work that must be completed to earn a grade in the course. All work must be completed within 21 days after the end of the term, exclusive of official college closings.

Withdrawal

You may withdraw from the course, without penalty, up to a date set by the College. If you do not withdraw from the course but stop attending, your grade at the end of the semester will be F.

Course Content:

Unit I: Introduction to Data Science and R programming

Unit 1 learning outcomes:

- Know the background of data science, how data science is used in the modern world, the trend of data science, and job markets for data science.
- The history of R language and how it affects modern statistics.
- Know how to install and configure R software for a statistical environment.
- Hello World lab assignment.

Unit 2: Data Structures and Data Analysis

Unit 2 learning outcomes:

- Understand the concepts of data visualization. Use one of the most elegant and versatile systems **ggplot2** from R to construct and build graphs.
- Know how to use R to present numerical and categorical data.
- Use the **dplyr** package to transform variables from data sets.
- Learn how to import and record data.
- Review descriptive statistics.
- Use exploratory data analysis including variation, missing values, covariation, patterns, and models.
- Be able to use R systems to analyze real world data sets.

Unit 3: Statistical Inference

Unit 3 learning outcomes:

- Review normal distribution, sampling distribution, t distribution, confidence intervals and hypothesis testing.
- Review correlation and regression.
- Learn linear regression with single predictor/multiple predictors.
- Learn confidence interval and hypothesis testing for population proportion.
- Learn inference for comparing single proportion to two proportions.

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- Learn inference for comparing a single mean to two independent means.
- Compare many means with ANOVA.
- Introduce machine learning.
- Be able to use the R system and statistical inference knowledge to complete the course project by using a real-world data set.

Department Policies:

The Math Department wants you to be successful in this course. Because of this, we have compiled a list of strategies and behaviors.

Attendance and class participation

- If you want to be successful in this course, attend every class.
- Come to class on time, and stay for the entire class period. If you are late or leave during class, you will miss important class material and you will also distract your classmates and your instructor. (See the Student Conduct Code)
- Turn off your cell phone during class. You and your classmates need to be free from distractions. (See the Student Conduct Code)
- Bring your book and calculator to every class.
- Respect your classmates and your instructor. Listen carefully to questions asked and answers given. Treat all questions with respect.
- Participate fully in class. Volunteer answers, work problems, take careful notes, and engage in discussions about the material. Use computers only for designated work. Above all, stay on task.
- Do your own work on tests and quizzes. Cheating will not be tolerated. (See the Academic Integrity Code.)

Absence

- If you are sick and an absence is unavoidable, please call or email your instructor. You are still responsible for all material that was covered during your absence. You are expected to read the textbook and do the homework.
- Make time to see your instructor when you return so that you can get any papers you missed.
- Remember that you are expected to be in class for the tests and quizzes.

Getting Help

After you have tried the homework, there are ways to get help:

- Look in your text and your class notes for examples similar to the problems you are finding difficult.
- See your instructor during office hours or make an appointment. Bring the work you have done.
- Go to the **Math Lab** to get extra help on your homework or simply go and do your homework there. Someone will be there if you get stuck. You don't need an appointment to use the Math Lab.

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- Form a **study group** with other class members. Working with other students can be a great way to learn. If you have a group to work with, consider meeting and working together in the Math Lab.
- Your textbook may have a complete solution manual available in the Math Lab, which can be used in the Math Lab.
- You can use the computers in the computer lab within the Math Lab to do work related to your math course.
- In the Math Lab, you can get help on how to use your calculator.

Visit the [Math Lab website](#) to view hours and other useful information about the Math Lab.

College Policies:

As an academic institution, Brookdale facilitates the free exchange of ideas, upholds the virtues of civil discourse, and honors diverse perspectives informed by credible sources. Our College values all students and strives for inclusion and safety regardless of a student's disability, age, sex, gender identity, sexual orientation, race, ethnicity, country of origin, immigration status, religious affiliation, political orientation, socioeconomic standing, and veteran status. For additional information, support services, and engagement opportunities, please visit www.brookdalecc.edu/support.

For information regarding:

- ♦ Brookdale's Academic Integrity Code
- ♦ Student Conduct Code
- ♦ Student Grade Appeal Process

Please refer to the [BCC STUDENT HANDBOOK AND BCC CATALOG](#).

NOTIFICATION FOR STUDENTS WITH DISABILITIES:

Brookdale Community College offers reasonable accommodations and/or services to persons with disabilities. Students with disabilities who wish to self-identify must contact the Disabilities Services Office at 732-224-2730 (voice) or 732-842-4211 (TTY) to provide appropriate documentation of the disability, and request specific accommodations or services. If a student qualifies, reasonable accommodations and/or services, which are appropriate for the college level and are recommended in the documentation, can be approved.

ADDITIONAL SUPPORT/LABS:

See the Tutoring Center for information <https://www.brookdalecc.edu/academic-tutoring/tutoring-center/>.

MENTAL HEALTH:

- Mental Health Crisis Support: From a campus phone, dial 5555 or 732-224-2329 from an external line; off-hours calls will be forwarded to BCC police (2222 from a campus phone)
- Psychological Counseling Services: 732-224-2986 (to schedule an appointment during regular hours)