

COP 2073C: Introduction to Statistical Programming with R

# Professor Information

|  |  |
| --- | --- |
| Professor | XXX |
| Virtual Office Hours | XXX |
| Virtual Contact Methods | XXX |
| Office Hours | XXX |
| Office Location | XXX |
| Office Phone | XXX |
| Email | [XXX@fscj.edu](mailto:XXX@fscj.edu) |

# Instructor Response

You can anticipate responses to inquiries and questions within 24 - 48 hours of receipt.  
You can expect to receive assignment feedback within …. hours.

# Campus Information

This online course is offered by the Florida State College at Jacksonville (FSCJ) Online. For questions or concerns, please feel free to call the FSCJ Online Resource Center (904-997-2628). For technical assistance, please contact the Help Desk at 877-572-8895 or (904) 632-3151 or via [Student Computing Resources](https://www.fscj.edu/student-services/student-resources/student-computing-resources).

# Course Description

This course introduces concepts of statistical programming, with a focus on the use of the R programming language and the RStudio programming environment. Students will learn base R language concepts including data types, functions, and packaging and will work with tidyverse and other packages commonly used in data science applications for data acquisition, analysis, and visualization. Students will develop R applications which use the language for probability and distribution analysis, correlation and linear regression, calculating confidence intervals, and hypothesis testing.

# Course Learning Outcomes

Upon completion of the course, the student will be able to:

## Course-Specific Learning Outcomes

1. Describe and provide examples of statistical programming concepts.
2. Describe characteristics of the R programming language, the structure of an R program, and implement a simple R program.
3. Describe an R package, list examples of commonly used packages, and implement an R program which utilizes one or more common R packages.
4. Describe the data types and structures used by the R programming language and implement an R program which uses R data types and structures.
5. Describe the Data Life Cycle and how it is implemented in R.
6. Describe how input and output is performed in R data is managed in R and implement an R program which demonstrates data input and output.
7. Describe the common mathematical and statistical functions used in R and implement programs which use those functions, including functions related to probability, correlation, linear regression, and confidence intervals.
8. Describe the process of hypothesis testing using R and implement a program which demonstrates hypothesis testing.
9. Describe and implement programs using the visualization tools available in R.
10. Describe the process used to debug an R program.
11. Describe the process used to build a custom package in R and implement a custom R package.
12. Describe the tidyverse system.
13. Describe the dplyr package and implement an R program which uses dplyr to manipulate data.
14. Describe the modelr package and implement an R program which uses modelr to model data.
15. Describe the ggplot2 package and implement an R program which uses the ggplot2 package to visualize data.
16. Describe the pipe operator and implement an R program which uses pipes.

# Course Information

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| --- | --- |
| Subject/Catalog #: Title | COP 2073C: Introduction to Statistical Programming with R |
| Class Number | XXX |
| Number of Credit Hours | 3 |
| Term/Year/Session/Length | XXX |
| Course Prerequisites | COP 1000C and STA 2023 |

# Important Dates

|  |  |
| --- | --- |
| Class Begins | XXX |
| Withdrawal with “W” Deadline | XXX |
| Class Ends | XXX |

These dates are critical for this course. Additional critical dates for this course can be found by choosing the appropriate term links in the [Academic and Registration Calendars](https://www.fscj.edu/i'm-looking-for/academic-calendar) at the Florida State College at Jacksonville website.

# Instructional Materials

If you have not done so already, obtain your textbook and related course materials. Visit your nearest campus bookstore or order online via the student portal, [myFSCJ](https://my.fscj.edu), or the [Follett Online Bookstore](http://www.bkstr.com). Be sure to order using your course and instructor’s name and the four-digit class number.

Please note that some courses may require a text plus additional software or a publisher’s Web access code. If purchasing a used text, be sure to check on and obtain all required materials.

## Required Text(s) and Materials

|  |  |
| --- | --- |
| decorative | **Textbook Title:** The Book of R: A First Course in Programming and Statistics  **Edition #:** 1  **Author:** Davies, Tilman  **Publisher:** No Starch Press  **Year:** 2016  **ISBN-13:** 978-1-59327-651-5  **Notes:** Free eBook available via FSCJ Library and Learning Commons in the “O’Reilly (formerly Safari) eBooks” database. Visit *Start Here* module in online classroom for information on how to access eBook. |

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| decorative | **Textbook Title:**  R for Data Science  **Edition #:** 1  **Author:**  Wickham, Hadley & Garrett Grolemund  **Publisher:**  O'Reilly Media, Inc  **Year:** 2017  **ISBN-**13: 978-1-491-91039-9  **Notes:** Free eBook available via FSCJ Library and Learning Commons in the “O’Reilly (formerly Safari) eBooks” database. Visit *Start Here* module in online classroom for information on how to access eBook. |

# Technology Requirements

This course will be delivered online using the Canvas course management system. Specific course technology requirements can be found in the Canvas *Course Orientation Assignment* in the *Start Here* module.

## Accessibility

If you require specific accommodations to complete this course, contact a campus Student Support Coordinator. Office locations and contact information are posted on the College’s [Services for Students with Disabilities](https://www.fscj.edu/student-services/student-resources/services-for-students-with-disabilities) site. You may also reach the Associate Director at (904) 361-6216.

# Your Course Participation and Assessments

## Learning Communities

Students learn through interactions with each other, with their instructor, and with the course material. A primary goal of this course is to encourage you to build learning communities within the course. This course has special forums to aid in building our learning community. We will use the discussion area to meet each other and share our thoughts and concerns.

“Questions for the Professor” discussion forum is used for general questions about course content, navigation, or flow. Please do not ask personal or specific grade-related questions in this forum, send individual communication instead.

# Assigned Work

In each module, you may have activities to complete. Detailed information and instructions for each assignment can be found in the modules of the online classroom.

To see all the assignments due in this course, refer to the *Course Summary* (under *Syllabus*) in the online classroom.

Original Work

All work must be your own. Your written programming assignments will be screened for signs of plagiarism or copying from other students. Do not copy and paste content from the Internet.

## Discussions

You will participate in one discussion and it is worth up to 50 points toward your final grade. This discussion will allow you to introduce yourself and interact with other students in the course. You will be required to review and respond to at least two of your classmates' introductions. The link to the discussion is located in the *Start Here* module in the online classroom.

Discussions are graded using the Discussion Rubric in the online classroom.

## Assignments

You will complete 12 ungraded practice exercises and 12 graded programming assignments. Programming assignments are worth up to 360 points toward your final grade.

Assignments are graded using the rubric(s) included in the online classroom.

### Practice Exercises (Ungraded)

There are 12 ungraded practice exercises in the course (one for each module). These exercises provide hands-on practice of concepts covered by each module of the course, and will typically consist of one or more coding assignments. While these exercises are not required, it is highly recommended that you complete them as they provide additional coding experience and in many cases help prepare you to complete the graded programming assignments. No credit is earned for completing these exercises. The instructor's solution to these exercises will be made visible to you after the completion of a short survey.

### Programming Assignments (Graded)

You will complete 12 graded programming assignments in this course. These assignments will assess content covered by each module of the course. Graded programming assignments are worth 30 points each and are worth up to 360 points toward your final grade.

## Review Quizzes

## You will take 12 review quizzes in this course. These quizzes are open-book, open-note assignments which are comprised of multiple-choice/true-false/matching/short-answer questions. The purpose of these quizzes is to serve as reviews for topics covered by each module of the course and may be taken multiple times up to the due date, with the highest score being recorded. Review quizzes are 20 points each and are worth up to 240 points toward your final grade.

## Exams

You will take two major exams in this course: a midterm exam and a final exam. These exams are open-book, open-note exams which are typically comprised of 20% multiple-choice/true-false/matching/short-answer questions and 80% essay-type questions (coding). Each exam may only be taken once and unless prior arrangements are made, must be taken at the specified date, time, and location which will be announced by your instructor. Each exam is worth 175 points, respectively.

# Grade Distribution (Course Grade)

Your final letter grade will be determined by totaling the points earned on all graded coursework.

|  |  |  |
| --- | --- | --- |
| Assigned Work | # and Point Value | Total Points |
| Course Orientation Assignment | 1 @ 0 points | 0 |
| Discussion | 1 @ 50 points | 50 |
| Programming Assignments | 12 @ 30 points | 360 |
| Review Quizzes | 12 @ 20 points | 240 |
| Exams (Midterm & Final) | 2 @ 175 points | 350 |
| Total Points Possible |  | 1000 |

|  |  |
| --- | --- |
| Grade | Points |
| A | 900-1000 |
| B | 800-899 |
| C | 700-799 |
| D | 600-699 |
| F | 0-599 |

## FN Grade – Failure for Non-Attendance

A Failure for Non-Attendance (FN) grade indicates that a student has failed a course due to non-attendance. It is calculated as an “F” in the student’s grade point average. **For students receiving financial aid, failure for non-attendance may require the student to refund to the College all or part of the aid received.** The faculty member will assign the FN grade at any time following the final withdrawal date for the course.

For additional information, please review the grading system and policies in the College catalog.

## I Grade - Incomplete

Incomplete (I) grades may be awarded based on the criteria in the College catalog.

Additional Specific Policy Here (Optional)

# Course Guidelines and Policies

## Academic Dishonesty

Academic dishonesty, in any form, has severe consequences. Please review the appendices in the current College catalog entitled Expectations of Student Conduct and Procedures for Handling Alleged Academic Dishonesty.

Additional Specific Policy Here (Optional)

Note: Online tools that scan written assignments for signs of plagiarism may be used to screen your assignment submissions. For plagiarism prevention assistance, refer to the Research Companion Guide on the [College’s Library and Learning Commons](http://guides.fscj.edu/Research/module8) resources site.

## Attendance

Attendance is measured in this course by your weekly access to the online content and timely completion of required course activities. If you fail to sufficiently participate in the online course before the official refund deadline, you can be dropped for non-attendance. If the official withdrawal date has passed and you fail to show sufficient progress in the online course, you can be awarded a Failure for Non-Attendance (FN) grade.

Additional Specific Policy Here (Optional)

## Late/Make-Up Work

Additional Specific Policy Here (Optional)

# Calendar of Activities

The Calendar of Activities is a summary of the lessons and course activities for each module.

|  |  |  |  |
| --- | --- | --- | --- |
| Week(s) | Assigned Work | Points Possible | Due Date |
| Module: Start Here | | | |
| XXX | Course Orientation Assignment | 0 | XXX |
| XXX | Introduction & Greetings Discussion | 50 | XXX |
| Module 1: Overview of Statistical Programming Concepts and the R Programming Language  Assigned Readings Textbook (The Book of R):   * Ch. 1 – Getting Started * Appendix A: Installing R and Contributed Packages * Appendix B: Working with RStudio | | | |
| XXX | Review Quiz 1 | 20 | XXX |
| XXX | Programming Assignment 1 | 30 | XXX |
| Module 2: Data Types  Assigned Readings Textbook (The Book of R):   * Ch. 2 – Numerics, Arithmetic, Assignment, and Vectors * Ch. 3 – Matrices and Arrays | | | |
| XXX | Review Quiz 2 | 20 | XXX |
| XXX | Programming Assignment 2 | 30 | XXX |
| Module 3: Extended Data Types and Data Structures  Assigned Readings  Textbook (The Book of R):   * Ch. 4 – Non-Numeric Values * Ch. 5 – Lists and Data Frames | | | |
| XXX | Review Quiz 3 | 20 | XXX |
| XXX | Programming Assignment 3 | 30 | XXX |
| Module 4: Visualizing Data  Assigned Readings  Textbook (The Book of R):   * Ch. 6 – Special Values, Classes, and Coercion * Ch. 7 – Basic Plotting | | | |
| XXX | Review Quiz 4 | 20 | XXX |
| XXX | Programming Assignment 4 | 30 | XXX |
| Module 5: Input, Output, and Functions  Assigned Readings  Textbook (The Book of R):   * Ch. 8 – Reading and Writing Files * Ch. 9 – Calling Functions | | | |
| XXX | Review Quiz 5 | 20 | XXX |
| XXX | Programming Assignment 5 | 30 | XXX |
| Module 6: Control Structures  Assigned Readings  Textbook (The Book of R):   * Ch. 10 – Conditions and Loops * Ch. 11 – Writing Functions * Ch. 12 – Exceptions, Timings, and Visibility | | | |
| XXX | Review Quiz 6 | 20 | XXX |
| XXX | Programming Assignment 6 | 30 | XXX |
| Module: Midterm Exam | | | |
| XXX | Midterm Exam | 175 | XXX |
| Module 7: Basic Statistics in R  Assigned Readings  Textbook (The Book of R):   * Ch. 13 – Elementary Statistics * Ch. 14 – Basic Data Visualization * Ch. 15 – Probability * Ch. 16 – Common Probability Distributions | | | |
| XXX | Review Quiz 7 | 20 | XXX |
| XXX | Programming Assignment 7 | 30 | XXX |
| Module 8: Advanced Statistics in R: Hypothesis Testing  Assigned Readings  Textbook (The Book of R):   * Ch. 17 – Sampling Distributions and Confidence * Ch. 18 – Hypothesis Testing * Ch. 19 – Analysis of Variance | | | |
| XXX | Review Quiz 8 | 20 | XXX |
| XXX | Programming Assignment 8 | 30 | XXX |
| Module 9: Advanced Statistics in R: Regression  Assigned Readings  Textbook (The Book of R):   * Ch. 20 – Simple Linear Regression | | | |
| XXX | Review Quiz 9 | 20 | XXX |
| XXX | Programming Assignment 9 | 30 | XXX |
| Module 10: Introduction to the tidyverse  Assigned Readings  Textbook (R for Data Science):   * Ch. 1 – Data Visualization with ggplot2 * Ch. 2 – Workflow Basics * Ch. 3 – Data Transformation with dplyr | | | |
| XXX | Review Quiz 10 | 20 | XXX |
| XXX | Programming Assignment 10 | 30 | XXX |
| Module 11: Modeling Data with the tidyverse  Assigned Readings  Textbook (R for Data Science):   * Ch. 18 – Model Basics with modelr | | | |
| XXX | Review Quiz 11 | 20 | XXX |
| XXX | Programming Assignment 11 | 30 | XXX |
| Module 12: Visualizing Data with the tidyverse  Assigned Readings  Textbook (R for Data Science):   * Ch. 5 – Exploratory Data Analysis * Ch. 22 – Graphics for Communication with ggplot2 | | | |
| XXX | Review Quiz 12 | 20 | XXX |
| XXX | Programming Assignment 12 | 30 | XXX |
| Module: Final Exam | | | |
| XXX | Final Exam | 175 | XXX |
| Total Points Possible | | 1000 |  |

**Special Note:** The instructor reserves the right to modify this syllabus. You will be notified of any changes.

# The Next Step

Your next step is to become familiar with the online classroom. Begin with the course announcement(s) and the *Start Here* module.