FLORIDA POLYTECHNIC UNIVERSITY

Course Syllabus

Course Information

- **Course Number and Title**: COP 2073 Foundations of Data Analytics
- **Credit Hours:** **3 credits**
- **Current Academic Term**: **SPRING 2026**
- **Class Meeting**: **BARC 1158 MWF 10am – 10:50am**

Instructor Information

- **Instructor**: **Alexandra Desaulniers**
- **Office**: IST 2074
- **Office Hours**: MWF 11am – 12:30pm (or by appointment)
- **E-mail**: **adesaulniers@floridapoly.edu**

Course Details

- **Delivery Mode:** face-to-face learning experience with class meetings twice a week. Please check the Canvas course website for all information, including announcements, discussions, and any supplementary material for topics covered in this course.

- **Official Catalog Course Description**:
  Students will learn how to work through data science problems within a modern statistical programming language. The course covers the complete analytical process, from gathering the data, to applying appropriate exploratory and statistical analysis, and communicating the results. Important topics in data science projects workflows, version control, and efficient programming are integrated throughout the course. Fundamentals of analytics, data visualization, and management of data are presented.

- **Prerequisites:** None

- **Gordon Rule (6A-10.030):** No.
- **Required Texts**:
  (PSDS) "Programming Skills for Data Science: Start Writing Code to Wrangle, Analyze, and Visualize Data with R". Freeman and Ross
  ISBN-13: 978-0135133101. Pearson. Addison-Wesley Data & Analytics Series (2018)

- **Supplementary Materials:**
  (R4DS) "R for Data Science" 2nd Edition by Hadley Wickham, Mine Cetinkaya-Rundel, and Garrett Grolemund.
  ISBN-13: 978-1492097402. Available online at: https://r4ds.hadley.nz/

- **Equipment and Materials**: R and other specialized analysis toolkits to synthesize concepts from data analytics and visualization as applied to relevant projects.
  This course is an application-driven introduction to data science. We will use the R programming language and RStudio. Both of these are free. The course covers fundamental and popular R packages for data science, introduced as working examples. The format of the course will include lectures by the instructor, class discussions, directed readings, and students' presentations.
  Recommended: a local installation of can be completed by downloading R from the R Project web site. The free and open-source Integrated Development Environment (IDE) for R can be downloaded from the RStudio web site. You are welcome to use a different IDE but using RStudio is highly encouraged.

  Suggested: You can also create an account in https://posit.cloud/ to access a cloud-based version of RStudio to work in your assignments/projects. Notice that there is a limited number of hours you can use this platform every month (do not purchase additional hours), and I recommend you have both: a local installation and an account for the cloud-based service.
  Notice also, that computer labs at the university have an installation of RStudio.

- **Course Objectives**:
  This course is an application-driven introduction to data science. The goal of this course is to teach applied and theoretical aspects of programming for data science. Attention will also be given to mastering concepts and tools necessary for implementing reproducible research. A final project will include a novel data analysis with associated documentation and presentation.

- **Instructional Methods:** Lectures, labs, reference materials discussions, directed readings, students' presentations.

- **Course Learning Outcomes**:

  1. **Use** core programming skills and packages for data science.
  2. **Apply** data analytics best practices.
  3. **Generate** data summaries by importing, reviewing and transforming datasets.
  4. **Create** and edit professional data visualizations.
  5. **Develop** professional skills through project-based learning: clear communication, creative and critical thinking, and effective teamwork.

- **Alignment with Program Outcomes**:

	Course Learning Outcome and Learning Level*				
Data Science Program Learning Outcomes	1	2	3	4	5
(1) An ability to identify, formulate, and solve broadly defined technical or scientific problems by applying knowledge of mathematics and science and/or technical topics to areas relevant to the discipline.		Application	Synthesis		
(2) An ability to formulate or design a system, process, procedure or program to meet desired needs.		Application	Synthesis		
(3) An ability to develop and conduct experiments or test hypotheses, analyze and interpret data and use scientific judgment to draw conclusions.	Application				
(4) An ability to communicate effectively with a range of audiences.					Synthesis
(5) An ability to understand ethical and professional responsibilities and the impact of technical and/or scientific solutions in global, economic, environmental, and societal contexts.		Application	Synthesis		
(6) An ability to function effectively on teams that establish goals, plan tasks, meet deadlines, and analyze risk and uncertainty.					Synthesis

*: learning level as described in Bloom's taxonomy and Anderson and Krathwohl's taxonomy.

	Course Learning Outcome and Learning Level*				
Business Analytics Program Learning Outcomes	1	2	3	4	5
(1) Apply current business analytics concepts, techniques, and practices to solve business problems.		Application	Synthesis		
(2) Analyze a given business problem using appropriate analytics techniques to generate insights and solutions.			Synthesis		
(3) Communicate effectively insights, analysis, conclusions, and solutions to a diverse audience.				Synthesis	Synthesis

*: learning level as described in Bloom's taxonomy and Anderson and Krathwohl's taxonomy.

Technology Requirements

- **You MUST use your Florida Poly email address for all communication in this course.**
  - All students are provided a university email address (access through https://floridapoly.edu)
- You will need to have access to a computer and a reliable internet connection.
- Web browsers should be up to date
- You will participate in the course using our Canvas learning management system (https://floridapolytechnic.instructure.com).
- Microsoft Office Word, Excel, and PowerPoint. These are part of the Office 365 suite available free of charge to students.
- Adobe reader for .pdf files; media player for videos
- For technology issues, contact the University's tech support team: https://floridapoly.edu/technologyservices/help-desk.php

Academic Support Resources

- **Library**: Students can access the Florida Polytechnic University Library through the University website and Canvas, on and off campus. Students may direct questions to library@floridapoly.edu.
- **Tutoring and Learning Center**: The Tutoring and Learning Center (The TLC) provides tutoring to all Florida Poly students who may need additional academic support. The TLC is staffed by students who have excelled in the courses they tutor. They offer support by reviewing concepts and materials from class, clarifying points of confusion and providing assistance with learning strategies. While the focus of TLC is to provide support to students in freshman-level courses, upper-level courses are also tutored at the Center. The TLC is located in the IST Commons (second floor).

- **Knack Tutoring**: Students looking for additional assistance outside of the classroom are advised to consider working with a peer tutor through Knack. Florida Polytechnic University has partnered with Knack to provide students with access to verified peer tutors who have previously aced this course. To view available tutors, visit floridapoly.joinknack.com and sign in with your student account.

- **Writing Center**: Located on the second floor of the IST (2059/2061), the Writing Center helps students to develop their writing and presentation skills. Consultations are available in person and virtually. For more detail, visit floridapoly.edu/writing center.

Course Policies

Attendance (see also University Policy)

Students in face-to-face (this includes labs and C-courses) courses are expected "to attend all of their scheduled University classes and to satisfy all academic objectives as defined by the instructor" (University Policy, FPU-5.0010AP).

If you know that you will miss a class for any reason discuss the situation with your instructor in a timely manner. Exceptions to any attendance requirements may be made on a case-by-case basis.

Late Work/Make-up work

Each student must keep current on assignments. *Late assignments are not graded, unless permission has been obtained from the instructor*. In case of a medical emergency, please notify your instructor as soon as possible who will evaluate any exceptions on a case-by-case basis.

Grading Scale (See also University Grading Policy).

Grades will be determined according to the following scale:

A	93% – 100%	**B**	83% – 85%	**C**	73% – 75%	**D**	63% – 65%
A–	90% – 92%	**B–**	80% – 82%	**C–**	70% – 72%	**D–**	60% – 62%
B+	86% – 89%	**C+**	76% – 79%	**D+**	66% – 69%	**F**	0% – 59%

Assignment/Evaluation Methods

Evaluation Method	***Percentage***
Attendance	5%
Discussion	10%
Assignments	15%
Quizzes	15%
Project	15%
Midterm Exam	20%
Final Exam	20%
Total	**100%**

Participation in all course activities is a very important element of this course and is a basic expectation. Course participation consists of active and respectful involvement in class discussions, presentations, peer feedback, postings, replies, projects, and other interactions.

In the **final project** you will show your knowledge and skills in data analytics, using any combination of the different tools and topics discussed throughout the semester applied to an area/field of your interest.

- *Final Project Report:*
  Your goal is to submit a cohesive project report that conveys that you have mastered the techniques discussed during the semester.
- *Final Project Presentation:*
  An important aspect of doing research is taking time to share your findings with others. We will give everyone 3-5 minutes to share their final project and summarize their findings. *The final project presentation accounts for 15% of your final project grade.*

Your instructor will provide you with specific guidelines for the final project report and final project presentation shortly after the first few weeks of classes (format and length, call for proposals, reference materials, presentation guidelines and logistics, rubric, etc.)

Sample final project topics from previous years include:

- Exploratory data analysis of menu from fast-food chain
- Finding patterns in performance of recent winning sports teams
- Analysis of trends and ratings for TV shows and movies
- Analysis of purchasing patterns for retail customers
- Exploring main characteristics of massive open online courses data
- Summarizing theme parks data and weather patterns
- Exploring and analyzing wine enthusiast reviews

University Policies

Reasonable Accommodations

The University is committed to ensuring equal access to all educational opportunities. The Office of Disability Services (ODS), facilitates reasonable accommodations for students with disabilities and documented eligibility. It is the student's responsibility to self-identify as a student with disabilities and register with ODS to request accommodations. If you have already registered with ODS, please ensure that you have requested an accommodation letter for this course through the ODS student portal, and communicate with your instructor about your approved accommodations as soon as possible. Arrangements for testing accommodations must be made in advance. Accommodations are not retroactive. If you are not registered with ODS but believe you have a temporary health condition or permanent disability requiring an accommodation, please contact ODS as soon as possible: DisabilityServices@floridapoly.edu; (863) 874-8770; www.floridapoly.edy/disability.

Accommodations for Religious Observances, Practices and Beliefs

The University will reasonably accommodate the religious observances, practices, and beliefs of individuals in regard to admissions, class attendance, and the scheduling of examinations and work assignments. (See University Policy.)

Title IX

Florida Polytechnic University is committed to ensuring a safe, productive learning environment on our campus that prohibits sex discrimination and sexual misconduct, including sexual harassment, sexual assault, dating violence, domestic violence and stalking. Resources are available if you or someone you know needs assistance. Any faculty or staff member you speak to is required to report the incident to the Title IX Coordinator. Please know, however, that your information will be kept private to the greatest extent possible. You will not be required to share your experience. If you want to speak to someone who is permitted to keep your disclosure confidential, please seek assistance from the Florida Polytechnic University Ombuds Office, BayCare's Student Assistance Program, 1-800-878-5470 and locally within the community at Peace River Center, 863-413-2707 (24-hour hotline) or 863-413-2708 to schedule an appointment. The Title IX Coordinator is available for any questions to discuss resources and options available.

Academic Integrity

Violations of academic integrity regulation include actions such as cheating, plagiarism, use of unauthorized resources (including but not limited to use of Artificial Intelligence tools), illegal use of intellectual property, and inappropriately aiding other students. Such actions undermine the central mission of the university and negatively impact the value of your Florida Poly degree. Suspected violations will be fully investigated, possibly resulting in sanctions up to and including expulsion from the university.

Recording Lectures

Students may, without prior notice, record video or audio of a class lecture for a class in which the student is enrolled for their own personal educational use. Recordings may not be used as a substitute for class participation or class attendance. Recordings may not be published or shared in any way, either intentionally or accidentally, without the written consent of the faculty member. Failure to adhere to these requirements is a violation of state law (subject to civil penalty) and the student code of conduct (subject to disciplinary action). Recording class activities including, but not limited to, lab sessions, student presentations (whether individually or part of a group), class discussion (except when incidental to and incorporated within a class lecture), and invited guest speakers is prohibited.

Generative AI Policy

Generative AI Permitted Within Guidelines

The best-known example of Generative AI (Artificial Intelligence) is ChatGPT, a chatbot that allows you to type a question as if you were talking to a real person, and it quickly offers a seemingly meaningful, original answer. Tools like this are powerful and can be useful in many contexts, but you must be aware of their limitations, as they can produce inaccurate, fabricated, and even offensive content. In addition, the work produced is not technically your own. In order to avoid violating Florida Polytechnic University academic integrity policy, students must be sure to follow the course's policies regarding the use of artificial intelligence in academic work. The AI policies for this class are outlined below.

You are welcome to use Generative AI (Artificial Intelligence), including ChatGPT and similar AI tools, in your work for this course. However, AI is not a replacement for your own thinking and research. AI-generated text or other content must be clearly marked and cited properly. In addition, you are responsible for confirming the veracity of any information or sources produced by artificial intelligence. If you have any questions about this, please reach out to me.

Additionally, direct copy paste of AI responses will not be tolerated. I require that you submit your own work in your own words/code.

Course Schedule

A **tentative course calendar** is included below.

Week	*Topic*	*Suggested Problems and Readings*
1	Overview of data science Tools setup (RStudio, git, GitHub)	Chapter 1, 2
	Canvas resources Using the command line	
2	Version control introduction Tracking project changes	Chapter 3
	Git/GitHub exercises Using Markdown for Documentation	
3	Writing and rendering Markdown Documenting and sharing code	Chapter 4
	Foundational R Skills Introduction to programming with R	
4	Defining vectors and lists Working with functions	Chapter 5, 6, 7, 8
	Understanding/Interpreting Data Types of data, data generation process	
5	Working with data frames	Chapter 9
	Data Wrangling: core `dplyr` functions.	
6	Analyzing data frames by group, joining dataframes	Chapter 10, 11
	Tidy data principles. Reshaping data with `tidyr`	
7	Summarizing, sorting, subsetting, merging data	Chapter 12
	Introduction to data visualization The grammar of graphics: `ggplot2`	
8	Choosing effective visualizations Exploratory data analysis (EDA) introduction	Chapter 15
	MIDTERM	
9	Exploratory data analysis (EDA) Generating questions about data	Chapter 16
	Measuring variation, exploring covariation. Checking missing values	

Week	*Topic*	*Suggested Problems and Readings*
10	Using data to answer questions Labs	
	Relational Data and Data Import Overview of relational databases.	
11	Working with dates and times Working with factors	Chapter 13, 14, R4DS
	EDA exercise Labs	
12	EDA exercise	Chapter 13, 14, R4DS
	Labs	
13	Web scraping and text data EDA with text data	
	Exploratory data analysis exercise Final Project Work	
14	Ethical responsibilities Other data science tools	
15	Building and Sharing Applications Dynamic reports	Chapter 18, 19, R4DS
	Project Presentations	
16	Project Presentations	
	Reading Day – No classes	

I reserve the right to modify this schedule as required by the progression of the class.

Important Dates: https://floridapoly.edu/academics/academic-calendar/index.php

Important Dates

January 12-16	M-F	Drop/Add Week
January 16	F	Withdrawal Deadline - No Academic or Fee Liability
January 19	M	Martin Luther King Jr. Holiday - No Classes
February 6	F	Withdrawal, All Courses, with 25% Refund (W assigned)
February 10	T	Career Day - No Classes
March 9	M	Mid-term Grades Due
March 16-March 20	M-F	Spring Break - No Classes
April 17	F	Withdrawal Without Academic Penalty Deadline (W assigned)
April 28	T	Last Day of Classes
April 29 - May 1	W-F	Reading Days - No Classes
May 4-8	M-F	Final Exams
May 13	W	Final Grades Available Online

Sample Rubric for Report and Presentations

The final presentations and reports will be evaluated using rubrics similar to the ones included below.

Sample Data Analysis Rubric:

Technical requirements	Possible points	Excellent	Good	Needs work
Code and output is included and properly formatted	10			
No error messages are included (or left unexplained)	4			
Generated data visualizations are appropriate, compelling, and well-formatted	15			
Use of tools covered in class is present (other tools may be explored)	10			
Summary statistics, comparison, or any other type of quantitative analysis is present and supports the analysis	15			
Dataset description is included (or referenced) and comments on the attributes are present	10			
Data analysis is fully reproducible (or special requirements for reproducibility are detailed)	6			
Narrative	**Possible points**	**Excellent**	**Good**	**Needs work**
Discussion on findings is sound	5			
The analysis is carefully thought-out	10			
Possible future work is proposed (and/or commentary of limitations is included)	5			
Results are clear and a convincing argument is present	10			

Sample Report Rubric

Objective	Category	Below Expectations	Weak	Average	Good	Excellent
	Score	1	2	3	4	5
Students can write professional quality documents	Introduction	Opening is off-topic and inappropriate to the purpose, not concise and no clarity	Opening is somewhat related to the topic and appropriate to the purpose but is not concise and clear	Opening is related to the topic and appropriate to the purpose. Somewhat clear and concise	Opening is related to the topic and appropriate to the purpose. Clear and concise	Strong opening that is clear and concise
	Organization	Disorganized; incorrect format; unclear direction	Somewhat organized; incorrect format; unclear direction	Organized; correct format; unclear direction	Organized; correct format; clear direction	Correct formatting, strong clarity and organization in

						the development of main points
	Literature Review	Does not present information from any source	Presents information from irrelevant sources representing limited points of view/approaches	Presents information from relevant sources representing limited points of view/approaches	Presents in-depth information from relevant sources representing limited points of view/approaches	Synthesizes in-depth information from relevant sources representing limited points of view/approaches
	Research Design (weighted twice)	Does not provide information on research design	Inquiry design demonstrates misunderstanding of the methodology or theoretical framework	Critical elements of the methodology or theoretical framework are missing, incorrectly developed or unfocused	Critical elements of the methodology or theoretical framework are appropriately developed however, more subtle elements are ignored or unaccounted for	All elements of the methodology or theoretical framework are skillfully developed and may be synthesized from across disciplines or relevant subdisciplines
	Analysis (weighted twice)	Incorrect, Irrelevant, no supporting evidence	Correct, irrelevant, no supporting evidence	Correct, relevant, no supporting evidence	Relevant and correct with supporting evidence	Relevant, correct, complete, incorporates innovative insights
	Next Steps	Missing or content does not support conclusion	Conclusion irrelevant to the findings	Conclusion somewhat relevant to the findings	Conclusion relevant to the findings	Strong conclusion that is clear, complete and compelling
	Grammar & Spelling	Uses language that often impedes meaning due to errors	Uses language that often sometimes meaning due to errors	Uses language that generally conveys meaning to readers with clarity, although writing includes some errors	Uses straightforward language that conveys meaning to readers. Language has few errors	Uses graceful language that communicates meaning to readers with clarity and fluency and is virtually error free
	Reference Style (APA)	Did not follow APA style	Numerous errors in APA style, did not cite sources correctly, formatting issues	Some errors in APA style, cited correctly but formatting issues persist	Minimum errors in style and formatting but does not detract from readability	No errors in APA style
Total points for Report = 50						

Sample Presentation Rubric

Objective	Category	Below Expectations	Weak	Average	Good	Excellent
	Score	**1**	**2**	**3**	**4**	**5**
Students can demonstrate mastery of communication technology	Use of Media	Lack of media detracts from the presentation objective	Misuse of media that detracts from the presentation objective	Use of media barely supports and contributes to the presentation objective	Use of media supports and contributes to the presentation objective	Use of media supports, clarifies and reinforces the presentation objective
	Quality of Slides	Very poor quality. Not enough or too much colors, fonts and animations that	Poor quality. Not enough or too much colors, fonts and animations that	Fonts, colors and animations barely support the presentation objective	Fonts, colors and animations support the presentation objective	Fonts, colors and animations support, clarify and reinforce the

		detract from project objective	detract from project objective			presentation objective
Students can develop and deliver a compelling oral talk with relevant facts and information	Opening statement	Opening is off-topic and inappropriate to the purpose, not concise and no clarity	Opening is somewhat related to the topic and appropriate to the purpose but is not concise and clear	Opening is related to the topic and appropriate to the purpose. Somewhat clear and concise	Opening is related to the topic and appropriate to the purpose. Clear and concise	Strong opening that is clear and concise
	Organization	Disorganized; incorrect format; unclear direction	Somewhat organized; incorrect format; unclear direction	Organized; correct format; unclear direction	Organized; correct format; clear direction	Correct formatting, strong clarity and organization in the development of main points
	Literature Review	Does not present information from any source	Presents information from irrelevant sources representing limited points of view/approaches	Presents information from relevant sources representing limited points of view/approaches	Presents in-depth information from relevant sources representing limited points of view/approaches	Synthesizes in-depth information from relevant sources representing limited points of view/approaches
	Analysis	Incorrect, Irrelevant, no supporting evidence	Correct, irrelevant, no supporting evidence	Correct, relevant, no supporting evidence	Relevant and correct with supporting evidence	Relevant, correct, complete, incorporates innovative insights
	Next Steps	Missing or content does not support conclusion	Conclusion irrelevant to the findings	Conclusion somewhat relevant to the findings	Conclusion relevant to the findings	Strong conclusion that is clear, complete and compelling
	Timing	Presentation is too short, insufficient coverage of material	Presentation is too long. Unable to cover all the material	Able to cover all the material within five extra minutes	Utilizes allotted time to provide sufficient coverage of material	Well-paced coverage of material within the allotted time
Students can deliver an oral talk with clarity and appropriate poise	Delivery Techniques	Does not participate in the oral presentation	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.
	Peer Evaluation	5 points				
Total Points = 50						