

**RUTGERS UNIVERSITY  
SCHOOL OF BUSINESS - CAMDEN**

**FALL 2022: MACHINE LEARNING APPLICATIONS FOR BUSINESS**

**Instructor:** Ram Gopalan

**E-mail:** ram.gopalan@rutgers.edu

**Course materials:** Please access the **CANVAS course site** for power point materials and lecture videos.

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**LEARNING GOALS:**

The focus of the course will be to introduce basic concepts in machine learning and *data-analytic thinking* to students, with an *applied* business orientation. Students will understand how to use data to competitive advantage and to build and evaluate *models* for decision-making. Companies today have access to vast amounts of data from their business operations. *Data Science* is the craft of extracting patterns from this data and using available information for competitive advantage. This course represents an introduction to data science and data analytic thinking. Students will learn to leverage data to answer business questions relating to classification tasks (e.g., will this credit card prospect default or not?), prediction (e.g., how much will this customer spend/year?) and similarity profiling (what do my most profitable customers look like?).

**TEXTBOOKS/COURSE PACK (HBS):**

1. **Data Science for Business**, by Foster Provost and Tom Fawcett, O'Reilly publishing, ISBN: 978-1-449-36132-7.
2. **Introduction to Machine Learning with Python, A Guide for Data Scientists**, by Andreas. C. Muller and Sarah Guido, also O'Reilly publishing, ISBN: 978-1-449-36941-5.
3. **Course pack to be obtained from this:** <https://hbsp.harvard.edu/import/961465>

**COMPUTER SOFTWARE:**

The course is very hands-on. Students will be expected to download and use **free, open-source packages** for machine learning and to use them for model-building. (e.g., the **Anaconda** package).

**Office hours:** Wednesdays 4 – 5 p.m., or by appointment.

**COURSE PREREQUISITES:** Students must be comfortable installing packages independently and navigating in a computing environment. Specifically, you must be able to complete installation of the Anaconda package on your own as demonstrated in the PREREQUISITES Module. Important: The course assumes the student already has some basic familiarity with the Python programming language as well as a working knowledge of Jupyter notebooks. See the PREREQS module for greater detail.

**COURSE REQUIREMENT AND GRADES:**

Student grades will be based upon the following items:

- (1) Exam I (15%)
- (2) Exam II (20%)
- (3) FINAL EXAM (25%)
- (4) Team case analyses (10% = 2\*5%)
- (5) Team programming assignment (15%).

- (6) **Team data science project proposal (10%)**
- (7) **Individual class participation and team work (5%).**

More detail on the deliverables will be provided during the semester. **Teams for these projects will be assigned. Moreover, the team assignments must be uploaded on CANVAS by the deadline stipulated, so that the system can verify that you submitted the assignment prior to the deadline.**

**Note: Class participation and team effort (5 %):**

Class participation grades will be assigned upon the following criteria: a) displaying a positive attitude and demonstrating a “solutions-focus” for any problems encountered during the course of the semester; b) helping fellow students succeed; and c) displaying a strong commitment to your team’s success and discipline in terms of showing up for team meetings. **You will have an opportunity to submit peer evaluations for all your team mates at the end of the semester!**

**Academic Integrity:**

“Academic integrity requires that all academic work be wholly the product of an identified individual or individuals. Joint efforts are only legitimate when the assistance of others is explicitly acknowledged... The principles of academic integrity entail simple standards of honesty and truth. Each member of the university has a responsibility to uphold the standards of the community and to take action when others violate them...Students are responsible for knowing what the standards are and for adhering to them. Students should also bring any violations of which they are aware to the attention of their instructors.”<sup>1</sup> Students are expected to know, understand and adhere to the policies on academic integrity outlined above. Procedures for violation of these policies outlined in the University Code of Academic Conduct will be followed. **IN THIS CLASS ALL EXAMS ARE INDIVIDUAL – YOU CANNOT COLLABORATE ON ANY ONLINE TEST.**

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<sup>1</sup> Rutgers University Code of Academic Conduct, taken from the Student Advising Handbook - <http://camden-sbc.rutgers.edu/CurrentStudents/students/advising.pdf>.

**TENTATIVE COURSE OUTLINE (NOTE: Instructor may make modifications to this schedule as necessary!):**

Module	Topic(s) for Module	Assigned Reading
Module 1	Data analytic thinking and data science solutions for business	Provost-Fawcett (PF): Chapters 1,2
Module 2	Supervised learning and classification via Decision Trees and the Nearest Neighbors algorithm	Ch3: PF Ch1: Muller-Guido (MG) <b>Case: Stitch Fix (5%)</b>
Module 3	Decision Trees (continued)	Ch3: PF, Ch2: MG
Module 4	Regression/Logistic Regression	Ch4: PF, Ch2: MG
Module 5	Regression/Logistic Regression	Ch4: PF, Ch2: MG <b>TEST 1: 15%</b>
Module 6	Understanding overfitting and cross-validation for models	Ch5: PF, Ch5: MG, <b>Case: Byte-Dance (5%)</b>
Module 7	Unsupervised learning, similarity and clustering	Ch6: PF, Ch3: MG
Module 8	Unsupervised learning, similarity and clustering	Ch6: PF, Ch3: MG
Module 9	Decision analytic thinking: what is a good model?	Ch7: PF, Ch5: MG
Module 10	Visualizing model performance: ROC curves	Ch8:PF, Ch5: MG <b>Programming Assignment due. (15%)</b>
Module 11	Evidence and probabilities, Naive Bayes	Ch9: PF <b>TEST 2: 20%</b>
Module 12	Representing and mining text	Ch10: PF, Ch7: MG
Module 13	Representing and mining text	Ch10: PF, Ch7: MG <b>Data science project proposal PPT due(10%).</b>
Module 14, <b>Final Exam TBD (25%)</b>	NOTE: <b>Final exam (25%)</b>	Ch 13,14: PF

## **Rutgers email - ALWAYS USE YOUR RUTGERS EMAIL ADDRESS:**

All communications to students will be done using the Rutgers email address provided to you. Please forward your Rutgers email to your personal email if necessary. **Not checking your Rutgers email is not an excuse for missing any communications.**

## **Disability Services/Accommodations**

Rutgers University welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation: <https://ods.rutgers.edu/students/documentation-guidelines>.

If the documentation supports your request for reasonable accommodations, your campus's disability services office will provide you with a Letter of Accommodations. Please share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. To begin this process, please complete the [Registration form](https://webapps.rutgers.edu/student-ods/forms/registration) (<https://webapps.rutgers.edu/student-ods/forms/registration>).

Erin G. Leuthold, MS Ed

(856) 225-2717

Rutgers-Camden Disability Services:

311 North Fifth Street, Camden, NJ 08102-1405

Web page: <https://ods.rutgers.edu/contact-ods/rutgers-university-camden>

E-mail: [disability-services@camden.rutgers.edu](mailto:disability-services@camden.rutgers.edu)

## **Exam Make-up Policy/Late Policy**

If, for a university approved reason, you cannot take an exam at the scheduled time you must give the professor written notice at least one week in advance so that other arrangements can be made. If the situation does not allow for advance notification (for example, emergency hospitalization), contact the professor as soon as possible after a missed exam. Make-up exams for non-university approved reasons are not guaranteed. The professor reserves the right to request written documentation to support your absence (such as a doctor's note, an obituary, or military orders).

## **Student Code of Conduct** <http://studentconduct.rutgers.edu/university-code-of-student-conduct>

Violations of the Student Code of Conduct are considered serious infractions of student behavior and students who violate the code are subject to penalties relative to the level of the matter. In general, students may not disturb normal classroom procedures by distracting or disruptive behavior. Examples of disruptive behavior include, but are not limited to, the following (**please adapt for online environments**):

- Repeatedly leaving and entering the classroom without authorization
- Answering cellular phone or allowing pager to beep
- Making loud or distracting noises
- Repeatedly speaking without being recognized, interrupting the instructor or other students, or otherwise acting in disregard of the instructor's requests
- Threats or violence

Violations of the code should be reported to the Dean of Students office [deanofstudents@camden.rutgers.edu](mailto:deanofstudents@camden.rutgers.edu) or 856-225-6050. If the violation is immediate and a potential threat is a concern, call the Rutgers-Camden police at 856-225-6111.