RUTGERS
Rutgers Business School
Newark and New Brunswick

Supply Chain Management
Course Number: 22:799:641
Course Title: Supply Chain Artificial Intelligence

COURSE DESCRIPTION

Supply chain management has become increasingly data-driven in the last several decades and traditional statistical techniques (e.g., forecasting) have been widely applied in supply chain planning. Well into the e-commerce age, there is great need for supply chain managers to understand artificial intelligence (AI) and machine learning (ML) methods, to organize/analyze "big" data and to integrate/automate data analysis into operations processes on newly emerging IT platforms (e.g., cloud computing). The main purpose of this course is to provide the most fundamental knowledge and programming skill sets to students so that they can understand the modern progress of AI/ML and how to apply AI/ML to supply chain management, glean data-oriented insights and develop actionable supply chain strategies.

The course is structured as a combination of lectures, in-class case studies, and group projects. Students will understand the philosophy and history of AI and related information technology, develop data analysis and data visualization skills, and also get a practical introduction in machine learning (e.g., via the Python *scikit-learn* library) through supply chain-related case studies. Students are then expected to apply and demonstrate knowledge of machine learning and data science with a group project involving a real-life supply chain problem. Python (https://www.python.org/) will be introduced and used as the main platform and extant Python packages will be employed as tools in these case-studies and group projects. The major learning approach of this course is through case-studies (in-class) and group projects (after-class). Case/project topics are drawn from various supply chain instances and a sample of these topics include:

I. Product recommendation using sports goods store chain data – machine learning algorithms (data source: IBM)
II. Predictive maintenance using hydraulic system senor data – time series/ machine learning algorithms (data source: UCI data repository)
III. JD ecommerce sales and order fulfillment data if time allows (data source: JD)

COURSE MATERIALS

1. Since students will be asked to use Python to analyze various supply chain problems, we recommend a Python programming book as a reference: *Python Data Science Handbook*, Jake VanderPlas, O'Reilly.
2. Miscellaneous online articles and business cases/reports.
3. Lecture slides, data and Python Jupyter notebooks are available on canvas before each class. Please check this site (http://canvas.rutgers.edu) every week.

PREREQUISITES

ACADEMIC INTEGRITY

I do NOT *tolerate cheating*. Students are responsible for understanding the RU Academic Integrity Policy http://academicintegrity.rutgers.edu/

I will strongly enforce this Policy and pursue *all* violations. On all examinations and assignments, students must sign the RU Honor Pledge, which states, "On my honor, I have neither received nor given any unauthorized assistance on this examination or assignment." I will screen all written assignments through *SafeAssign* or *Turnitin*, plagiarism detection services that compare the work against a large database of past work. Don't let cheating destroy your hard-earned opportunity to learn. See business.rutgers.edu/ai for more details.

ATTENDANCE AND PREPARATION POLICY

Attendance will be monitored selectively. Every student is expected to contribute to class discussions. Continuing, thoughtful and thorough participation in all aspects of the class will enable students to maximize their benefit from this course. Some ground rules include:

- This class requires that you bring a laptop (with Anaconda) in most sessions.
- Attend with open mind, and strong desire to learn.
- Engage in class discussions – focus on substance/quality.
- Keep your cell phone silent.
- Should you be late or have to leave early, please notify the instructor in advance.

Should you repeatedly miss class and/or be unprepared for discussions, points will be deducted from your class participation grade.

Since the instructor plans to attend all class sessions, the same is expected of all the registered students. If due to an emergency situation, the instructor would be unable to attend, a notice via email and Canvas will be sent as far in advance as possible. If you are to be absent, please report your absence in advance by sending an email to the instructor with details and supporting documentation and, additionally, also report the same at: https://sims.rutgers.edu/ssra/

For weather emergencies, consult the campus home page. If the campus is open, class will be held.

HOMEWORK SETS

After-class exercises will occasionally be assigned based on extensions of in-class case studies and course materials. Homework will be graded by effort.

TEAM PROJECT

Students are required to form a team (of three members). Each team will pick a data set (we will provide a data set list), propose several meaningful managerial questions to be answered by the data set, use Python to analyze the data set and draw managerial insights.

Each team needs to make a project proposal presentation on **()** (20 minutes). The ppt proposal should cover research questions and preliminary description/visualization of the data set.

Each team needs to present its final results on **()** (40 minutes). The final report (30-40 pages) is due on **()**.

Grade criteria – find a rich data set, propose/answer interesting managerial questions, build appropriate decision models, conduct clean data analysis via Python, and write an informative report!

In the project report, each team needs to report the effort contribution of its team members (e.g., 30%, 30% and 40%). **A student who makes less than 20% contribution will have points deducted from his/her score.**

EXAM DATES AND POLICIES

Exam One:

The in-class exam will be held on **()**. Exam questions are based on extensions of in-class case studies and course materials covered before spring break. Students are required to use Python to analyze data and draw correct managerial insights from data outputs. There will be no conceptual questions in the exam.

Exam Two:

The in-class exam will be held on **()**. Exam questions are based on extensions of in-class case studies and course materials covered after spring break. Students are required to use Python to analyze data and draw correct managerial insights from data outputs. There will be no conceptual questions in the exam.

Exams are open-book and open-notes. **NO MAKE-UP EXAMS WILL BE GIVEN EXCEPT FOR SCHOOL ALLOWED REASONS.** A brief review of the material to be covered in the exam will be part of the lecture before each exam.

If you have a disability that influences testing procedures, please provide me with an official letter from the Office of Disability Services at the start of the semester.

GRADING POLICY

Each component will account for a percentage weight in your numerical course grade (max 100 pts) as follows:

Attendance	5%
Homework	5%
Team Project	30%
Exam 1	30%
Exam 2	30%

Your course numerical grade will be translated into your course letter grade as follows:

Final Letter Grades: Letter grades will be curved! The average class GPA is targeted to be in the range 3.4-3.6

~40% of A/A-; ~60% of B+/B/B-; ~10% C+/C/C-; optional F.

No extra credits! If you want to achieve a satisfactory grade, work **hard** on the team project and two exams.

No excuses will be accepted after the final letter grades have been assigned.

COURSE SCHEDULE

AI Course Weekly Schedule
(This is a tentative schedule and is subject to change)

week	Topics
1	Course overview; AI concepts
2	Python Basic: numpy
3	Python Data Manipulation: pandas
4	Python Data Visualization: matplotlib and seaborn
5	Python Data Visualization: matplotlib and seaborn
6	Case 1: Sales Data - Regression and Statistics Concepts
7	Case 1: Sales Data - Machine Learning Techniques
8	*no classes*
9	**Exam 1**
10	Project Proposal / Guest Speaker
11	Case II: Preventive maintenance
12	Case II: Preventive maintenance

13	**Exam 2**
14	Project presentation
15	Project presentation, course wrap-up **(project report due)**

SUPPORT SERVICES

If you need accommodation for a ***disability***, obtain a Letter of Accommodation from the Office of Disability Services. The Office of Disability Services at Rutgers, The State University of New Jersey, provides student-centered and student-inclusive programming in compliance with the Americans with Disabilities Act of 1990, the Americans with Disabilities Act Amendments of 2008, Section 504 of the Rehabilitation Act of 1973, Section 508 of the Rehabilitation Act of 1998, and the New Jersey Law Against Discrimination. More information can be found at ods.rutgers.edu.

[Rutgers University-New Brunswick ODS phone (848)445-6800 or email dsoffice@echo.rutgers.edu]

[Rutgers University-Newark ODS phone (973)353-5375 or email ods@newark.rutgers.edu]

If you are ***pregnant***, the Office of Title IX and ADA Compliance is available to assist with any concerns or potential accommodations related to pregnancy.

[Rutgers University-New Brunswick Title IX Coordinator phone (848)932-8200 or email jackie.moran@rutgers.edu]

[Rutgers University-Newark Office of Title IX and ADA Compliance phone (973)353-1906 or email TitleIX@newark.rutgers.edu]

If you seek ***religious accommodations***, the Office of the Dean of Students is available to verify absences for religious observance, as needed.

[Rutgers University-New Brunswick Dean of Students phone (848)932-2300 or email deanofstudents@echo.rutgers.edu]

[Rutgers University-Newark Dean of Students phone (973)353-5063 or email DeanofStudents@newark.rutgers.edu]

If you have experienced any form of ***gender or sex-based discrimination or harassment***, including sexual assault, sexual harassment, relationship violence, or stalking, the Office for Violence Prevention and Victim Assistance provides help and support. More information can be found at http://vpva.rutgers.edu/.

[Rutgers University-New Brunswick incident report link: http://studentconduct.rutgers.edu/concern/. You may contact the Office for Violence Prevention and Victim Assistance at (848)932-1181]

[Rutgers University-Newark incident report link: https://cm.maxient.com/reportingform.php?RutgersUniv&layout_id=7 . You may also contact the Office of Title IX and ADA Compliance at (973)353-1906 or email at TitleIX@newark.rutgers.edu. If you wish to speak with a staff member who is confidential and does **not** have a reporting responsibility, you may contact the Office for Violence Prevention and Victim Assistance at (973)353-1918 or email run.vpva@rutgers.edu]

If students who have experienced a temporary condition or injury that is adversely affecting their ability to fully participate, you should submit a request via https://temporaryconditions.rutgers.edu .

If you are a military ***veteran*** or are on active military duty, you can obtain support through the Office of Veteran and Military Programs and Services. http://veterans.rutgers.edu/

If you are in need of ***mental health*** services, please use our readily available services.

[Rutgers University-Newark Counseling Center: http://counseling.newark.rutgers.edu/]

[Rutgers Counseling and Psychological Services–New Brunswick: http://rhscaps.rutgers.edu/]

If you are in need of ***physical health*** services, please use our readily available services.

[Rutgers Health Services – Newark: http://health.newark.rutgers.edu/]

[Rutgers Health Services – New Brunswick: http://health.rutgers.edu/]

If you are in need of ***legal*** services, please use our readily available services: http://rusls.rutgers.edu/

Students experiencing difficulty in courses due to ***English as a second language (ESL)*** should contact the Program in American Language Studies for supports.

[Rutgers–Newark: PALS@newark.rutgers.edu]

[Rutgers–New Brunswick: eslpals@english.rutgers.edu]

If you are in need of additional ***academic assistance***, please use our readily available services.

[Rutgers University-Newark Learning Center: http://www.ncas.rutgers.edu/rlc

[Rutgers University-Newark Writing Center: http://www.ncas.rutgers.edu/writingcenter]

[Rutgers University-New Brunswick Learning Center: https://rlc.rutgers.edu/]

[Optional items that many faculty include:

- Students must sign, date, and return a statement declaring that they understand the RU Academic Integrity Policy.

- Students must sign, date, and return a statement declaring that they understand this syllabus.]

COMMUNICATION WITH YOUR INSTRUCTOR

Email is the best way to communicate with your instructor. When sending email to your instructor, please sign your message with your first and last name.

Please use your rutgers.edu email whenever possible and put () plus the section number in the subject line. Emails with no subject line or an unidentifiable name may be deleted as a protection against computer viruses.