Business Analytics and Information Technology
Course Number: 33:136:494
Course Title: Data Mining for Business Intelligence

COURSE DESCRIPTION

The overall objective of this course is to introduce students to both technical and managerial issues and implications for business decisions of knowledge management and data analytics. Lectures will be complimented by laboratory exercises to expose students to practical applications of these concepts and technologies.

The key objectives of this course are two-fold: (1) to teach the fundamental concepts of Data Mining, (2) to provide extensive hands-on experience in applying the concepts to real-world business applications by using the R and programming.

The course also covers Linear, Multiple Regression. Classification methods, Logistic Regression, Linear and Quadratic Discriminant Analysis, Nearest Neighbor Classifiers and Support Vector Machines, are introduced. Clustering methods are also introduced. Clustering methods include K-Means Clustering, K-Medoids and Hierarchical Clustering. Cross-validation and the Bootstrap, Model Selection and Regularization procedures are introduced. Lastly Anomaly Detection procedures are introduced.

COURSE MATERIALS

1.   *An Introduction to Statistical Learning with Applications in R* by Gareth James, Daniell Witten, Trevor Hastie, Robert Tibshirani: Springer This book is downloadable free from: http://www-bcf.usc.edu/~gareth/ISL/

2.   *The Elements of Statistical Learning*: Data Mining, Inference, and Prediction by Trevor Hastie, Robert Tibshirani and Jerome Friedman: Springer This book is downloadable from:
https://web.stanford.edu/~hastie/ElemStatLearn/
3.   *Introduction to Data Mining (IDM),* by Tan, Steinbach and Kumar This book's website is:
https://www-users.cs.umn.edu/~kumar001/dmbook/index.php

-Course items in Canvas

LEARNING GOALS AND OBJECTIVES

LGO1. Students will apply key quantitative techniques essential for analyzing and improving business operations. Students will be able to apply important quantitative methods developed in the fields of statistics, data mining and business intelligence that are commonly used to solve business related problems.

LGO2. Students will be able to perform skilled statistical data analysis, summarization and interpretation of datasets by use of analytical software and programming

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PREREQUISITES

No previous knowledge of programming languages is required. However, those of you that are familiar with some other language will have an easier ride in the first few weeks. You need to have access to a personal computer (Windows, Mac or Unix will all work.) You need to be able to download and install software on this machine. You also need to have access to the internet.

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

- **I plan to pass around and attendance sheet during most classes and record the results in my private grading spreadsheet.**

- **After missing classes 4 times, you will start to lose 2 points from your cumulative score for each missing class. For example, if you miss 4 classes, there will be no deduction. However, if you miss 5 classes 2 points will be deducted from your cumulative score. If you miss 6 classes, 4 points will be deducted from your cumulative score and so on.**

- Expect me to attend all in-class sessions. I expect the same of you. If I am to be absent, my department chair or I will send you notice via email and Canvas as far in advance as possible.

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

- Expect me to arrive on time for each class session. I expect the same of you.

- Expect me to prepare properly for each class session. I expect the same of you. Complete all background reading and assignments. You cannot learn if you are not prepared. The minimum expectation is that for each class session, you have prepared by studying for at least twice as many hours as the class hours.

- Expect me to participate fully in each class session. I expect the same of you. Stay focused and involved. You cannot learn if you are not paying attention.

ASSIGNMENTS, EXAMS

All polices are subject to change at the instructor's discretion:

Assignments:

- I am planning give 2 to 4 homework assignments (number of assignments may change during the semester). Assignments are planned to be due one week after distribution.
- Due to the difficult logistics of tracking large numbers of students, **there is no credit for late assignments. You will receive a zero score for any late assignments.**
- It is key that the homework is well presented, readable, and easy to follow. This will be considered when grading and the extent to which it impacts your grade will be determined at the instructor's discretion.
- **Pictures (Jpeg files etc.) will not be accepted,** but only R files, Word, PDF, Excel or Access files, depending on the nature of the assignment.

Exams:

- There will be 3 exams**. midterm exams (Midterm1 is on (), Midterm2 is on ()) and   Final exam** ().
- Plan to bring a calculator to every exam**. All exams are planned to be closed book and closed notes.   No computers, tablets, or phones of any kind are permitted in exams.**
- **No Makeup Exams**
- A make-up test is only scheduled due to illness – **a doctor's statement is required**. **It is your responsibility to be aware of the correct dates and times of the tests.**

In addition, during in-class exams, the following rules apply:

- If you have a disability that influences testing procedures, provide me an official letter from the Office of Disability Services at the start of the semester.
- You must show a valid Rutgers photo ID to enter the room and to turn in the exam. -   Alternate seating; do not sit next to another student or in your usual seat.

Term Project:

- A team term project is part of the requirements for the Data Mining for Business Intelligence.
- Each team member is expected to contribute to the team effort during the term.
- The Term projects will be graded based on the timeliness and quality of the Team's assignments and the product, as assessed by me.
- At the end of the semester, each group must present their projects.
- Number of groups and members will be determined during the semester.

- Individual grades for the project, however, will also take into account your assessment of the effectiveness of the individual student's participation in team's activities, informed by evaluations completed by all team members at the end of the semester.

CLASSROOM CONDUCT

- All cell phones should be turned off
- Please raise your hand before asking questions
- Refrain from side conversations, sleeping, and other disruptive behaviors.

EXAM DATES AND POLICIES

There are 3 exams (Midterm1, Midterm 2 and Final) in this course:

Midterm 1: (), in-class, paper based, **closed book/notes,** calculator allowed, no laptops or PDAs, all cell phones turned off.

Midterm 2: (), in-class, paper based, **closed book/notes,** calculator allowed, no laptops or PDAs, all cell phones turned off.

Final Exam: (), comprehensive (entire class), in-class, paper based, **closed book/notes**, calculator allowed, no laptops or PDAs, all cell phones turned off.

GRADING POLICY
Course grades are determined as follows:

Homework	10%
Midterm 1	20 %
Midterm2	20 %
Project	15%
Final Exam	35 %
Total	100%

- **Extra credit: None**

- **After missing classes 4 times, you will start to lose 2 points from your cumulative score for each   missing class. For example, if you miss 4 classes, there will be no deduction. However, if you miss   5 classes 2 points will be deducted from your cumulative score. If you miss 6 classes, 4 points will   be deducted from your cumulative score and so on.**

Grade distribution is as follows:

Letter	Range
A	90-100
B+	85 – 89.99
B	80 – 84.99
C+	75 – 79.99
C	70 – 74.99
D	60 – 69.99
F	< 60

1. Grades will not be rounded up or down – they are calculated and recorded to the one hundredth place automatically and are used in that form to assign midterm and final grades. There will be no "curve".

2. Course grade will be issued when all course requirements are met.

-**Grade posting:** Grades will be provided within two weeks of an exam, assignment/paper submission, or quiz. Grades on hardcopy items will be provided in person in the class when the specific items are returned. For online/Canvas items, grades will be posted in the Canvas.

-**Return of graded items: Midterms and Final exam will not be returned.** Canvas for this course will be turned off and archived at the end of the final exam.

-**Grade related information:** No grade related information will be provided through email. All grade related information will be provided in-person via appointments. It is expected that you are respectful when you review your grade with me and accept the grade you have earned. Please do not use abusive language in email or in person. Any instances of that will be reported according to university guidelines.

-**Regrading:** Requests to regrade assignments & exams must be done in writing to the instructor within one week of the specific items being returned. Regraded items will be delivered back to students in person during after class hours.

-**Grade grubbing:** Your final grade is not subject to negotiation. If you feel I have made an error, submit your written argument to me within one week of receiving your grade of the specific item. If you want me to review the final grade, submit your written argument to me within one week of receiving your final grade. Clarify the precise error I made and provide all due supporting documentation. If I have made an error, I will gladly correct it. But I will adjust grades only if I have made an error. I cannot and will not adjust grades based on consequences, such as hurt pride, lost scholarships, lost tuition reimbursement, lost

job opportunities, or dismissals. Do not ask me to do so. It is dishonest to attempt to influence faculty in an effort to obtain a grade that you did not earn, and it will not work.

-It is key that the homework is well presented, readable, and easy to follow. This will be considered when grading and the extent to which it impacts your grade will be determined at the instructor's discretion.

-Pictures or scanned images will not be accepted, but only Word, PDF, Excel or Access files, depending on the nature of the assignment.

COURSE SCHEDULE

The following schedule is subject to change at instructor's discretion.

Amended Lecture and Assignment Schedule			
Class #	Topic	Homework Distributed	Homework Due
1	Introduction and Course Policies / Review of Statistics		
2	Review of R		
3	Review of R		
4	Introduction to Linear Algebra		
5	Introduction to Linear Algebra		
6	Simple Linear Regression / Multiple Linear Regression		
7	Simple Linear Regression / Multiple Linear Regression		
8	Classification / Logistic Regression		
9	Classification / Linear and Quadratic Discriminant Analysis		
10	Classification / Nearest Neighbor Classifier		
11	Classification / Support Vector Machines		
12	Classification / Support Vector Machines		
13	Tree Based Methods		
14	Tree Based Methods / **Midterm 1 Review**		
15	**Midterm1**		

		NO CLASS		
16	Tree Based Methods			
17	Clustering / K-Means Clustering			
18	Clustering / K-Medoids Clustering			
19	Clustering / Hierarchical Clustering			
20	Resampling Methods			
21	Resampling Methods / **Midterm 2 Review**			
22	**Midterm2**			
23	Resampling Methods			
24	Anomaly Detection			
25	Anomaly Detection			
26	Project Presentation			
27	Project Presentation			
28	Review for final exam			
FINAL EXAM				

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.]