Syllabus – Spring 2024

POMS.6120.082/AB2 Statistics for Predictive Analytics

8-Week Online Session II (3 credit hours)

General Course Information

Instructor:	Nichalin Summerfield, Ph.D.	
Course Chat schedule:	Wednesday 6:30-7:30pm Eastern Time	
Blackboard URL:	https://uml.umassonline.net	
Contact:	Email:	Nichalin_Summerfield@uml.edu
	Phone:	978-934-5525

Note: Throughout this course, all times are Eastern Time.

Course Description

This course introduces statistical methods and techniques for predictive analytics. This is part of the business-analytics umbrella of courses. The main focus of this course is on regression, a powerful and widely used predictive method. Topics covered include simple linear regression, multiple regression, variable selection, model diagnostics, and systems of regression equations. The course also covers classification techniques using statistical methods such as linear discriminant function and logistic regression. Spreadsheet software, such as MS Excel, and statistical software, such as SAS and R, will be heavily utilized.

Course Objectives

1. To develop the ability to apply predictive analytics to business problems and be able to identify when the concomitant tools are appropriate.
2. To develop the capability to diagnose effectively and solve appropriate problems using spreadsheet models and statistical software packages.
3. To develop the ability to apply valid data and logical analysis to business decisions that may not have only quantitative solutions.
4. To enhance oral and written communication skills in both interpersonal and group contexts.

Prerequisites for the Course

ECON.2110 Statistics for Business and Economics I.

Course Materials:

Required Book:
James, Witten, Hastie, and Tibshirani. *An Introduction to Statistical Learning: With Applications in R*. Springer (2nd edition is preferred)
eBook PDF is available for free at www.StatLearning.com

Optional Book for Reviewing Statistics:
Anderson, Sweeney, Williams, Camm, Cochran. *Essentials of Statistics for Business and Economics.* Cengage Learning.

Hardware
Please follow the UML's recommendations
https://www.uml.edu/it/services/hardware/student-hardware-recommendations-software-licenses.aspx

Required Software:
- R http://www.r-project.org/
- RStudio http://www.rstudio.org
- MS Excel or any spreadsheet software
- MS Word or any word processing software
- MS PowerPoint or any presentation software

Note that Microsoft Office 365 is available to UML students. You can follow the instructions here:
https://www.uml.edu/IT/Services/Software/myoffice-for-students.aspx

Supplemental Materials:
All other supplemental materials will be distributed on Blackboard.

Course Materials "Release" Day

Each "week" of this course begins on a Monday (12:00 AM ET) and ends on a Sunday (11:59 PM ET) with the exception for Week 8. Week 8 runs from Monday 4/29/2024, 12:00 AM ET through Saturday 5/4/2024, 11:59 PM ET. Weeks 1 – 7 will run for 7 days each, from Monday through Sunday.

You should be prepared to spend 7-8 hours a week on reading and various assignments. While you may feel that I am displaying a lot of information to you, remember that in a traditional "live" course you would be coming to a three-hour class and then spending approximately three more hours outside of class on assignments and reading. Please be sure to budget your time accordingly.

The course calendar at the end of this syllabus provides additional details with regards to the course schedule. Your midterm exam will be assigned during week 5. Your final exam will be assigned during week 8. You can take the exams at any point during their week. More details to follow.

Interaction Guidelines – Communication and Participation
In our online course, we will be using *Discussion Board*, *Email*, and *Chat*.

Discussion Board:
You can access the Discussion Board on the Course Menu. Each week will have its own "Questions/Comments" Discussion Board. This is the place to ask any software or assignment related questions that may arise. Anyone can ask questions and respond to existing questions. Instructor responses can be expected within two

business days. Please remember that I am not a Mac user, therefore, I expect Mac users to use Discussion Board to share any tips and tricks for R and RStudio for Mac.

Email:
Email will be used for all personal communication that you do not want to share with your classmates, such as questions about your grade or personal schedule. I will check and respond to emails from this class in the afternoon. If the opportunity arises, however, I may check my email at various other times throughout the day. You can expect to receive a response within 24 hours. If I am unable to respond within 24 hours, I will let you know beforehand. Please check your mail daily so you do not miss any important message from me.

Chat:
Chat is optional, but strongly encouraged. During a weekly 1-hour chat session, we will have a conversation about the course contents, assignments, and projects. This is where you can ask questions and share your opinions. You can also chat with your classmates, however, please keep subject matter related to course material. To chat with a classmate, please begin your statement with that person's name, e.g., *"John: What do you think about..."*

To access Chat, click the **Chat** link in your course menu on Blackboard, then click the "*Course Room*" (Please do not click Create Session). Once you click Course Room, click the "*Join Course Room*" on the right side of screen.

Our weekly chats will be held on **Wednesday 6:30pm-7:30pm** Eastern Time.

Netiquette
Netiquette stands for Network Etiquette. It refers to proper behavior while interacting online. The golden rule of netiquette is to treat people as you would want to be treated. Please be polite and considerate. Think about whether your comment could cause hurt feelings. Be careful about how your words can come across because misunderstandings can be common online. Feel free to use emojis to show your tone.

Assignment Guidelines

How You Will Be Graded
Your final course grade will be based on the following:

Requirement	**% Total Grade**
5 x Discussion Participation (1% ea.)	5%
5 x R Lab (3% ea.)	15%
5 x Assignments (4% ea.)	20%
1 x Group Assignment	20%
Midterm Exam	20%
Final Exam	20%
Total:	**100%**

Your final course letter grade will be determined as follows:

Numeric Grade:	Letter Grade:
97 - 100	A+
93 - below 97	A
90 - below 93	A-
87 - below 90	B+
83 - below 87	B
80 - below 83	B-
77 - below 80	C+
70 - below 77	C
0 - below 70	F

Discussion Participation
The "Forum of the Week" is a required element of the course. There are 8 forums (1 each week). Only 5 forums will be graded. Posting to each of the weekly forums is worth 1% towards your final course grade, for a total of 5% towards your final course grade. You will earn the full 1% credit for each forum by posting at least 3 grammatically correct, complete, thoughtful sentences to the initial forum questions (posted by me). You can either comment on the initial questions, or you can reply to a fellow classmate's post. Your post will be graded within 7 days after the due date.

R Lab
The purpose of R Labs is for you to learn R. You will be reading the step-by-step instructions from the textbook and running the R code along with it. Then you will copy and paste the R result into MSWord (or any other word processing software) and upload it into the corresponding R lab drop box on Blackboard. Your R Lab submission will be graded based on completeness.

Assignments
Assignments will be on Blackboard. You will access the link to the assignments from the weekly folders. The link will become available during the week that the assignments is assigned. There may be both multiple-choice and fill-in-the-blank calculation questions. Your assignment submission will be graded within 7 days after the due date.

Group Assignment
The group assignment must be done in a team of 3-5 students. I will form all student groups based on skills and availability. The details of the assignment and its rubric will be posted on Blackboard. The assignment may involve R coding.

Midterm and Final Exams
The midterm and final exams are in the same format. They will be taken online on Blackboard. As soon as you submit your exams, your multiple-choice and fill-in-the-blank grades will be calculated. Any short-answer questions will be graded manually

within 7 days after the due dates. You will not be able to see your grade or your results until after the availability period of each exam.

The number of questions on the exams will be announced the week of the exams. Approximately 3/4 of the exams will be multiple-choice or true/false, and 1/4 will be short-answer or fill-in-the-blank. The Final exam is non-cumulative.
You will have a limited amount of time to complete the exam, e.g., you need to submit the exam within a couple of hours after you start. The exams cannot be paused once they begin, and they will be submitted automatically when the allotted time ends. If your internet is disconnected during the exam, you will have to re-login as soon as possible to continue the exam where you left off. The exams can be taken any day during the exam weeks.

The midterm exam will be released on Monday 4/8/2024, 12:00am and will be due by Sunday 4/14/2024, 11:59pm.

The final exam will be released on Monday 4/29/2024, 12:00am and will be due by Saturday 5/4/2024, 11:59pm.

General exam policy
- You may consult your notes, your assignments, or any of the other course materials to complete the exams. However, if you must look up every answer, you will run out of time.
- During the exam allotted time, you may not communicate with anyone other than the course instructor. Everything you write must be in your own words.
- During the exam weeks, you must not communicate at all with your classmates about the exams.
- You may not copy and/or distribute the exams to anyone, even after the exam due dates.
- Any violation will be handled according to the Academic Integrity Policy.

Make Up Policy and Late Submission Policy

Make-ups for R labs and assignments:
R Labs and assignments are due on the due date. One tenth of its worth will be deducted from the assignment grade for each day that it is late. The cutoff date for each assignment is two weeks after the due date, and the assignment will no longer be accepted after that cutoff date. A grade of 0 will be assigned if the assignment is not submitted by the cutoff date.

Make-ups for discussion forum postings:
Discussion forum posts are due on the due date. Discussion forum posts will be accepted up to two weeks late, with a deduction of ¼ of its worth. Discussion forum posts will not be accepted beyond two weeks post due date.

Make-ups for midterm and final exams, and project:
There will be no make-up for the midterm and final exams, and project, unless prior arrangements have been made with the instructor.

In cases of emergency or medical situation:
In case of emergency or medical situation, requests for make-up work may be discussed with the instructor and will be handled on an individual basis, following the university's policies and guidelines.

Academic Integrity Policy

UMass Lowell Online students are expected to be honest and to respect ethical standards in meeting academic assignments and requirements. A student who cheats on an examination or assignment is subject to administrative dismissal. Please visit the following web site for specific details regarding this policy: https://gps.uml.edu/policies/academicintegrity.cfm.

Student Disability Services

If you are registered with Disability Services and will require course accommodations, please notify me via the Accommodate semester request process as soon as possible so that we might make appropriate arrangements. It is important that we connect to discuss the logistics of your accommodation; please speak to me during office hours or privately after class as I respect and want to protect your privacy. If you need further information or need to register for academic accommodations, please visit the Disability Services Website.

Additionally, Student Disability Services supports software for ALL students (not just those registered with their office). The university has literacy software that allows you to read on-screen text aloud, research and check written work, and create study guides. You can download the software from the IT Software webpage on the UML assistive technologies website.

Student Mental Health and Wellbeing:

We are a campus that cares about your wellbeing and success. Your personal health and well-being are of utmost importance to faculty and campus administrators. I am available to talk about your stresses or concerns related to your coursework in my class.

Here are some resources to support your well-being:

Counseling Services provide crisis intervention, assessment, referrals, short term individual counseling and group therapy. Call to book an appointment at (978) 934-6800.

UMatter2 is a university-wide initiative to support students and promote mental health. They can be reached at (978) 934-6671. You will find information at that website on how to access Togetherall, an online community which is a peer-to-peer platform dedicated to mental health support.

Centers for Learning and Academic Support Services (CLASS) provides advising services including goal setting, course selection, SIS functions, changing majors/minors and course deletions. (978) 934-2936 or Advisement@uml.edu.

The mission of the Office of Student Life & Wellbeing is to advance the holistic concept for student success by infusing health-promoting actions and collaboration into campus culture. They can be reached at 978-934-4342 or Wellbeing@uml.edu.

Diversity, Inclusion, and Community Standards:

UMass Lowell—and your professor—value human diversity in all its forms, whether expressed through race and ethnicity, culture, political and social views, religious and spiritual beliefs, language and geographic characteristics, gender, gender identities and sexual orientations, learning and physical abilities, age, parenting status and social or economic backgrounds. Enrich yourself by practicing respect in your interactions, and enrich one another by expressing your point of view, knowing that diversity and individual differences are respected, appreciated, and recognized as a source of strength.

The Office of Multicultural Affairs (OMA) supports and advocates for students while leading diversity-related programming. At the same time working to create an inclusive environment for LGBTQ+ individuals via the LGBTQ+ Resource Center. Contact (978) 934-4336 or Multicultural_Affairs@uml.edu

University Privacy Statement

UMass Lowell recognizes the importance of mutual trust between students and faculty. Massachusetts is a two-party consent state, which means it is illegal to record someone without their permission. Recordings of classroom lectures are the intellectual property of the instructor. Instructors have the right to prohibit audio and video recording of their lectures, unless the requesting student is registered with Disabilities Services and recording of class sessions is an approved accommodation. In addition, sharing or selling recordings of classroom activities, discussions, or lectures with any other person or medium without permission of the instructor is prohibited.

Assignment Due Date

Week	Assignment	Assigned	Due Date
1	Icebreaker (non-graded) Mandatory survey (non-graded) Assignment (non-graded)	3/11	3/17
2	R Lab (non-graded) Assignment (non-graded) Discussion participation (non-graded)	3/18	3/24
3	R Lab 1 Assignment 1 Discussion participation 1	3/25	3/31
	Group assignment	3/25	**5/4**
4	R Lab 2 Assignment 2 Discussion participation 2	4/1	4/7
5	**Midterm Exam** (Chapters 1 – 4A) R Lab 3 Assignment 3 Discussion participation 3	4/8	4/14
6	R Lab 4 Assignment 4 Discussion participation 4	4/15	4/21
7	R Lab 5 Assignment 5 Discussion participation 5	4/22	4/28
8	**Final Exam** (Chapters 4B – 7)	4/29	5/4

Course Calendar

Week	Date	Topics	Assignments/Activities/Exams
1	3/11 – 3/17	**Review of Statistics**	Icebreaker (non-graded) Mandatory survey (non-graded) Assignment (non-graded)
2	3/18 – 3/24	**Ch 1-2 Intro to Statistical Learning** - Bias-Variance Trade-Off	R Lab (non-graded) Assignment (non-graded) Discussion participation (non-graded)
3	3/25 – 3/31	**Ch 3 Linear Regression** - Simple Linear Regression - Multiple Linear Regression	R Lab 1 Assignment 1 Discussion participation 1
4	4/1 – 4/7	**Ch 4A Classification** - Logistics Regression **Ch 4B Classification** - LDA - QDA	R Lab 2 Assignment 2 Discussion participation 2
5	4/8 – 4/14	**Ch 5 Resampling Methods** - Cross-Validation - Bootstrap	**Midterm Exam** (Chapters 1 – 4A) R Lab 3 Assignment 3 Discussion participation 3
6	4/15 – 4/21	**Ch 6 Linear Model Selection and Regularization** - Subset Selection - Shrinkage Methods Dimension Reduction Methods	R Lab 4 Assignment 4 Discussion participation 4
7	4/22 – 4/28	**Ch 7 Moving Beyond Linearity** - Polynomial Regression - Regression Spline - Smoothing Spline	R Lab 5 Assignment 5 Discussion participation 5
8	4/29 – 5/4	**N/A**	Group Assignment **Final Exam** (Chapters 4B – 7)