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School of Management and Labor Relations

HR Analytics II
Selected Problems: HRM Analytics and Issues Course #: 38:533:650
(Section 90, 3 credits)

Rutgers University – New Brunswick Campus School of Management and Labor Relations
(Spring 2026)

Instructor:	Rania Elanwer, Ph.D.
Email:	re308@rutgers.edu
Course Meeting:	Asynchronous
Student Hours:	**I will hold student hours each week in my personal ZOOM room**: - **Day and Time**: Mondays 2:00pm-3:00pm. https://rutgers.zoom.us/my/re308 *If the available time do not work for you, no worries. Send me an email to set up an alternative time.
Course Website:	Canvas.rutgers.edu (please get into the habit of checking Canvas for syllabus, course info, and other announcements)
Required Textbook:	**We will use an open access (i.e., free) textbook to support this course.** Williams, G. (2011). *Data Mining with Rattle and R: The Art of Excavating Data for Knowledge Discovery.* http://users.umiacs.umd.edu/~oard/teaching/301/spring16/readings/Williams.pdf ISBN-10: 1441998896 ISBN-13: 978-1441998897

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Required Software:	Required for this class two software applications, i.e., R and Rattle, are needed to be installed in students' computers. The related installation details will be described in Lesson 4. This application requires a Windows machine. If you don't have a Windows machine you can use Rutgers Virtual Lab to access the required software. • R for Windows: https://cran.r-project.org/bin/windows/base/ • Rattle for the R Analytical Tool to Learn Easily: http://rattle.togaware.com/
Recommended Materials:	Jhangiani, R., Chiang, I.A., Cuttler, C., & Leighton, D. C. (2019). *Research Methods in Psychology*. https://kpu.pressbooks.pub/psychmethods4e/ ISBN-13: 978-1085976923 ISBN-10: 1085976920

Course Description and Objectives

In this course, students will gain skills in developing an analytics process to create fact-based decisions for solving HR-related problems. In this course, we focus on important strategic decisions and steps that take place BEFORE data are collected or a survey is administered. We also build on existing analytics skills through continued data analysis. This course builds on prior analytics courses and contributes to an "analytics mindset" – we will focus on identifying relevant research questions and problems within organizations to guide the analytics process, identifying the appropriate analytics technique linked to the problems, and build a comprehensive analytics process that can identify the cause of the current problem and make predictions to what might happen in the future

Although the importance of people in achieving organizational success has always been recognized, many HR professionals still rely on intuition and past experience for making key workforce decisions. However, today's leaders can greatly enhance their decision-making processes by leveraging the unique opportunities provided by data analytics. This course focuses on "evidence-based management", which means the purpose is to train students how to find, summarize, and interrogate the evidence that exists for a particular problem (e.g., low engagement) and use this evidence to arrive to a plan for how the problem could be solved or investigated within the organization.

At the end of this course, students will be able to apply analytics as a project plan process organized according to six steps (a) understand the current business problem; (b) collect data relevant to the current business issue; (c) understand and prepare the data for the analysis, (d) create analytics models to predict

future business situation; and (e) evaluate and communicate such information in succinct professional (non-jargon) writing and visualizations.

Course Structure

This is an asynchronous class, so I will have class materials/lectures posted online weekly. Each week, I expect you to complete the assigned readings, viewings, and/or assignments.

Basis of Evaluation

1. Group Projects (5 projects)	**50%**
2. Lab Assignments (6 assignments)	**30%**
3. Final Group Project and Presentation	**20%**
Total: 1000 points	**100%**

Grades will be assigned according to the traditional cut-offs used at Rutgers:
90-100% = A
85-89.9% = B+
80-84.9% = B
75-79.9% = C+
70-74.9% = C
< 70% = F

Group Projects (5) – 500 points total (60%)

Throughout the semester, you will be working in groups to complete six projects. Each project consists of one of the analytics processes we will be developing throughout the semester. By the end of semester all six projects will lead to a final analytics proposal project that you will develop with your group. I will provide coaching as you complete your projects, but you will need to plan to spend time beyond normal class materials to work on each project.

Scope of the Projects:

- **Project1: Phase 1 (Business understanding).** During this phase, you will collaborate with your group to conduct a literature review of scientific articles related to a topic that will be assigned to you in class. Although the topic will be provided, each group must use this topic to create a related business case to solve an HR related problem. The goal of this project is to comprehend and demonstrate the process required to identify the business problem, stakeholders involved in problem resolution, and to develop a goal for the analytics project. Each group will submit a literature review that review articles

related to the assigned topic and a proposal with a summary of the background of the identified business/performance issue by trying to answer the following three questions (1) what the problem is, (2) Why that happened, (3) How this issue will be resolved.

- **Project 2: Phase 2 (Data understanding)**. In this project you will be provided with a data set that will be used to build your analytics project. In this phase you will work with your group to understand the data you have and provide a summary of the information you extracted about the data. Each group will submit a report to the process used to understand the data and all information the group extracted from the data. The report must include all types of visualization methods the group used to understand the data.

- **Project 3: Phase 3 (Data preparation)**. In this step, you will collaborate with your group to modify, clean, and transform the data in preparation for analysis. During this phase, each group will be required to submit a report detailing the process they used to clean the data. The report must include the visualization methods used by the group to aid in the data cleaning process.

- **Project 4: Phase 4 (Data Modeling).** During this phase, each team must create, train, and test at least three models to predict the outcome variable. Each team is required to submit a report on the process used to create the models and the results of the modeling process.

- **Project 5: Phase 5 (Evaluation).** In this phase, each team will use two evaluation methods to evaluate all models created in phase 4 (the modeling phase) and choose the model with the best performance. Each team must submit a report on the evaluation results as well as the process used to identify the highest performing model.

Final Group Project (Phase6) and Presentation - 200 points total (10%)

At the end of the semester, each group will submit a final written report and deliver a presentation on their analytics project. The purpose of this assignment is to provide stakeholders with a clear and professional report that explains the process used to make predictions about an organizational issue and offers HR-related recommendations based on the modeling results. Deliverable for this project includes:

- **Final Report:** The report must summarize all phases of the analytics project and include visualizations that demonstrate the process and results. It should be organized in a professional format suitable for stakeholders and conclude with recommendations grounded in the modeling outcomes.
- **Presentation:** The presentation should provide a concise summary of the phases of the project and highlight the HR recommendations for solving the identified **performance problem.**

You must submit your projects through Canvas. All submitted assignments will be evaluated

via **Turnitin.** Please see policies regarding integrity breaches for more information about consequences of cheating and plagiarism.

Lab Assignments – 300 points (30%)

There are a total of six lab assignments for a case study chosen by the instructor. These lab assignments serve as exercises for students to apply the techniques learned in each lesson to the case. During the course, each lab assignment is made available at the start of each week. They account for 25% of a student's overall grade. It is critical that students complete and turn in all lab assignments in order to master the materials.

Late Submissions

I expect students to complete all assignments on time. I do not accept late submissions. However, I will grant one FREEBIE, no questions asked (things happen). This means that you can submit ONE assignment (project) up to 3 days late, with no penalty.

If you have an excused reason for submitting late, I encourage you to contact me in advance of the due date to discuss a possible accommodation.

Requests for Reconsidering a Grade
If you have questions about the evaluation or grade that your work earned, you may ask in writing to have it reviewed again and the grade reconsidered. You have seven days from the time you receive the grade to make the request. No reconsideration of grades or scoring will occur after seven days have elapsed. To do this, prepare a written statement (one or two paragraphs) explaining what you believe to be erroneous about the grade. **Please recognize that a new grade could be lower or higher than the original grade.**

Important Class Policy

Group Work Assessment
Active participation in all group assignments is required. Please Note: Group projects will include a peer assessment component. Students who do not contribute equally to the project, as compared to their group members, may receive a reduced grade or no points for the project.

Use of AI in This Course
You are permitted to use AI applications to support your work in this course, especially when working with R and Rattle. AI tools may be used to search for solutions to errors, troubleshoot

issues, or better understand how specific functions work. However, AI should be used only as a learning aid, not as a substitute for your own analysis. All assignments, reports, and projects must reflect your own understanding and original work in accordance with academic integrity standards.

Other Important, Miscellaneous Things

Students with disabilities

Students requesting accommodation for disabilities should contact the Office of Disability Services to determine his/her Coordinator. The coordinator will then provide documentation to the student. Upon review and approval, the student must then provide this documentation to the instructor. Please refer to the Office of Disability Services for Students for more detail regarding this policy: https://ods.rutgers.edu/ .

APA style – this is necessary for all written work in this course!

You are required to use APA style for your written deliverables and presentations (where applicable). This is most relevant for formatting, in-text citations, reference lists, tables, and figures. It is imperative that you familiarize yourself with the requirements throughout the semester (i.e., don't wait until the first assignment is due to figure this out).

Briefly, all projects must be:

- **Typed**
- **Contain 1-inch margins all around the document**
- **Use 12pt. Times New Roman font**

Here are some websites that you should consult for further assistance (more materials are located on our Canvas website):

- https://owl.purdue.edu/owl/research_and_citation/apa_style/apa_formatting_and_style_guide/general_format.html
- https://owl.purdue.edu/owl/research_and_citation/conducting_research/evaluating_sources_of_information/where_to_begin.html
- https://apastyle.apa.org/

Media Policy

The recording and transmission of classroom lectures and discussions by students is prohibited without written permission from the class instructor and all students in the class as well as guest speakers have been informed that audio/video recording may occur. Recording of lectures or class presentations is solely authorized for the purposes of individual or group study with other students enrolled in the same class. Permission to allow the recording is not a transfer of any copyrights in the recording.

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The recording may not be reproduced or uploaded to publicly accessible web environments. You cannot share any part of any recording without express written permission by all parties potentially affected by the recording.

Recordings, course materials, and lecture notes may not be exchanged or distributed for commercial purposes, for compensation, or for any other purpose other than study by students enrolled in the class. Public distribution of such materials may constitute copyright infringement in violation of federal or state law, or University policy. Violation of this policy may subject a student to disciplinary action under the University's Standards of Conduct.

*Exception:

It is not a violation of this policy for a student determined by the Learning Needs and Evaluation Center ("LNEC") to be entitled to educational accommodations, to exercise any rights protected under Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990, including needed recording or adaptations of classroom lectures or materials for personal research and study. Such recordings of lectures or class presentations is solely authorized for the purposes of individual or group study with other students enrolled in the same class. Permission to allow the recording is not a transfer of any copyrights in the recording. The restrictions on third party web and commercial distribution apply in such cases.

Destruction of Approved Recordings:

Students must destroy recordings at the end of the semester in which they are enrolled in the class unless they receive the instructor's written permission to retain them or are entitled to retain them as an LNEC-authorized accommodation.

Academic Integrity

Rutgers University takes academic dishonesty very seriously. By enrolling in this course, you assume responsibility for familiarizing yourself with the Academic Integrity Policy and the possible penalties (including suspension and expulsion) for violating the policy. As per the policy, all suspected violations will be reported to the Office of Student Conduct.

Academic dishonesty includes (but is not limited to):

- cheating
- plagiarism
- aiding others in committing a violation or allowing others to use your work
- failure to cite sources correctly
- fabrication

- using another person's ideas or words without attribution
- re-using a previous assignment
- unauthorized collaboration
- sabotaging another student's work

If in doubt, please consult the instructor. Please review the Academic Integrity Policy at: https://nbacademicintegrity.rutgers.edu/.

Spring 2026 Course Schedule

Week 1	01/20	**Course Welcome and Introduction** **HR Analytics** • What is big data • What are analytics (descriptive, predictive and prescriptive) • Why we need analytics • The integration between HR and analytics	**Review:** Syllabus **Read:** - Marler, J. H., & Boudreau, J. W. (2017) - The analytical journey Provost, F., & Fawcett, T. (2013). - Margherita, A. (2022)
Week 2	01/26	**Introduction to Machine learning** **Analytics as a project plan (the CRISP Model)** **Prepare to start Project 1/Phase 1**. Introducing the project **Phase 1: Business understanding:** • What is business understanding? • How to connect organizational problem to testable hypotheses • How to form a data mining question? **Writing a literature review** • (Conducting a systematic review) **Instructions for Project1: Phase1(Business Understanding)**	**Read:** Altemeyer, (2019) Li, J. & Herd, A. M. (2017). King, K. (2016). Watch: "Understanding Research Articles" [https://www.youtube.com/watch?v=-SA_J-BnuwI] 5 minutes 1- Textbook (Jhangiani et al., 2019) Ch. 2 (section 7, 8,9,10,11) 2- MARS guidelines p. 7, 8 (lit search items to include) 3- Mackey et al. (2021) p. 5-8 (example lit search)
Week 3	02/02	**Data collection:** • Data collection steps • Methods of collecting data. • Sampling and sampling methods **We will continue working on project 1: phase 1**	**Read:** Strategies for collecting data (the needs assessment book ch.3 p.51-74)
Week 4	02/09	**Phase 2: Data understanding** • Data and data summary **Introducing R and Rattle:** • Installation **Project 2: Phase 2 (Data Understanding)**	**Read:** Textbook (Williams, 2011): Chapters 3, 4, & 5 **Due:** Project Phase1: Phase1(Business Understanding)
Week 5	02/16	**Project 2: Phase 2 (Data Understanding)** • Troubleshoot Project #2: bring your questions and concerns.	**Due:** Lab Assignment1

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Week 6	02/23	**Phase 3: Data Preparation** • How to review and clean raw dataset • How to run initial descriptive statistics • How to evaluate variable distributions	**Read**: Textbook (Williams, 2011): Chapters 7 **Due**: Project 2: phase 2 (Data Understanding)
Week 7	03/02	**Project 3: Phase 3 (Data preparation)** Troubleshoot Project #3: bring your questions and concerns.	**Due:** Lab assignment 2
Week 8	03/09	**Phase4: Modeling** • What is modeling • Building a model • Training a model • Evaluation	**Read:** Textbook (Williams, 2011): Chapter 8 **Due:** Project 3: Phase 3 (Data
	03/16	**Spring Break**	
Week 9	03/23	**Phase4: Modeling** • linear regression • Multilinear regression **Phase5: Evaluation** **Instructions for Project 4 and 5 (Modeling and Evaluation)**	**Read:** Textbook (Williams, 2011): Chapter 8 **Due:** Lab Assignment 3
Week 10	03/30	**Phase4: Modeling** • logistic regression **Phase5: Evaluation**	**Read:** Materials posted on Canvas **Due:** Lab Assignment 4
Week 11	04/06	**Phase4: Modeling** • Decision Tree **Phase5: Evaluation**	**Read:** Textbook (Williams, 2011): Chapter 11 **Due:** Lab Assignment 5
Week 12	04/13	**Phase4: Modeling** • Artificial neural network model **Phase5: Evaluation**	**Due:** Lab assignment 6
Week 13	04/20	**Continue working on:** Project 4: Phase 4 (Modeling) Project 5: Phase 5 (Evaluation) Troubleshoot Project #4,5: bring your questions and concerns.	**Continued:** Project 4: Phase 4 (Modeling) Project 5:Phase5(Evaluation)
Week 14	04/27	Phase 6 (the deployment phase) and instructions for the final group project.	**Due:** Project 4: Phase 4 (Modeling) Project 5:Phase5(Evaluation)
Week 15	05/04	**Final Group Project Presentation**	