ISM 645-01, ISM 645-02, ISM 701-01: Principles of Predictive Analytics

Course Syllabus for Fall 2025

Professor: Dr. Shimi Zhou
Office: 489 Bryan Building **Email:** s_zhou2@uncg.edu
Class time: Monday 6:30 to 9:20 PM **Website:** canvas.uncg.edu
Classroom: Bryan School of Business, Room 216
Office Hours: Wednesday 2 to 4 pm by appointment (Virtual on Teams or 489 Bryan Building)

Course Description: Predictive analytics focuses on exploring and analyzing large volumes of data to uncover patterns, relationships, and insights that are valuable for business decision-making. This course introduces students to the principles, models, and methods of predictive analytics, with an emphasis on both theoretical foundations and practical applications. The rapid growth of digital data presents new opportunities for organizations to better understand customers, products, competitors, and market trends. Predictive analytics enables businesses to leverage this data by discovering meaningful patterns through data exploration, visualization, and analysis. The course integrates the art of communicating insights with the science of handling and interpreting complex datasets.

The primary objective of this course is to equip students with the knowledge and skills necessary to extract useful information from large datasets and predict relationships or phenomena relevant to organizational goals. By the end of the course, students will be more proficient in transforming raw data into actionable insights that contribute to business value. Topics include core concepts and principles of predictive analytics, methodologies used in data mining, and emerging trends in the field.

Course Learning Objective:

Upon successful completion of this course, students will gain hands-on experience with widely used analytics software and develop the analytical capabilities needed to support data-driven business decisions. Students will be able to demonstrate an understanding of the foundational principles of predictive analytics, identify and evaluate various predictive methodologies, and design effective approaches for data collection, preprocessing, and exploration.

Additionally, students will learn to apply and assess predictive modeling techniques, interpret their results, and consider the organizational implications of using such tools in practice. The course also emphasizes proficiency in analytics software to ensure students can implement solutions in real-world contexts.

Textbook:

Required Textbook:

- *Python Data Science Handbook: Essential Tools for Working with Data* (2nd Edition)
  Author: Jacob T. VanderPlas (2023)
  Publisher: O'Reilly Media
  Available through UNCG Library

Recommended Optional Texts:

- *Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython* (2nd Edition)
  Author: Wes McKinney
  ISBN: 9781491957660
  A great resource for reviewing Python basics and foundational data analysis techniques.
- *Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow* (3rd Edition)
  Author: Aurélien Géron
  ISBN: 9781098122478
  Available through UNCG Library
  This book is suitable for students interested in exploring advanced topics and deep learning.

Programming Environment:

- The Jupyter software is needed
  - You can install the Jupyter server on your local machine for FREE
    - JupyterLab or Jupyter Notebook
    - https://jupyter.org/index.html
    - https://www.anaconda.com/products/individual

I will share additional materials and references for course materials on canvas. **To succeed in the class, practicing the software, reading the chapters, and watching the videos shared in the class are equally important.** Please note that there are multiple books, guides, and references available for Python. My choice of textbook reflects my desire to manage the cost while maintaining the quality of materials and coverage of concepts and technologies for the course.
I encourage you to explore alternative, and perhaps more current, resources for Python that are readily available on the web and find what works for you. Please share your findings and preferences with the rest of the class.

Canvas Learning Management System:
UNCG Canvas is available at https://canvas.uncg.edu. Course materials, announcements, and updates will be posted on Canvas regularly. Please check canvas daily for announcements, discussions, and materials. You will be responsible for any information or announcements provided to you through emails and for any updates on Canvas.

Course Structure:

ISM 645-01 and ISM 645-02 will be delivered in a synchronous "HyFlex" format in Room 216 of the Bryan Building. Students must enroll in the correct section. Those registered for ISM 645-01 are expected to attend class in person at the scheduled times and dates in Room 216. Students enrolled in ISM 645-02 are expected to attend class virtually, also at the scheduled times and dates.

Attendance for all HyFlex classes is mandatory, regardless of whether students attend in person or virtually. This means students must be present during the scheduled class sessions, either physically or online, according to their registered section. In rare and exceptional circumstances—such as illness, emergencies, or other documented difficulties - faculty may grant special permission for a student to miss a specific class session or, in the case of ISM 645-01 students, to attend virtually instead of in person. These exceptions are not granted upon request or convenience and are subject to the instructor's discretion. Documentation may be required. If such permission is granted, a recording of the missed session may be provided as a one-time exception rather than a standard practice, and any make-up arrangements must align with the policies outlined in the syllabus.

Students enrolled in ISM 645-03 are not required to attend class sessions in person or virtually. All course materials, announcements, and communications for ISM 645-03 will be provided exclusively through the Canvas platform.

Performance Evaluation:

All individual assignments — including exams, exercises, and bonus questions — must be completed independently. Collaboration is not permitted on individual work. While students may seek general advice or clarification from peers or faculty, you must not seek or accept specific answers from anyone else. Any violation of this policy will result in a grade of 0 on the assignment. A second violation will lead to a final grade of F for the course. If you are ever uncertain about what is permitted, consult the instructor before discussing the assignment with others.

There will be **NO makeup or rescheduled assignments, quizzes, or exams** for missed deadlines. The **only exception** applies to **documented emergencies**, such as medical issues or the death of an immediate family member. In such cases, students are required to submit official documentation and contact the instructor in advance of the deadline.

All assignments are due by **11:59 PM** on the scheduled due date. It is your responsibility to be aware of all due dates and manage your time accordingly. **Late submissions will not be accepted**, and **makeup opportunities will not be offered**. If you anticipate any issue that might prevent you from meeting a deadline, you must notify the instructor as early as possible.

Quizzes:

Throughout the semester, there will be eight bi-weekly individual quizzes designed to assess students' understanding of key programming concepts and problem-solving skills. These quizzes will be based on the materials and techniques covered in class and will evaluate students' ability to apply Python programming to practical scenarios.

Each quiz will include a combination of conceptual questions and hands-on coding tasks that require students to write Python code and interpret the results. Students are expected to complete quizzes independently, without collaboration, and submit both their code and outputs for evaluation. Quizzes will be released periodically over the semester. Once released, students will have a two-week window to complete and submit their responses. Detailed instructions will be provided with each quiz to clearly outline the requirements and expectations.

Individual Project:

Each student will complete an individual project over the course of the semester, focused on identifying a real-world problem that can be addressed using the analytics techniques taught in this course. After selecting a problem, the student must locate a suitable dataset that aligns with the chosen topic.

Students are required to submit a **short presentation video** (up to 15 minutes) by a specified deadline to outline their proposed individual project. The video should include a brief description of the **business problem**, an overview of the **dataset to be used**, and a summary of any **basic data exploration, manipulation, or visualizations** they have performed so far. The purpose of this presentation is to ensure the project is realistic and feasible based on the course content covered to that point. Students will receive feedback from the instructor and classmates to help guide the next steps. No separate submission of the dataset or a written proposal is required at this stage.

In this stage, students are expected to apply appropriate **analytical methods** covered in the course—such as statistical analysis, data transformation, feature engineering, and predictive modeling—depending on the scope and nature of their selected project. The analysis should be data-driven, methodologically sound, and aligned with the business problem introduced in the proposal stage.

The **final project report** should clearly articulate the business problem, describe the dataset and its relevant features, and detail the steps taken in the analysis. This includes explaining the methods used, interpreting the results, and discussing how the findings address the original problem. Students should also reflect on **key insights**, as well as any **exceptions, limitations, or challenges** encountered during the process. The accompanying **Jupyter Notebook** must contain all Python code used to perform the analysis, organized in a readable and reproducible format. Code should be properly commented to explain the logic behind key steps. Both the report and notebook will be evaluated based on clarity, depth of analysis, technical accuracy, and completeness. This final deliverable is intended to demonstrate students' ability to apply course concepts to a real-world dataset and communicate their findings in a meaningful and professional manner.

The final project grade will be based on the quality and completeness of the proposal presentation, the appropriateness and execution of the analytical techniques, and the clarity and depth of the final deliverables. The project must fully address the proposed problem and demonstrate the student's ability to apply course concepts to real-world data effectively.

While the project is individual, students are encouraged to seek feedback during office hours or through scheduled check-ins. The project aims to promote independent problem-solving, critical thinking, and the application of predictive analytics techniques to real-world scenarios, supporting a rich and practical learning experience.

Discussions:

This course is designed to integrate theoretical foundations with hands-on practice. The theoretical component emphasizes the mathematical and logical principles of data analytics, while the practical component focuses on developing programming skills and the ability to implement theoretical models in code.

To encourage deeper engagement with the material, students will participate in a series of online discussion activities posted on the Canvas platform throughout the semester. These discussions are intended to promote thoughtful reflection and application of course concepts. Students are expected to contribute original responses that demonstrate a clear understanding of the material, rather than simply restating textbook definitions.

The goal of these discussions is to create a collaborative learning environment in which students can exchange ideas, explore diverse perspectives, and apply analytical thinking to real-world challenges. Active and timely participation is essential. Each student's contributions will be evaluated based on both the quality of their insights and the punctuality of their submissions.

Bonus Credit:

To support students who may be new to Python programming, this course offers an optional bonus activity aimed at helping you build foundational skills in Python - one of the most important languages in analytics. This semester, we will use LinkedIn Learning as the platform for the bonus activity. The course titled **"Python Essential Training" by Ryan Mitchell** is available through LinkedIn Learning and serves as the designated bonus course. A link to the course and access instructions will be provided on the Canvas course page. Students who complete the course and successfully submit answers to the corresponding **bonus quiz** (which will also be posted on Canvas) are eligible to receive bonus credit. The bonus quiz is designed to check your understanding of the key concepts and techniques covered in the LinkedIn Learning course. This activity is optional, but highly encouraged - especially for those seeking additional practice or a stronger grasp of Python fundamentals. Completion of the course and quiz must be done by the specified deadline to earn the bonus credit.

Grading:

The course grade will be based on the following distribution:

	Assignment	Grade
1	Quizzes	40%
2	Discussions	10%
3	Individual Project	50%
4	Bonus Credit – Bonus Quiz	2%
	Total	102%

Final grades will be assigned based on the total points earned according to the following scale:

[100 – 94]	=	A	(75 – 70]	=	C
(94 – 90]	=	A-	Below 70	=	F
(90 – 86]	=	B+			
(86 – 83]	=	B			
(83 – 80]	=	B-			
(80 – 75]	=	C+			

All students are required to follow the provisions of the UNCG Academic Integrity Policy in completing course work (http://academicintegrity.uncg.edu). If you do not know the provisions of the Integrity Policy, make time to study it.

Student Responsibilities and Communications:

Course Platforms and Announcements:
All course-related materials, assignments, announcements, and updates will be posted on Canvas. Students are expected to check Canvas regularly to stay informed. In addition, important course updates may be communicated through your UNCG iSpartan email account. Students are responsible for checking email and Canvas frequently and managing their time accordingly.

Instructor Communication:
Email is the preferred method of communication for this course. If you have any questions or need to reach out, please email me directly at: s_zhou2@uncg.edu. To ensure effective communication, students should observe the following email etiquette:

- Always include a clear subject line.
- Use standard fonts and avoid special formatting unless required for an assignment.
- Avoid sending large attachments unless permission is granted in advance.
- Be mindful of tone, as written text may lack context - read your messages carefully.
- Respect the privacy of your classmates in all communications.

***Office Hours*:**
Office hours are available Wednesdays from 2:00 PM to 4:00 PM by appointment. Students may choose to meet virtually via Microsoft Teams or in person in Bryan Building, Room 489. To schedule a meeting, please send a Teams meeting invite in advance and clearly indicate your preferred meeting format (virtual or in-person) in the note. I encourage all students to take advantage of office hours for questions, feedback, or further discussion of course materials.

Course Evaluations:
Near the end of the semester, students will be invited to complete an online course evaluation. Your feedback is highly encouraged and plays a vital role in helping the instructor and the university improve future course offerings and instructional practices.

Guidelines For Ethical and Professional Behavior of Students and Faculty:

The administration, faculty, staff, and students of the Bryan School of Business and Economics at UNCG are committed to ethical and professional behavior in all areas of their academic and professional lives. The values, principles and expectations established in this document and the addendums encompass many aspects of professional behavior and integrity. It is not an exhaustive list, since change is part of life both inside and outside university. It is further noted that all expectations and principles discussed in this document apply to all modes of communication or course delivery.

This set of Guidelines constitutes a statement of values, principles, and expectations; concerns and issues are still best addressed by conversations between the individual faculty member and student. If further discussions are necessary, Department Heads may be contacted by either faculty or students. Complete guideline can be found at: https://bryan.uncg.edu/wp-content/uploads/2023/11/Faculty-and-Student-Guidelines-2018-2019.pdf.

IMPORTANT: Academic Integrity Policy for Generative Artificial Intelligence

Discussing your assignments with other students can be a valuable learning resource; however, each student is expected to do their original work. University students conduct themselves to the highest standards of academic integrity. Academic misconduct for which a student is subject to penalty includes all forms of cheating, such as illicit possession of examinations or examination materials, forgery, or plagiarism. UNCG Academic Integrity Policy can be viewed at http://sa.uncg.edu/handbook/academic-integrity-policy/.

Students should NOT make, borrow, or "share" copies of their assignments or files with other students, including previous students. Helping one another is allowed, but copying, even electronically, is cheating. This practice is against the UNCG Academic Integrity Policy and defeats the purpose of this course. No credit will be received for shared work, and other penalties may be imposed.

You are expected to follow the University's Academic Integrity Policy. All ideas, text, images, and other content you submit should be appropriately cited when taken, directly or indirectly, from another source. For purposes of this course, use of generative artificial intelligence (GAI) will be treated analogously to assistance from another person. Unauthorized or unacknowledged collaboration, or the presentation of another's work as your own, is a violation of the Academic Integrity Policy. If you are unsure about whether particular uses of GAI tools may be plagiarism, cheating, or another form of academic dishonesty, please reach out to me to discuss it as soon as possible.

We expect that all work students submit for this course will be their own. In instances when collaborative work is assigned, we expect for the assignment to list all team members who participated. We specifically forbid the use of generative artificial intelligence (GAI) tools at all stages of the work process, including preliminary ones. Violations of this policy will be considered violations of the Academic Integrity policy. We draw your attention to the fact that different classes may implement different GAI policies, and it is the student's responsibility to conform to expectations for each course. (Adapted from Harvard University).

If you wish to use GAI for any part of a graded assignment (from idea generation to creation to editing), you must first ask for permission and explain how you plan to use the tool. In addition, you must properly cite the GAI tool you use. I will treat Failure to cite the GAI tool is as a violation of the plagiarism standard University Academic Integrity Policy. (Adapted from UVM Center for Student Conduct)

Students are invited to use GAI platforms to help prepare for assignments and projects (e.g., to help with brainstorming or to see what a completed essay might look like). I also welcome you to use GAI tools to help revise and edit your work (e.g., to help identify flaws in reasoning, spot confusing or underdeveloped paragraphs, or to simply fix citations). When submitting work, students must clearly identify any writing, text, or media generated by GAI. This can be done in a variety of ways. In this course, parts of essays generated by GAI should appear in a different colored font, and the relationship between those sections and student contributions should be discussed in cover letters that accompany the essay submission. (Adapted from the University of Iowa)

This course requires students to utilize generative artificial intelligence (GAI) tools for select assignments. Expectations for GAI use will be clearly outlined in the guidelines or prompts for each assignment. Students are expected to thoughtfully interact with and evaluate any GAI-generated content and are solely responsible for the final work product. Appropriate acknowledgement and citation of GAI tools used is mandatory. Failure to properly credit GAI use constitutes academic misconduct. Students should ensure they understand and follow policies set for other courses, as expectations may differ from this one. Please contact me with any questions on the use of AI in our coursework, including ethical and privacy concerns.

Accommodation for Students with Disabilities:
UNCG seeks to comply fully with the Americans with Disabilities Act (ADA). Students requesting accommodation based on a disability must connect with the Office of Accessibility Resources and Services (OARS) at 215 Elliott University Center, (336)334- 5440, oars.uncg.edu. The student is to provide a written request for *each test* accommodation to their instructor (an e-mail will suffice provided you have received a reply from the instructor). Both *the requests to the* OARS *and the instructor* are to be made at least ten school days before the test date.

Important Health Statement:
Health and well-being impact learning and academic success. Throughout your time at the university, you may experience a range of concerns that can cause barriers to your academic success. These might include illnesses, strained relationships, anxiety, high levels of stress, alcohol, drug problems, feeling down, or loss of motivation. Student Health Services and The Counseling Center can help with these or other issues you may experience. You can learn about the free, confidential mental health services available on campus by calling 336-334- 5874, visiting the website at https://shs.uncg.edu/, or visiting the Anna M. Gove
Student Health Center at 107 Gray Drive. For undergraduate or graduate students in recovery from alcohol and other drug addiction, The Spartan Recovery Program (SRP) offers recovery support services. You can learn more about recovery and recovery support services by visiting https://shs.uncg.edu/srp or reaching out to recovery@uncg.edu

Religious Obligations Statement:
It is expected that instructors will make reasonable accommodations for students who have conflicts due to religious obligations. Please make arrangements with the instructor in advance of any conflict. For more information on UNCG's Religious Obligations policy, visit:
https://drive.google.com/file/d/0B3_J3Uix1B4UeTV4Nk1vVFJoVFE/view?resourcekey=0-zRdXEmUA6rRI2RzKqo6u3g

Expectations of Faculty and Students in the Bryan School:
Students should read the Guidelines for Faculty and Students presented on the web pages found at http://bryan.uncg.edu/wp-content/uploads/2012/08/faculty_student_guidelines.pdf

Absences for University-Sponsored Activities:

The university recognizes the importance of certain extra-curricular and co-curricular activities (including travel days) that enhance student learning, personal development, and professional growth. Instructors will excuse absences of students for participation in university-sponsored events under the following conditions:

1. Students who expect to miss one or more class meetings due to participation in university-sponsored activities should:

a) Notify the instructor(s) at least five class days in advance;

b) Arrange to complete all missed work in advance of the absence whenever practicable as judged by the instructor(s). When the missed work cannot be completed in advance, the instructor(s) should provide students with the opportunity to make up the work. Students should be aware, however, that not all kinds of work can be made up. The instructor(s) have the discretion to deny makeup work if (i) alternative assignments place an unreasonable demand on the instructor, (ii) the original assignment is such that not completing it at the originally assigned time impedes student learning

c) Present relevant documentation of participation in a relevant University-sponsored activity to the instructor(s) upon request. Students who expect to miss more than three class periods of any single course of any kind in a term or more than two consecutive meetings of a laboratory course in order to participate in university-sponsored activities should inform the instructor at the beginning of the course. In the case that the faculty member cannot make reasonable accommodations for makeup work, the student may appropriately be advised to drop the course.

Tentative Schedule:
A flexible schedule of topics and assignments/quizzes is provided below and on Canvas. A detailed schedule before the beginning of each week will be posted on Canvas. It will include the week's readings, assignments, and instructions. It is the student's responsibility to stay on track with readings and assignments to be successful in the course.

Week	Topic	Chapter	Assignment Due
8/18/2025	Class Overview; Module 1: Introduction to Predictive Analytics	-	
8/25/2025	Module 2: Introduction to Python Quiz 1	1	Quiz 1
9/1/2025	Labor Day, No Class- Module 3: Exploratory Data Analysis Part 1 Discussion 1	2	Discussion 1
9/8/2025	Module 4: Exploratory Data Analysis Part 2 Quiz 2	2	Quiz 2
9/15/2025	Module 5: Data Manipulation Part 1 Discussion 2	3	Discussion 2
9/22/2025	Module 6: Data Manipulation Part 2 Quiz 3		Quiz 3
9/29/2025	Module 7: Visualization Individual Project Proposal Presentation Video; Discussion 3	4	Discussion 3
10/6/2025	No Class – Individual Project Proposal Quiz 4		Individual Project Proposal Presentation Video; Quiz 4
10/13/2025	Fall Break		
10/20/2025	Module 8: Overview of Machine Learning; Supervised Learning: Classification Quiz 5; Discussion 4	5	Quiz 5; Discussion 4
10/27/2025	Module 9: Linear & Logistics Regressions	5	
11/3/2025	Module 10: Support Vector Machines Quiz 6	5	Quiz 6
11/10/2025	Module 11: Decision Trees and Random Forests Discussion 5	5	Discussion 5
11/17/2025	Module 12: Dimensionality Reduction Quiz 7	5	Quiz 7
11/24/2025	Module 13: Unsupervised Learning	5	
12/1/2025	No Class – Final Project Report Individual Final Project Report & Jupyter Notebook; Quiz 8		Individual Final Project Report; Jupyter Notebook; Quiz 8

The dates for topics covered and due dates for assignments are subject to change. If there are changes to any of the dates, they will be discussed in the lecture videos as well as announced via Canvas. Note: See the Student Section of the Bryan School website for additional information about "Faculty and Student Guidelines". https://bryan.uncg.edu/wp-content/uploads/2017/08/faculty- and-student-guidelines-2