QMB3302 Foundations of Analytics and AI

Instructor	Contact	Class	Information
Instructor:	Dr. Joel Davis	**Class Location:**	NA
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Location:	Stuzin 100, Retail Center		
Phone:	352-273-3292		
Term:	Spring 2026		

COURSE DETAILS

0.1 Welcome to the course!

This course is designed to introduce you to the basics of data analytics, machine learning and Artificial Intelligence (AI). We also introduce some foundational knowledge and skills in the powerful programming language Python. It assumes no prior coding experience. Over the semester we progress through three integrated modules: four weeks focused on essential Python skills, four weeks on core machine learning techniques, and four weeks on large language models (LLMs) and contemporary AI applications. Together, these modules build the technical fluency and conceptual understanding needed to engage confidently with data-driven tools and AI systems in academic, professional, and organizational settings.

Why learn Python? Python remains the dominant language for analytics and AI. It combines simple syntax with a very broad system of libraries for conducting this kind of work. It is used extensively across industries, everything from technology and consulting to retail, finance, and healthcare. It is used by organizations such as Google, Amazon, NASA, Deloitte, and countless startups. Its open-source nature also makes it accessible and cost-effective for individuals and firms alike. Developing proficiency in Python enables you to automate tasks, analyze data rigorously, and implement models that support data-informed decision-making.

Machine learning and AI have become essential tools in modern organizations. Firms generate enormous volumes of data, yet competitive advantage depends on the ability to convert that data into actionable insights. Understanding the principles behind predictive models, classification systems, and LLM-based tools is a baseline expectation for emerging business professionals. Whether your future career is in marketing, finance, operations, consulting, or entrepreneurship, the ability to interpret and evaluate AI systems, and to understand their limitations, will enhance your effectiveness in the workplace.

By the end of the course, you will have both (1) practical skills for working with Python and core machine learning methods, and (2) broad AI literacy that enables you to engage thoughtfully with the evolving landscape of intelligent systems.

0.2 COURSE OBJECTIVES

0.2.1 Programming and Computational Skills

- ***Programming:*** Install and configure Python and the required software environment for running analytical and AI-related scripts.
- ***Programming:*** Read and interpret basic Python programs, recognizing core data types, control structures, and common programming patterns.
- ***Programming:*** Write and execute Python scripts to manipulate, clean, and prepare data for analytical tasks.
- ***Programming:*** Diagnose and resolve coding errors through systematic debugging and structured problem-solving strategies.
- ***Computational Foundations:*** Develop fluency with essential computational workflows (e.g., navigating files, managing environments, and executing scripts) that support professional analytical practice.

0.2.2 Analytics and Data Interpretation

- ***Analytics:*** Produce foundational data visualizations using standard Python libraries and interpret the patterns and relationships they reveal.
- ***Analytics:*** Generate descriptive statistical summaries for continuous and categorical variables to support data-driven reasoning and basic inference.

0.2.3 Artificial Intelligence

- ***AI Literacy:*** Explain the major categories of AI systems—including machine learning models and large language models—and understand the types of problems they are designed to solve.
- ***AI Literacy:*** Evaluate the capabilities and limitations of AI tools in business contexts, including issues related to data requirements, interpretability, and responsible use.

- ***Machine Learning:*** Build and evaluate simple machine-learning models to illustrate core concepts such as classification, prediction, generalization, and model validation.
- ***LLM Foundations:*** Understand how large language models operate at a conceptual level, including tokens, context windows, and the statistical nature of model predictions.

- ***Prompting Skills:*** Design, refine, and evaluate prompts to achieve reliable, structured, and domain-appropriate outputs from LLMs.

- ***Critical Use of LLMs:*** Assess the strengths, limitations, and failure modes of LLMs in analytical and business settings, and apply strategies to mitigate common errors or hallucinations.

0.2.4 Applied Analytics and AI in Business

- ***Applied Skills:*** Understand how Python, machine learning, and large language models are used across business domains to support decision-making, automation, and analytical problem-solving.

- ***Applied Skills:*** Interpret the outputs of analytical and AI systems and communicate insights in a clear and professional manner.

0.3 PREREQUISITES

For relevant course prerequisites, please refer to one.uf.

This course is suitable for those with no programming experience.

0.4 COMPUTER AND SOFTWARE

The coding portions of the course assume a Python 3 installation with several standard libraries (such as Pandas, Numpy and Matplotlib). The download and all required software is free. Although UF APPS has the required software, a local installation is strongly preferred.

For problems with UF APPS or connectivity (WIFI), please contact the UF Help Desk at http://helpdesk.ufl.edu/, or call 352-392-4357.

0.5 TEXTBOOK:

We will make occasional use of the below textbooks, both available free and online. Readings from these textbooks will be posted in Canvas.

1. **VanderPlas, J. (2016).** *Python Data Science Handbook: Essential Tools for Working with Data.* O'Reilly Media, Inc.
   Available online at: https://jakevdp.github.io/PythonDataScienceHandbook/
   This text is required and available for free online.
2. **VanderPlas, J. (2016).** *A Whirlwind Tour of Python.* O'Reilly Media, Incorporated.
   Available online at: https://jakevdp.github.io/WhirlwindTourOfPython/
   This text is required and available for free online.

0.6 OFFICE HOURS

I have standing office hours on Wednesdays from 1-3 PM. No appointment is necessary. The weekly announcemnt will note if office hours for the week have changed, it is important you check this. If you wish to reserve a specific time, you may use this link: Office Hours Booking (also available in Canvas) to reserve preferred times. You need to be logged in to a UF account (VPN or Microsoft 360) to book. When reserving time, you may see times available at other times of the week. If these are open and available to book, you are free to use that tool to reserve a meeting at those times. Please use the notes section of the reservation to send me any detail regarding the topic if you feel that is needed. It is fine, and even nice, to just come and say hello. You don't need a burning reason to book a chat. I assume the office hours booked 1-on-1 are in person, in my office. But if you prefer to meet online or outside, mark that in the notes. If you would like to meet via Zoom/Teams, block the time and send a meeting invite in Microsoft Teams or Zoom.

Given the online nature of this class, I will post occasional evening and weekend drop-in office hours on Zoom. I will use announcements to let you know the time and Zoom link.

0.7 INSTRUCTOR COMMUNICATION

The best way to get a hold of me is via email or Canvas messages. It is important when you email about an issue that you tell me a little bit about yourself, at a minimum, just include the class number. I try to answer all emails within 24 hours during the week. On weekends, it will take longer.

1 ACADEMIC POLICIES

1.1 IMPORTANT DATES

The instructor reserves the right to change the content of the course material if needed due to postponement of class caused by inclement weather, instructor illness, etc., or due to the pace of the course.

1.2 ATTENDANCE, MAKEUP EXAMS, MISSED WORK

Students are responsible for satisfying all academic objectives as defined by the professor.

In general, acceptable reasons for failure to participate in class include illness, serious family emergencies, special curricular requirements (e.g., judging trips, field trips, professional conferences), military obligation, severe weather conditions, religious holidays, and participation in official university activities such as music performances, athletic competition, or debate. Absences from class for court-imposed legal obligations (e.g., jury duty or subpoena) must be excused. Other reasons also may be approved. Students shall be permitted a reasonable amount of time to make up the material or activities covered in their absence.

There are no make-ups for missed exams or quizzes related to an unexcused absence.

Students cannot participate in the class unless they are registered officially or approved to audit with evidence of having paid audit fees. The Office of the University Registrar provides official class rolls to instructors.

1.3 HONOR CODE REMINDER

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (http://www.dso.ufl.edu/sccr/process/student-conduct-honorcode/) specifies several behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

1.4 ASSURANCE OF LEARNING

Each program at the Warrington College of Business Administration has developed goals and objectives that express the most valued skills and knowledge that students should be able to demonstrate upon completion of the total learning experiences in that program. The following goals and objectives are specifically mapped onto this course:

- **Goal 1:** Demonstrate competency in and across business disciplines.
  - (1A) Demonstrate knowledge and understanding of elements of economics, finance, accounting, marketing.
  - (1B) Demonstrate proficiency in the use of business-related software applications.
- **Goal 2:** Apply appropriate problem-solving and decision-making skills.
  - (2A) Specify and implement a framework for identifying a business problem and develop alternative solutions.

1.5 AI COURSE CONTENT

Each program at the University of Florida designated as an AI course has Student Learning Outcomes (SLOs) that describe the knowledge, skills, and attitudes that students are expected to acquire throughout the program.

This course fits into the UF AI Category "Build AI". In this course, students will: Evaluate & Create AI: Higher-order thinking skills (e.g., evaluate, appraise, predict, design) with AI applications. AI course content is over 50 percent.

This course has the following identified Student Learning Outcomes, with the corresponding week they are assessed:

- **SLO1:** Identify, describe, and/or explain the components, requirements, and/or characteristics of AI. (Weeks 1, 5, 8-12)
- **SLO2:** Recognize, identify, describe, define, and/or explain applications of AI in multiple domains. (Weeks 6,8,9,12)
- **SLO3:** Select and/or utilize AI tools and techniques appropriate to a specific context and application. (Weeks 5-9)
- **SLO5:** Assess the context-specific value or quality of AI tools and applications. (Weeks 5-12)

When you see these noted in the syllabus, in the schedule, or written somewhere in the course materials- don't panic. These designations are for the university, they don't have any direct impact on your grade. If you have questions, let me know!

2 COURSE STRUCTURE

2.1 SCHEDULE

Week	Start Date	Module / Focus	Content Summary
Week 1	01/12/26	What is Analytics & AI? + Python Setup	AI paradigms; data pipelines; terminal skills; Python installation; printing, variables, simple programs.
Week 2	01/19/26	Python Foundations	Data types; strings; lists & dictionaries; loops; functions; debugging; integrated mini-lab.
Week 3	01/26/26	Data Handling & Exploration	Pandas; loading data; cleaning & transforming datasets; descriptive statistics; JSON & APIs; end-to-end mini-lab.
Week 4	02/02/26	Visualization & Integrated Workflow	Matplotlib & seaborn; visualization principles; synthetic data; full data-to-insight workflow; assessment prep.
Week 5	02/09/26	Machine Learning Foundations	Supervised learning; train–validation–test; bias–variance; feature engineering; scaling; regression; ML pipelines.
Week 6	02/16/26	Trees, Ensembles, and Clustering	Decision trees; random forests; pruning; interpretability; classification metrics; K-means; PCA; segmentation mini-lab.
Week 7	02/23/26	NLP Foundations	Text as data; preprocessing; Bag-of-Words; TF-IDF; classical NLP; sentiment classification mini-lab.

Week	Start Date	Module / Focus	Content Summary
Week 8	03/02/26	Neural Networks & Vision	Neural network intuition; gradient descent; images & tensors; CNNs; augmentation; CNN mini-lab; ML → LLM bridge.
Week 9	03/09/26	Foundations of LLMs	Pretraining; model families; encoder/decoder architectures; generalization; knowledge limits; intro prompting lab.
Week NA	03/16/26	**Spring Break – No Class**	—
Week 10	03/23/26	Transformers	Why Transformers; attention intuition; multi-head attention; positional encoding; encoder vs decoder; embeddings lab.
Week 11	03/30/26	Prompting & Structured Outputs	Instruction and role prompting; few-shot; Chain-of-Thought; JSON/schema outputs; verification; adaptation methods; hands-on lab.
Week 12	04/06/26	RAG & Tool Use	RAG pipeline; embeddings; retrieval tuning; function calling; validation loops; mini RAG capstone lab.

2.2 GRADING AND DATES DETAIL

Date Assigned	Date Due	Activity	Points
2025-08-25	2025-09-01	Introduction. Say hi!	5
2025-08-25	varies	Course Surveys	45
2025-08-25	2025-09-01	Install Python	10
2025-09-01	2025-09-08	Quiz Week 2	50
2025-09-08	2025-09-15	Quiz Week 3	50
2025-09-15	2025-09-22	Quiz Week 4	50
2025-09-22	2025-09-29	Quiz Week 5	50

Date Assigned	Date Due	Activity	Points
2025-09-29	2025-10-06	Simulation Exercise 1	40
2025-09-29	2025-10-06	Midterm Weeks 1-6	250
2025-10-13	2025-10-20	Quiz Week 8	50
2025-10-20	2025-10-27	Quiz Week 9	50
2025-10-27	2025-11-03	Quiz Week 10	50
2025-11-03	2025-11-10	Quiz Week 11	50
2025-11-10	2025-12-01	Quiz Week 12	50
2025-11-10	2025-12-01	Final Practice	50
2025-12-06	2025-12-12	Final Exam Weeks 7+	250

Table 4: Final Grade Calculation

Grade	**Score (in percent)**
A	93.0 or above
A-	92.9-90
B+	89.9-86.6
B	86.5-83
B-	82.9-80
C+	79.9-76.6
C	76.5-73
C-	72.9-70
D+	69.9-66.6
D	66.5-63
D-	62.9-60
E	Less than 60

2.3 LECTURES

You will watch prerecorded course lectures within the course website pages. You will be responsible for all material presented in lectures. Lectures occasionally will be used to clarify and summarize the text, but will also include material not covered in the text. Please note that exam and assignment questions may come from material discussed verbally in the lecture. Additional videos may be posted throughout the course to answer student questions. The content of these will not be on the exams. Optional videos will be clearly labeled in the video title, the announcement, or the discussion post. If it is not labeled optional, questions in the exams may draw from the video. The first 6 weeks of the course cover the basics of using Python for data analysis, and the last 7 weeks cover more advanced topics in analytics and AI. Planned gaps in the schedule are for catching up and holidays/breaks.

2.4 QUIZZES, SIMULATIONS AND EXAM DETAIL

NOTE: The number and weight of the assignments may be reduced during the semester at the discretion of the instructor. If a quiz or assignment is removed, the points for that assignment are also removed and are no longer considered when calculating the final grade. The final exam is harder than the midterm and the quizzes, so it is advisable to go into the final exam with a very good grade. Make sure you prepare for the final exam!

2.4.1 SIMULATIONS

The simulation exercises test your understanding of the material to that date in the course. The first exercise has more coding, while the second exercise is almost exclusively related to testing your knowledge, understanding, and application of the analytics and AI approaches discussed in the lectures.

Note on Grading the Simulation Assignments: This simulation is intentionally challenging and designed to stretch your thinking. To ensure the grading reflects effort and relative mastery rather than absolute perfection, final scores will be curved based on the top 25% of performers. The average score of that top quartile will be mapped to full credit (40 points), and all other scores will be scaled proportionally. This approach ensures fairness while maintaining high standards. In practical terms this means when receiving your grade for this exercise, you should not panic. Once the exercise is complete, the curve will be calculated. The grades and the mapping used to generate them will be posted.

2.4.2 WEEKLY QUIZ

Most weeks of the course have a quiz. The quiz is open book, open notes, and untimed. Each quiz can be taken twice, and the highest score is retained. The due date for the quizzes (always the same each week) is posted on Canvas. I offer a 2-day automatic "grace" period for every quiz. This is intended to be used for emergencies only. The quiz is due on the due date. Without penalty and without approval, you can turn it in up to 2 days late. Keep in mind, of course, that were something to occur during the grace period, this would not be an adequate reason for an extension. You will need to show that you were not able to complete the quiz on time by the original due date, and that the 2-day grace period was inadequate to recover from that incident or problem and take the quiz. I believe these situations will be extremely rare.

At the end of the course, the 2 quizzes with the lowest grade will be dropped (not counted).

The quizzes in this course are designed to give you feedback on your current level of understanding. Many of the questions on the quiz have additional details and feedback available when the wrong/right answer is chosen. Be sure to read this after you have completed the

quiz. This is important even if you scored very well; the additional details will help solidify your understanding of the material.

A word about late or missing quizzes: I understand that sometimes life, minor illness, other classes, and just plain mistakes are made, and a quiz is missed or completed late. I don't want to be the judge and jury of your misfortune. Sometimes bad things happen. The dropped quizzes and automatic grace period of 2 days per quiz allow you the privacy and flexibility to prioritize without worrying about my judgment or having one mistake result in a major grade impact. This grading does not remove an opportunity to make up a quiz due to an excused absence (see below), but given the generous "drop 2" policy and 2 days grace for grading, I would assume these are rare. The quizzes are open for 7 days; students who anticipate issues with conflicting activities should complete the quizzes earlier in the week. I believe, and hope you agree, this policy is clear, fair, and flexible. I ask in return that if you truly need an exception beyond this built-in flexibility, that you are clear and honest about that need.

Some of the questions for the quizzes are from a question pool. You should not expect second attempts at a quiz to be identical. On a retake, the questions may change. The new questions from the pool may look very similar to the first quiz questions. It is critical if you want to improve your grade that you read and complete each question again carefully, and not just plug in your answers from your first quiz attempt.

Throughout the course, you'll encounter occasional graded survey-style questions. These questions are worth just a few points, and are graded for completion (completing the survey is full points). They are an easy way to add some cushion to your grade. Their purpose is to give you a chance to reflect on your learning and to help me (your instructor) gauge how the class is progressing. Your responses help identify what concepts are clear, what might need more explanation, and how I can improve the course in real time. Your honest input is greatly appreciated and contributes to making this a more responsive and effective learning experience for everyone.

2.4.3 MIDTERM AND FINAL EXAM

The midterm exam will be drawn evenly from all lectures, worksheets, and readings that occurred up to that point in the course (Weeks 1-6). The final exam covers all the material after the midterm to the end of the course. It does not test material from prior to the midterm, but it is important to note that much of the code and analytics post-midterm is built on that earlier learning. You are responsible for all assigned material. Students should have a notebook up and running for the exam to assist with validating answers to code completion problems. The exams are proctored using Honorlock. Students are not permitted to use the internet or work with others during the exams.

MIDTERM EXAM: The exam will be open and available to take anytime during the date range in Canvas. This may change slightly from this syllabus if we are behind or some event causes a delay.

FINAL EXAM: The exam will be open and available to take anytime during the date range in Canvas. The dates in this syllabus are the current planned open and close dates for the exam, but Canvas should be your guide.

2.4.4 COLLABORATION

Writing code and performing data analytics is often a collaborative exercise. You are free to discuss on Canvas or elsewhere any materials from the lectures or workbooks. Quizzes, simulations, and exams are individual efforts only. Please do not post answers or solutions from these in the forums or elsewhere online.

2.4.4.1 Use of Generative AI tools or other AI tools

You are permitted to use generative AI tools (such as ChatGPT, GitHub Copilot, or similar technologies) for most course activities, including the graded quizzes, exercises, and assignments. However, AI tools may not be used during the midterm or final exam, which are intended to assess your individual understanding.

3 UNIVERSITY POLICIES

3.1 ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting https://disability.ufl.edu/ students/get-started/. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible.

3.2 ONLINE COURSE EVALUATION PROCESS

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at https://gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via https: //ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https: //gatorevals.aa.ufl.edu/public-results/.

3.3 CLASS RECORDING

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A "class lecture" is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To "publish" means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

Should all or part of this class or open study sessions be offered via an online mechanism during this semester, our sessions may be audio visually recorded for students in the class to refer back and for enrolled students who are unable to attend live. Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during these sessions, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live.

4 CAMPUS RESOURCES

4.1 HEALTH AND WELLNESS

U Matter, We Care: If you or someone you know is in distress, please contact umatter@ufl.edu, 352-392-1575, or visit the U Matter, We Care website to refer or report a concern, and a team member will reach out to the student in distress.

Counseling and Wellness Center: Visit the Counseling and Wellness Center website or call 352-392-1575 for information on crisis services as well as non-crisis services.

Student Health Care Center: Call 352-392-1161 for 24/7 information to help you find the care you need, or visit the Student Health Care Center website.

University Police Department: Visit the UF Police Department website or call 352-392-1111 (or 9-1-1 for emergencies).

UF Health Shands Emergency Room / Trauma Center: For immediate medical care, call 352-733-0111 or go to the emergency room at 1515 SW Archer Road, Gainesville, FL 32608. Visit the UF Health Emergency Room and Trauma Center website.

GatorWell Health Promotion Services: For prevention services focused on optimal well-being, including Wellness Coaching for Academic Success, visit the GatorWell website or call 352-273-4450.

4.2 ACADEMIC RESOURCES

E-learning technical support: Contact the UF Computing Help Desk at 352-392-4357 or via e-mail at helpdesk@ufl.edu. https://helpdesk.ufl.edu

Career Connections Center: Reitz Union Suite 1300, 352-392-1601. Career assistance and counseling services. https://career.ufl.edu

Library Support: Various ways to receive assistance with respect to using the libraries or finding resources. https://uflib.ufl.edu/find/ask

Teaching Center: Broward Hall, 352-392-2010 or to make an appointment 352-392-6420. General study skills and tutoring.

Writing Studio: 2215 Turlington Hall, 352-846-1138. Help brainstorming, formatting, and writing papers.

Student Complaints On-Campus: Visit the Student Honor Code and Student Conduct Code webpage for more information. https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code

On-Line Students Complaints: View the Distance Learning Student Complaint Process.