

Information Systems Department
University of Maryland Baltimore County
Baltimore Maryland 21250
Foundations of Data Science

Instructor: Dr. Vandana Janeja
Office: ITE 404G
e-mail [REDACTED] : please put "IS 298/296" in subject line
Course Delivery Site <http://blackboard.umbc.edu>
Office Hours: M/Wed 2:15-3:30 (other times by appointment)
Please email me for a webex meeting and I will send you a link to connect.

Teaching Assistant: [REDACTED]

[REDACTED] Will be hosting blackboard office hours. Please email him for the link and meeting logistics

Meeting Times:
M-Wed 1 - 2:15pm Via Blackboard Collaborate Under "Collaborate Classroom" link on blackboard.

Textbook:
Computational and Inferential Thinking, Foundations of Data Science, By Ani Adhikari and John DeNero: <https://www.inferentialthinking.com/chapters/intro>

Additional material will be delivered through PowerPoint lecture slides and papers from conferences and journals.

Course Description: This course offers an introduction to computing and data analytics that incorporates a synthesis of inferential and computational thinking, teaching these capacities conceptually through manipulation of real data in a way that anchors students' understanding of both principles and practice of data science. The course teaches critical concepts and skills in computer programming and statistical inference, in conjunction with hands-on analysis of real-world datasets, including economic data, document collections, geographical data, and social networks. It also delves into social issues surrounding data analysis such as privacy and design. Students are eased into programming in Python using Jupyter notebooks from a web browser through a process that requires no specialized software or computing resources. The course is open to both BS and BTA students with no prerequisites beyond high school algebra, and the textbook is freely available online <https://www.inferentialthinking.com/chapters/intro.html>.

Instructional Methods: Discussion, Lectures and Demonstrations

Attendance and Participation: Regular and punctual attendance is expected of all students. In the case of absence due to emergency (illness, death in the family, accident), religious holiday,

or participation in official College functions, it is the student's responsibility to confer with the instructor about the absence and missed course work. I expect that we all show mutual respect for each other during lectures and discussions. Mutual respect entails beginning the class on time, turning off cell phone ringers, pagers, and beepers, and allowing other members of the class to participate in dialogue without interruption or distraction. Adopting these practices is intended to minimize disruption to class discussion and dialogue and maximize the value of the class for all participants.

Class Preparation: All of the reading and homework assignments should be completed before the class in which the material is to be discussed.

Course Requirements:

Regular Punctual Attendance **via blackboard collaborate**
Class Assignments & Homework Tests
Projects

Grading:

IS instructors are expected to have exams and evaluations consisting of a mix of class work, test, homework and programming projects, which result in a reasonable distribution of grades. Please be aware that the students will be tested **on both theory and practical aspects** of Data Science for this course. The break up for this class is as follows:

Activity	Grade
Lab	10%
Homework	20%
Projects (Tools presentation 10%, P1, P2 10 % each)	30%
Midterm	15%
Final	20%
Class Participation	5%

Each task is explained in detail as follows:

Lab

Lab work is graded based on data analytics activities given in the lab.

Assignments (Individual):

Each of these assignments will be an analytics task for which a sample dataset will be provided by the instructor and a specific task will have to be performed individually on the dataset. The evaluation will be based on the programming and results of the analytics task.

Midterm and Final exam

Exams will be closed book and individual exam. The exam format will include problem solving questions and theory questions.

Presentation: Tools Exploration (groups of two- you can choose to collaborate online through the collaborate discussion rooms.)

This will be an emerging technologies demo led by student groups. These tools should be relevant to data science. This exercise includes selection of a tool or emerging technology, obtaining evaluation copy, and explanation of key functionality and demo of the tool. So start early to get the evaluation version and experiment with the tools. A simple description and screen shots will NOT be accepted and may lead to a zero for this assignment. Example tools include data analytics tools such as: rapid miner, Orange, Knime, Cloud based analytics etc.

You will sign up to the forum if you are interested in exploring that tool. Each person will pick the tasks they want to explore and create a short exercise. You will upload slides. On the day of the discussion you will informally share the findings using a short demo. Things to include in your slides: Evaluation version (easy or tough to get), interface features, good or bad aspects of using the software. Your grade will depend on the exercise you developed and shared in the forum. The **online** demo is an informal setting for the entire class to discuss the tool.

Project 1, 2

Projects will be based on performing data science algorithms on a real world dataset. The project will be used to demonstrate the skills developed in the topics covered during the semester. **Project collaboration can be through the blackboard collaborate discussion rooms.**

Grading criteria: With respect to final letter grades, the University's Undergraduate Catalogue states that, "A, indicates superior achievement; B, good performance; C, adequate performance; D, minimal performance; F, failure" There is specifically no mention of any numerical scores associated with these letter grades. Final letter grades in this course conform to the University's officially published definitions of the respective letter grades. In accordance with the published University grading policy, it is important to understand that final letter grades reflect academic achievement and not effort. While mistakes in the arithmetic computation of grades and grade recording errors will always be corrected, it is important to understand that in all other situations final letter grades are not negotiable and challenges to final letter grades are not entertained.

Academic Integrity: By enrolling in this course, each student assumes the responsibilities of an active participant in UMBC's scholarly community in which everyone's academic work and behavior are held to the highest standards of honesty. Cheating, fabricating, plagiarism, and helping others to commit these acts are all forms of academic dishonesty and they are wrong. Academic misconduct could result in disciplinary action that may include, but is not limited to, suspension or dismissal. Full policies on academic integrity should be available in the UMBC Student Handbook, Faculty Handbook, or the UMBC Directory.

Cheating in any form will not be tolerated in this class. *You may not copy other students' work or copy programs from the Internet. You will receive an F for any assignment found to be copied, from any source (this includes any collaboration on individual assignments), for the first time and any subsequent violations will result in immediate failure of the course. You may not reuse your own work from another class for the deliverables in this course. Any form of cheating will be reported and will stay on student's record for the rest of their term at UMBC with possible note on their transcripts.*

Inclement Weather: Any paper (hardcopy) assignment or test due on a class date that has been canceled due to inclement weather will be due the next class meeting. If it is an email/online submission the work should be submitted on the day it is due regardless of the class cancellation or inclement weather.

Accessibility in the classroom: If you have any special needs for technology or classroom accessibility please contact the student support Services and me as well if you like so that we can best accommodate your needs in a confidential and timely manner.

UMBC is committed to eliminating discriminatory obstacles that disadvantage students based on disability. Student Support Services (SSS) is the UMBC department designated to receive and maintain confidential files of disability-related documentation, certify eligibility for services, determine reasonable accommodations, develop with each student plans for the provision of such accommodations, and serve as a liaison between faculty members and students regarding disability-related issues. If you have a disability and want to request accommodations, contact SSS in the Math/Psych Bldg., room 213 or at 410-455-2459. SSS will require you to provide appropriate documentation of disability. If you require accommodations for this class, make an appointment to meet with me to discuss your SSS-approved accommodations.

TENTATIVE COURSE SCHEDULE (Schedule subject to change)

There may be **guest lectures on data science applications**. The schedule will be adjusted accordingly.

Date	Topic	Readings	Activity/Deadlines
27-Jan	Class Introduction, Syllabus and Expectations/ DS Introduction, Introduction, Cause and Effect	1.1, 1.2, 1.3, 2	
29-Jan	Reading books: Using Python to parse literature Data Types, Tables, Building Tables	4, 5	Python basics
3-Feb	Data Types, Tables, Building Tables	4, 5	Lab: Python basics and Expressions
5-Feb	Data Types, Tables, Building Tables	4, 5	Homework 01 (Due Thu 02/12); Lab: Expressions and Table Operations
10-Feb	Tables and Arrays	5, 6	Lab: Data Types and Creating & Extending Tables
12-Feb	Census, Histograms, Functions; Groups	6.3, 6.4, 7, 7.1, 7.2, 7.3, 8, 8.1, 8.2, 8.3	Homework 02 (Due Thu 02/19); HW 1 due
17-Feb	Census, Histograms, Functions; Groups	8.4, 8.5; 9, 9.1, 9.2, 9.3, 9.5, 18.1	Lab: Functions and Visualizations ; Project 1 announced

19-Feb	Joins, Tables Examples; Iteration, Chance	8.4, 8.5; 9, 9.1, 9.2, 9.3, 9.5, 18.1	HW2 Due
24-Feb	Joins, Tables Examples; Iteration, Chance	8.4, 8.5; 9, 9.1, 9.2, 9.3, 9.5, 18.1	Lab: Conditional Statements, Iteration, Tables; Tool Exploration pick
26-Feb	Joins, Tables Examples; Iteration, Chance	8.4, 8.5; 9, 9.1, 9.2, 9.3, 9.5, 18.1	
2-Mar	Randomness	8.4, 8.5; 9, 9.1, 9.2, 9.3, 9.5, 18.1	
4-Mar	Overview of Data Science		Project 1 Due
9-Mar	Overview of Data Science -- Tools exercise		Lab- Weka
11-Mar	Exam 1		
16-Mar	Spring Break		
18-Mar	Spring Break		
23-Mar	Why Mean matters?	14	Homework 03 announced (Due Thu 4/1)
25-Mar	Why Mean matters?	14	Lab Tool exploration pick due in discussion board
30-Mar	Prediction	15	
1-Apr	Prediction Discuss HW3	15	HW 3 Due Homework 4 announced (Due Thu 04/15)
6-Apr	Prediction	15	Tool exploration check point Lab Project 2 announced
8-Apr	Privacy		HW 4 Due
13-Apr	Ethics		
15-Apr	Classification	17	
20-Apr	Classification	17	Project 2 due
22-Apr	Classification	17	
27-Apr	Tools exploration presentations	Tools Exploration	
29-Apr	Tools exploration presentations	Tools Exploration	
4-May	Case Study: Health, Education;		

6-May	Case Study: Health, Education;		
11-May	Final Exam		

Disclosures of Sexual Misconduct and Child Abuse or Neglect

As an instructor, I am considered a Responsible Employee, per [UMBC's Policy on Prohibited Sexual Misconduct, Interpersonal Violence, and Other Related Misconduct](#) (located at <http://humanrelations.umbc.edu/sexual-misconduct/umbc-resource-page-for-sexual-misconduct-and-other-related-misconduct/>). While my goal is for you to be able to share information related to your life experiences through discussion and written work, I want to be transparent that as a Responsible Employee I am required to report disclosures of sexual assault, domestic violence, relationship violence, stalking, and/or gender-based harassment to the University's Title IX Coordinators.

As an instructor, I also have a mandatory obligation to report disclosures of or suspected instances of child abuse or neglect (www.usmh.usmd.edu/regents/bylaws/SectionVI/VII150.pdf). The purpose of these reporting requirements is for the University to inform you of options, supports and resources; you will not be forced to file a report with the police. Further, you are able to receive supports and resources, even if you choose to not want any action taken. Please note that in certain situations, based on the nature of the disclosure, the University may need to take action.

If you need to speak with someone in confidence about an incident, UMBC has the following Confidential Resources available to support you:

The Counseling Center: [410-455-2472](tel:410-455-2472)

University Health Services: [410-455-2542](tel:410-455-2542)

(After-hours counseling and care available by calling campus police at [410-455-5555](tel:410-455-5555))

Other on-campus supports and resources:

The Women's Center, [410-455-2714](tel:410-455-2714)

Title IX Coordinator, [410-455-1606](tel:410-455-1606)

Additional on and off campus supports and resources can be found at: <http://humanrelations.umbc.edu/sexual-misconduct/gender-equitytitle-ix/>.

Diversity Statement on Civil Dialogue:

I hope the course challenges us to engage with issues that touch our and others' lives personally and politically and to develop ways of thinking and acting to address them in nuanced, conscious, and accountable ways. Questions, personal insights, experiences, and emotions about the materials and topics are always welcome in class. I do not expect that we share the same views on the topics we cover. We all need to speak up, especially when we do not agree with each other's views, but do so in a respectful manner. The range of views you hold and the

experiences you bring into the classroom will make our learning experiences much more interesting and enriching. In order to ensure an environment for robust intellectual debate, please do not video or audio record in class.

Diversity Statement on Respect:

Students in this class are encouraged to speak up and participate during class meetings. Because the class will represent a diversity of individual beliefs, backgrounds, and experiences, every member of this class must show respect for every other member of this class. (From California State University, Chico's Office of Diversity and Inclusion).