COURSE SYLLABUS

```
*********************************************************************************
```

YEAR COURSE OFFERED: 2025

SEMESTER COURSE OFFERED: Spring

DEPARTMENT: Decision and Information Sciences (DISC)

COURSE NUMBER: BZAN 6355

NAME OF COURSE: Advanced Programming Big Data Analytics

NAME OF INSTRUCTOR: Raksha Singh

```
*********************************************************************************
```
The information contained in this class syllabus is subject to change without notice. Students are expected to be aware of any additional course policies presented by the instructor during the course.
```
*********************************************************************************
```

This course is fully online/asynchronous. Pls follow the departmental guidelines about online courses. For the asynchronous mode, study materials will be assigned for self-paced study as coursework.

Learning Objectives

On completion of this course, the student should be able to :
- Identify terminology and concepts related to data mining.
- Design models using data mining tools in Python to build and evaluate them.
- Understand the principles of descriptive, predictive, and prescriptive analytics.
- Learn key data mining techniques for data manipulation and data visualization.
- Apply data exploration techniques to understand constraints in real-world data challenges using case studies and discussions around real-world Big data.

Major Assignments/Exams

Cengage Quizzes(2/9 – 5/12) and HW assignments(from 1/15-2/8)	20%
Harvard Case Studies	30%
Python Assignments	40%
Portfolio	10%

COURSE SYLLABUS

Required Reading

1. ***Business Analytics*** by Jeffrey D. Camm, James J. Cochran, Michael J. Fry, Jeffrey W. Ohlmann | 5th Edition | Copyright 2024 - https://www.cengage.com/c/business-analytics-5e-camm-cochran-fry-ohlmann/9780357902202/
2. Open Access web version of ***Python for Data Analysis (3rd Edition)*** https://wesmckinney.com/book/ OR Wes McKinney, ***Python for Data Analysis: Data Wrangling with Pandas, NumPy, and Python (2nd ed.)***, O'Reilly, 2017. ISBN-13: 978-1491957660
3. Harvard Coursepack Case Studies found on Canvas link or here - https://hbsp.harvard.edu/import/1257140

Harvard Coursepack

Each student will need to read and participate in Discussions on Case Studies related to Big Data and Business Use Cases. This component of the course is included to aid the student in developing critical thinking and applying a Data Analytics mindset to build strategy and data practices in a professional setting.
Each student needs to have their own individual copy of the case study. The link to the Coursepack with all the case studies is provided here as well as on Canvas.
https://hbsp.harvard.edu/import/1257140

Recommended Reading

1. Daniel T. Larose and Chantal D. Larose, ***Discovering Knowledge in Data: An Introduction to Data Mining (2nd ed.)***, Wiley, 2014. ISBN-13: 978-0-470-90874-7 (hardback)

List of discussion/lecture topics

- Descriptive, predictive, and prescriptive analytics
- Data wrangling
- Data manipulation
- Data visualization
- Regressions
- Classification
- Natural Language Processing
- Supervised Vector Machine Learning Algorithms
- Nearest Neighbor Algorithms
- Clustering
- Harvard Case Studies - Discussions on Data Ethics, Usage, and Biases in real-world applications
- Solidify Statistical concepts related to data mining
- Use some R and Excel to compare with Python
- Data Analysis is with essential Python libraries

COURSE SYLLABUS

- Portfolio
- Critical thinking

Discussion Posts

- Online classroom discussion is a vital learning activity that enhances writing and critical thinking. These skills establish the foundation for self-reflection and unbiased consideration of other perspectives that enhance the long-term development of the business professional.
- A successful professional engages in substantive conversations, reflecting on other's perspectives while articulating their own views. More importantly, they demonstrate the disposition to critically and reflectively consider new information, facts, and perspectives in the enhancement of their own knowledge and development. To emulate a real-world conversation, the student will participate in the classroom discussion forum. The classroom discussion has two components: the student's original response to the discussion question/prompt and the student's ongoing participation and contribution to the discussion. Each component is graded separately.
  Initial Post to Discussion Questions/Prompts:
- The student is required to post a substantive initial response to Discussion Questions.
  Ongoing Contribution to Class Discussion:
- In addition to the initial responses posted the student must also contribute to the discussion by posting one substantive participation post to one another student.
    Substantive Participation Posts
    o Full participation in the discussion is a key component of the learning experience. It enriches group interaction and enhances the learning environment.
    o To be considered substantive, a participation post (initial or ongoing) should average 150-250 words in length.
    o The post should include appropriate foundation knowledge, be factual, and enhance the ongoing dialogue. However, rather than just reporting what someone else has stated, the student should demonstrate application and/or reflection of knowledge such that the student enhances the meaning of the material.
    o Contributing to the discussion should promote an exciting, vibrant, shared learning community that accomplishes two or more of the following - Expands on a classmate's comments in a value-adding, topic-related way, promotes a collaborative, supportive community, and advances the dialogue through follow-up questions. "One-liners," off-topic posts, vague statements, inadequate explanations, or posts do not meet the substantive participation requirements listed above.

Critical Thinking

An important component of this course is: critical thinking. Critical thinking is important in Business Data Analytics. This is formulated through case studies. Some important points to consider when responding to discussion posts:

- In what ways can you embrace critical thinking?

- Meta-cognition?
- Higher-level thinking (analysis, synthesis, creation)?
- Which of these three levels do you do best and why?
- Provide examples from your own experiences where critical thinking has been necessary for success.

Portfolio

- Creating a Portfolio of programs/exercises with dashboards from exercises in the class.
- This can be used when showcasing your work to future employers.
- It will help students to learn presentation skills that can prove useful when presenting to C-Suite Officers/Stakeholders or Senior Management.

Homework Assignments

- To be worked on and submitted in Canvas.
- Cengage assignments are to be worked on independently while programming assignments may be individual/or team assignments as assigned by the Instructor.

Course Syllabus

COURSE SYLLABUS

	Week	Dates	Chapter	Topic	Harvard Case	Assignment
Module 1	**Week 1**	Jan 13- Jan 20	Introductions	Python Fundamentals		Python HW#1
	Week 2	Jan 20- Jan 27	Chapter 1 – TB	Data wrangling	Harvard Case -Machine Learning Concepts: An Educational Game Simulation	Cengage HW#1 Python HW#2
	Week 3	Jan 27 – Feb 3	Chapter 2 - TB Chapter 3 – TB	Data visualization	Harvard Case - C3.ai-Driven to Succeed	Cengage HW#2 Python HW#3
	Week 4	Feb 3 - Feb 10		Data preprocessing		
Module 2	**Week 5**	Feb 10 – Feb 17	Chapter 5 – TB Chapter 8 – TB	Linear regression; Multivariate Regression	Harvard Case - Numenta: Inventing and (or) Commercializing AI	Cengage HW#3 – Quiz 10 Q
	Week 6	Feb 17- Feb 24	Chapter 10 – TB	Logarithmic Regressions		
	Week 7	Feb 24 – Mar 3	Chapter 11 - TB	Classification - kNN	Harvard Case - Cloudphysician: A Collaboration between Man and Machine to Save Lives	Cengage HW#4 - Quiz 10 Q
	Week 8	Mar 3 – Mar 10	Chapter 11 - TB	Naive Bayes		Python HW#4: Regressions - 4 Datasets;
	Week 9	Mar 10 – Mar 17	**Spring Break**			
	Week 10	Mar 17 – Mar 24	Chapter 11 - TB	SVM Learning Algorithm	Harvard Case -Predicting Consumer Tastes with Big Data at Gap	Cengage HW#5 - Quiz 10 Q
Module 3	**Week 11**	Mar 24 – Mar 31		Clustering - Unsupervised Learning		Cengage HW#6 - Quiz 10 Q
	Week 12	Mar 31 – Apr 7	Chapter 9 – TB	Time Series Analysis	Harvard Case -Automating Bureaucracy with Python: The Case of the Springfield Bail Fund: Python PowerPoint Files (D)	Python HW#5: Classification & Clustering – 2 Datasets
	Week 13	Apr 7 – Apr 14	Chapter 9 – TB	Time Series Forecasting		Cengage HW#7 - Quiz 10 Q
	Week 14	Apr 14 – Apr 21	Chapter 17 – TB	NLP; Decision Analysis	Harvard Case -Automating Bureaucracy with Python: The Case of the Springfield Bail Fund: Python PowerPoint Files (D)	Cengage HW#8 - Quiz 10 Q
Module 4	**Week 15**	Apr 21 – Apr 28			Harvard Case -Algorithmic Bias in Marketing	Python HW#6: Time Series, NLP – 2 datasets; Portfolio due

Required Technology

- We will use Python 3 to do all the programming work in this course.
- Anaconda 3 is strongly recommended as the IDE to edit and test Python codes. To maximize your success in online courses at UH, you should have access to a desktop or laptop computer running an up-to-date Windows or macOS operating system, using the latest Firefox or Chrome browsers.

Late work
All coursework, including programming assignments (or labs), must be submitted by the deadline. No late submissions will be accepted.

COURSE SYLLABUS

Make-Up Exams
Make-up exams will only be given in cases of documented emergencies as per UH Guidelines.

Feedback & Grading Policy:
Submitted coursework will be graded within one week. Multiple submissions are allowed before the deadline. However, resubmission is not accepted after the deadline.
Any correspondence regarding your participation or grades can only be sent from your UH email. Please note that all communications with the instructor must be directed to the email address: rbsingh2@cougarnet.uh.edu.

Mental Health and Wellness Resources
The University of Houston has a number of resources to support student's mental health and overall wellness, including CoogsCARE and the UH Go App. UH Counseling and Psychological Services (CAPS) offers 24/7 mental health support for all students, addressing various concerns like stress, college adjustment and sadness. CAPS provides individual and couples counseling, group therapy, workshops and connections to other support services on and off-campus. For assistance visit uh.edu/caps, call 713-743-5454, or visit a Let's Talk location in-person or virtually. Let's Talk are daily, informal confidential consultations with CAPS therapists where no appointment or paperwork is needed.
Need Support Now?
If you or someone you know is struggling or in crisis, help is available. Call CAPS crisis support 24/7 at 713-743-5454, or the National Suicide and Crisis Lifeline: call or text 988, or chat 988lifeline.org.

Title IX/Sexual Misconduct
Per the UHS Sexual Misconduct Policy, your instructor is a "responsible employee" for reporting purposes under Title IX regulations and state law and must report incidents of sexual misconduct (sexual harassment, non-consensual sexual contact, sexual assault, sexual exploitation, sexual intimidation, intimate partner violence, or stalking) about which they become aware to the Title IX office. Please know there are places on campus where you can make a report in confidence. You can find more information about resources on the Title IX website at https://uh.edu/equal-opportunity/title-ix-sexual-misconduct/resources/.

Reasonable Academic Adjustments/Auxiliary Aids
The University of Houston is committed to providing an academic environment and educational programs that are accessible for its students. Any student with a disability who is experiencing barriers to learning, assessment or participation is encouraged to contact the Justin Dart, Jr. Student Accessibility Center (Dart Center) to learn more about academic accommodations and support that may be available to them. Students seeking academic accommodations will need to register with the Dart Center as soon as possible to ensure timely implementation of approved accommodations. Please contact the Dart Center by visiting the website: https://uh.edu/accessibility/ calling (713) 743-5400, or emailing jdcenter@Central.UH.EDU.
The Student Health Center offers a Psychiatry Clinic for enrolled UH students. Call 713-743-5149 during clinic hours, Monday through Friday 8 a.m. - 4:30 p.m. to schedule an appointment.
The A.D. Bruce Religion Center offers spiritual support and a variety of programs centered on well-being.
The Center for Student Advocacy and Community (CSAC) is where you can go if you need help but don't know where to start. CSAC is a "home away from home" and serves as a resource hub

to help you get the resources needed to support academic and personal success. Through our Cougar Cupboard, all students can get up to 30 lbs of FREE groceries a week. Additionally, we provide 1:1 appointments to get you connected to on- and off-campus resources related to essential needs, safety and advocacy, and more. The Cougar Closet is a registered student organization advised by our office and offers free clothes to students so that all Coogs can feel good in their fit. We also host a series of cultural and community-based events that fosters social connection and helps the cougar community come closer together. Visit the CSAC homepage or follow us on Instagram: @uh_CSAC and @uhcupbrd. YOU belong here.

<u>Women and Gender Resource Center</u>
The mission of the WGRC is to advance the University of Houston and promote the success of all students, faculty, and staff through educating, empowering, and supporting the UH community. The WGRC suite is open to you. Stop by the office for a study space, to take a break, grab a snack, or check out one of the WGRC programs or resources. Stop by Student Center South room B12 (Basement floor near Starbucks and down the hall from Creation Station) from 9 am to 5 pm Monday through Friday.

<u>Academic Honesty Policy</u>
High ethical standards are critical to the integrity of any institution, and bear directly on the ultimate value of conferred degrees. All UH community members are expected to contribute to an atmosphere of the highest possible ethical standards. Maintaining such an atmosphere requires that any instances of academic dishonesty be recognized and addressed. The UH Academic Honesty Policy is designed to handle those instances with fairness to all parties involved: the students, the instructors, and the University itself. All students and faculty of the University of Houston are responsible for being familiar with this policy.

<u>Excused Absence Policy</u>
Regular class attendance, participation, and engagement in coursework are important contributors to student success. Absences may be excused as provided in the University of Houston Undergraduate Excused Absence Policy and Graduate Excused Absence Policy for reasons including: medical illness of student or close relative, death of a close family member, legal or government proceeding that a student is obligated to attend, recognized professional and educational activities where the student is presenting, and University-sponsored activity or athletic competition. Under these policies, students with excused absences will be provided with an opportunity to make up any quiz, exam or other work that contributes to the course grade or a satisfactory alternative. Please read the full policy for details regarding reasons for excused absences, the approval process, and extended absences. Additional policies address absences related to military service, religious holy days, pregnancy and related conditions, and disability.

<u>Recording of Class</u>
Students may not record all or part of class, livestream all or part of class, or make/distribute screen captures, without advanced written consent of the instructor. If you have or think you may have a disability such that you need to record class-related activities, please contact the Justin Dart, Jr. Student Accessibility Center. If you have an accommodation to record class-related activities, those recordings may not be shared with any other student, whether in this course or not, or with any other person or on any other platform. Classes may be recorded by the instructor. Students may use instructor's recordings for their own studying and notetaking. Instructor's recordings are not authorized to be shared with anyone without the prior written

approval of the instructor. Failure to comply with requirements regarding recordings will result in a disciplinary referral to the Dean of Students Office and may result in disciplinary action.

Recommended Language and Guidance (use as appropriate for class content and format)
<u>Resources for Online Learning</u>
The University of Houston is committed to student success, and provides information to optimize the online learning experience through our <u>Power-On</u> website. Please visit this website for a comprehensive set of resources, tools, and tips including: obtaining access to the internet, AccessUH, Blackboard, and Canvas; using your smartphone as a webcam; and downloading Microsoft Office 365 at no cost. For questions or assistance contact <u>UHOnline@uh.edu</u>.

<u>UH Email</u>
Please check and use your Cougarnet email for communications related to this course. Faculty use the Cougarnet email to respond to course-related inquiries such as grade queries or progress reports for reasons of FERPA. To access your Cougarnet email, <u>login</u> to your Microsoft 365 account with your Cougarnet credentials. Visit <u>University Information Technology (UIT)</u> for instructions on how to connect your Cougarnet e-mail on a mobile device.

<u>Webcams</u>
Access to a webcam is required for students participating remotely in this course. Webcams must be turned on (*state <u>when</u> webcams are required to be on and the <u>academic basis</u> for requiring them to be on*). (*Example: Webcams must be turned on during exams to ensure the academic integrity of exam administration.*)

<u>Security Escorts and Cougar Ride</u>
UHPD continually works with the University community to make the campus a safe place to learn, work, and live. The security escort service is designed for the community members who have safety concerns and would like to have a Security Officer walk with them, for their safety, as they make their way across campus. Based on availability either a UHPD Security Officer or Police Officer will escort students, faculty, and staff to locations beginning and ending on campus. If you feel that you need a Security Officer to walk with you for your safety, please call <u>713-743-3333</u>. Arrangements may be made for special needs.

Parking and Transportation Services also offers a late-night, on-demand shuttle service called "Cougar Ride" that provides rides to and from all on-campus shuttle stops, as well as the MD Anderson Library, Cougar Village/Moody Towers and the UH Technology Bridge. Rides can be requested through the UH Go app. Days and hours of operation can be found at <u>https://uh.edu/af-university-services/parking/cougar-ride/</u>.

<u>Syllabus Changes</u>
Please note that the instructor may need to make modifications to the course syllabus. Notice of such changes will be announced as quickly as possible through {*specify how students will be notified of changes*}.

<u>Use of Artificial Intelligence for assignments</u>
The use of AI tools is not recommended in this course. Unless specified assignments that have used AI tools will drop a letter grade. Note that Turnitin currently has a filter for ChatGPT.
<u>Online</u>

COURSE SYLLABUS

Exams & Proctoring
There will be online proctoring applications that will use an environmental scan
(1) Students need to be aware if they are using online proctoring software, and the student should consequently choose an environment with as little background noise and additional movement as possible to avoid the software flagging their exam for potential academic dishonesty
(3) Students can use their personal computer to complete exams and quizzes in any specific location (e.g., their home).