UCD Michael Smurfit
Graduate Business School

MKT 46090: Big Data Analytics

Autumn Trimester 2025/26

Time (Room):	Wednesday	14:00-16:50 (N203-GSB)
Office Hours (Room):	By appointment (D005)	

Instructor: David DeFranza
Email: david.defranza@ucd.ie

Every day, an increasing variety of new information is created at a larger volume and faster velocity than ever before. This information presents incredible opportunities for businesses but contending with its size and speed poses considerable technical and strategic challenges. Indeed, businesses capable of extracting knowledge from large data sets can achieve a considerable competitive advantage, and managers capable of facilitating this process will find they have an advantage in the job market. In this module, we will engage with business problems using data analytic thinking. Along the way, we will discuss the fundamental principles guiding the extraction of knowledge from information, challenges posed by very large data sets (including "Big Data"), and some of the most common techniques and technologies used to mine such data.

Learning Outcomes

This module aims to prepare you for the challenges and opportunities today's marketers face when dealing with "Big Data" and extracting knowledge from large data sets more generally. At the end of this module, you should be able to:

1. Explain the unique characteristics of and challenges posed by Big Data
2. Apply industry standard best practices for the organization and documentation of large datasets
3. Summarize the data mining process within the context of a business problem
4. Identify an appropriate analysis method based on a description of the business problem and available data
5. Assess the performance of a model or analysis based on common diagnostic metrics
6. Explain foundational data mining methods and machine learning algorithms
7. Implement analysis methods using Excel, Python, and AI tools

Required & Recommended Readings

Required reading for each week will be posted to Brightspace.

Some cases and readings are provided through Harvard Business Publishing. Please use the links provided via Brightspace to download a copy of these materials. Note that cases may include a supplemental data file which you should also download.

Required Software

In this module, you will be asked to attempt to implement the methods discussed using Python. It is recommended that students use Google Colab, which facilitates development and evaluation of Python code in the web browser and has no other dependencies.

Access to Google Colab is free using your UCD email and available here:
https://colab.research.google.com

Importantly, Google Colab is integrated with the Gemini AI assistant, which can provide Python code based on prompts. The ***use of Gemini*** for completing data analysis assignments ***is expected and encouraged***. For more details on the assignments, see below.

Assessment

This module has two assessment components, each with a specific weighting and marks totally 100%. Please note that all assessment in this course is individual. There is no group work. Following, each assessment component is discussed in detail.

Assessment Component	Weighting	Individual / Group	Deadline
1. Data Analysis Applications	50%	Individual	7 Oct, 4 Nov, 7 Dec
2. Final Exam	50%	Individual	**TBD**

Data Analysis Applications

This assignment challenges students to engage directly with data analysis using Python in Google Colab, leveraging Gemini to guide their coding attempts. The objective is to apply theoretical concepts from the course to a real-world dataset, recognizing the challenges and limitations of big data analytics when executed without formal programming training. Students will document their process, critically assess their successes and failures, and reflect on their experience in the style of a LinkedIn or blog post.

Using the dataset provided in the Allianz case (see case list above), students will address specific assignment questions, detailed on Brightspace. This is a learning-focused assignment. The emphasis is not on obtaining perfectly correct results but on engaging with the data, reflecting on the process, and critically analyzing AI-assisted programming.

Following each analysis attempt, students will assess the accuracy, reliability, and interpretability of their findings. In a short report between 800 and 1,000 words, students will provide a narrative of their experience with the analysis, insights on what worked and what didn't, reflections on the value and challenges of AI-assisted programming in marketing analytics, and a discussion on how this exercise deepened their understanding of the business case and relevant course concepts. All reports should include a working link to the associated Colab notebook.

Final Exam

The final exam will be one hour long and consist of up to 50 multiple-choice questions. The exam will be held at the Blackrock Exam Centre (see the end of this document for directions). The exam is closed-book and paper-and-pencil. Additional details will be provided during the term.

Assessment Criteria and Grade Descriptors

This module utilizes criterion referencing and UCD grade descriptors. Before attempting the assessments for this module, you are encouraged to review the grade descriptors. A copy of the UCD grade descriptors can be downloaded from:

https://www.ucd.ie/registry/t4media/UCD%20Module%20Grade%20Descriptors.pdf

Please note that this course utilizes the "**Alternative Linear Conversion Grade Scale**" for conversion of numeric grades to letter grades, including calculation of a final grade from the course average. The scale can be found here:

https://www.ucd.ie/registry/t4media/Standard%20Conversion%20Grade%20Scale.pdf

Protocol for submitting your assignments: All continuous assessment should be submitted electronically via Brightspace or handed to the instructor in class, as directed, by the deadline specified. Please do not email assignments directly to the teaching team, unless explicitly directed to do so.

Statement of Inclusion

This module strives to be a model of inclusion. We respect and value student diversity in all of the modules we offer. We aim to provide and promote equitable access and opportunity to all students regardless of disability, race, age, gender, sexuality or socio-economic status. Students are encouraged to approach staff to discuss their learning needs. Any information disclosed will be treated confidentially.

University Policies

You should ensure you are familiar with the following UCD protocols:

- ***Plagiarism and Academic Integrity:*** UCD and the College of Business take academic integrity extremely seriously. All work must be your own, be completed specifically for this module and not have been submitted elsewhere. It should also be accompanied by a signed own work statement, such as the following:

  > *I declare that all materials included in this essay/report/project/dissertation is the end result of my own work and that due acknowledgement have been given in the bibliography and references to ALL sources be they printed, electronic or personal.*

  The university's plagiarism and academic integrity policy is available from: https://www.ucd.ie/secca/studentconduct/

- ***Harvard Referencing Style:*** UCD College of Business uses the Harvard style of referencing. The UCD library has developed some resources on avoiding plagiarism and on how to reference correctly using the Harvard style. These resources are available from: https://libguides.ucd.ie/academicintegrity

- ***Late Submission of Coursework:*** This policy outlines the steps you should take where you know in advance that you will not be in a position to meet a submission deadline and the penalties imposed in such circumstances. See:

  https://hub.ucd.ie/usis/!W_HU_MENU.P_PUBLISH?p_tag=GD-DOCLAND&ID=137

- ***UCD Extenuating Circumstances policy:*** If, during the course of this module, you encounter any serious unforeseen circumstances that are beyond your control and which prevent you from meeting the requirements of the module, you should consult this policy. A student guide to this policy is available from:

  https://www.ucd.ie/students/studentdesk/extenuatingcircumstances/

- ***UCD Student Code:*** The UCD Student Code establishes the University's regulations and expectations in respect of student behaviour and conduct. The Student Code is available from: https://www.ucd.ie/secca/studentconduct/

Module Topics

The schedule below outlines the planned themes, by lecture. Updates and additions will be notified in class and on Brightspace. Required reading and additional information will be posted to Brightspace.

Lecture	Date	Topic & Required Reading
1	10 September	Course Overview; Intro to Big Data & Machine Learning • Campbell et al. (2020). "From data to action: How marketers can leverage AI" • Overgoor et al. (2019). "Letting the computers take over: Using AI to solve marketing problems" • Huang & Rust (2022). "A framework for collaborative artificial intelligence in marketing"
2	17 September	Introduction to Python and Google • Parzen & Ellery (2024). "Introduction to data analysis in Python" • Prabhu (2019). "Exploring the data in Python" • Prabhu (2020). "Cheat-sheet for Google Colab"
3	24 September	Managing and Evaluating Data • Krotov & Johnson (2023). "Big web data: Challenges related to data, technology, legality, and ethics" • Gebru et al. (2021). "Datasheets for datasets" • Cai & Zhu (2015). "The challenges of data quality and data quality assessment in the big data era"
4	1 October	Feature Engineering • Dong (2015). "Beating Kaggle the easy way" • Sekar (2023). "Feature engineering for machine learning: A step-by-step guide" • Altman & Krzywinski (2018). "The curse(s) of dimensionality" • Parzen & Ellery (2024). "PCA for MBAs"
	7 October	**Data Analysis Applications Assignment 1 Due**
5	8 October	Predictive Modeling • Bojinov et al. (2025). "Prediction & machine learning" • Angwin et al. (2016). "Machine bias" • Logg (2019). "Using algorithms to understand the biases in your organization"
6	15 October	Recommender Systems • Schrage (2020). "The transformational power of recommendation" • Roy & Dutta (2022). "A systematic review and research perspective on recommender systems" • Ransbotham et al. (2018). "The hidden side effects of recommendation systems"

7	22 October	Tree-Based Models • Lee & Kim (2021). "The decision tree for longer-stay hotel guest" • Song & Kim (2021). "Predictors of consumers' willingness to share personal information with fashion sales robots"
8	29 October	Linear Models • Varian (2014). "Big Data: New tricks for economists" • Venkatesan & Gibbs (2013). "Logistic regression" • Cui & Curry (2005). "Prediction in marketing using support vector machines"
	4 November	**Data Analysis Applications Assignment 2 Due**
9	5 November	Introduction to Neural Networks • Kashef (2020). "A note on neural networks" • Bertucci (n.d.). "Backprop explainer"
10	12 November	Neural Networks with Memory • Chauhan (2021). "A simple overview of RNN, LSTM and Attention Mechanism" • Bender et al. (2021). "On the dangers of stochastic parrots"
11	19 November	Large Language Models • Mingotti (2025). Inside LLMs: How pre-training shapes what ChatGPT knows • Mingotti (2025). Inside LLMs: Neural networks and attention • Mingotti (2025): Inside LLMs: Understanding transformer architecture—A guide for marketers
12	26 November	Review & Wrap Up • Grewal et al. (2025). "How should gen AI fit into your marketing strategy" • Ascarza et al. (2021). "Why you aren't getting more from your marketing AI" • Wu & Higgins (2023). "Generative AI value chain"
	7 December	**Data Analysis Applications Assignment 3 Due**
	TBD	**Final Exam**

How to Find D Building Offices

UCD Blackrock Campus

Building Index	No.	Grid
Blackrock Examination Centre	1.	H5
Copi-Print / ILTG	2.	D3
D Building	3.	D5
E Building	4.	C4
East Hall	5.	C3
Graduate School of Business	6.	D3
Library	7.	E3
Liguori House (Grey House)	8.	E1
Management House Executive Education	9.	D2
Marketing Development Programme (Granite Room)	10.	D3
Oratory	11.	B3
Proby House	12.	D1
Restaurant	13.	B4
Services Desk	14.	C4
West Hall	15.	B3
Laundry Room	16.	D4

LEGEND

Building
Walkways
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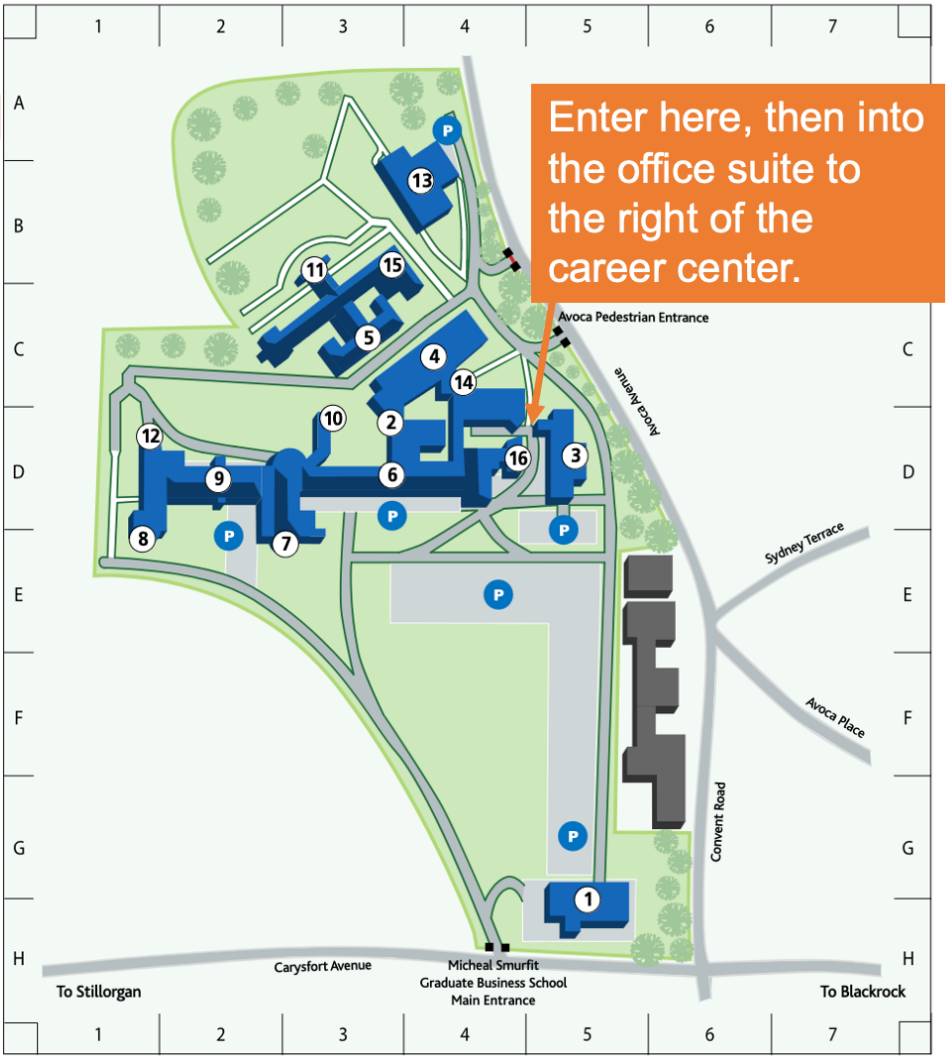
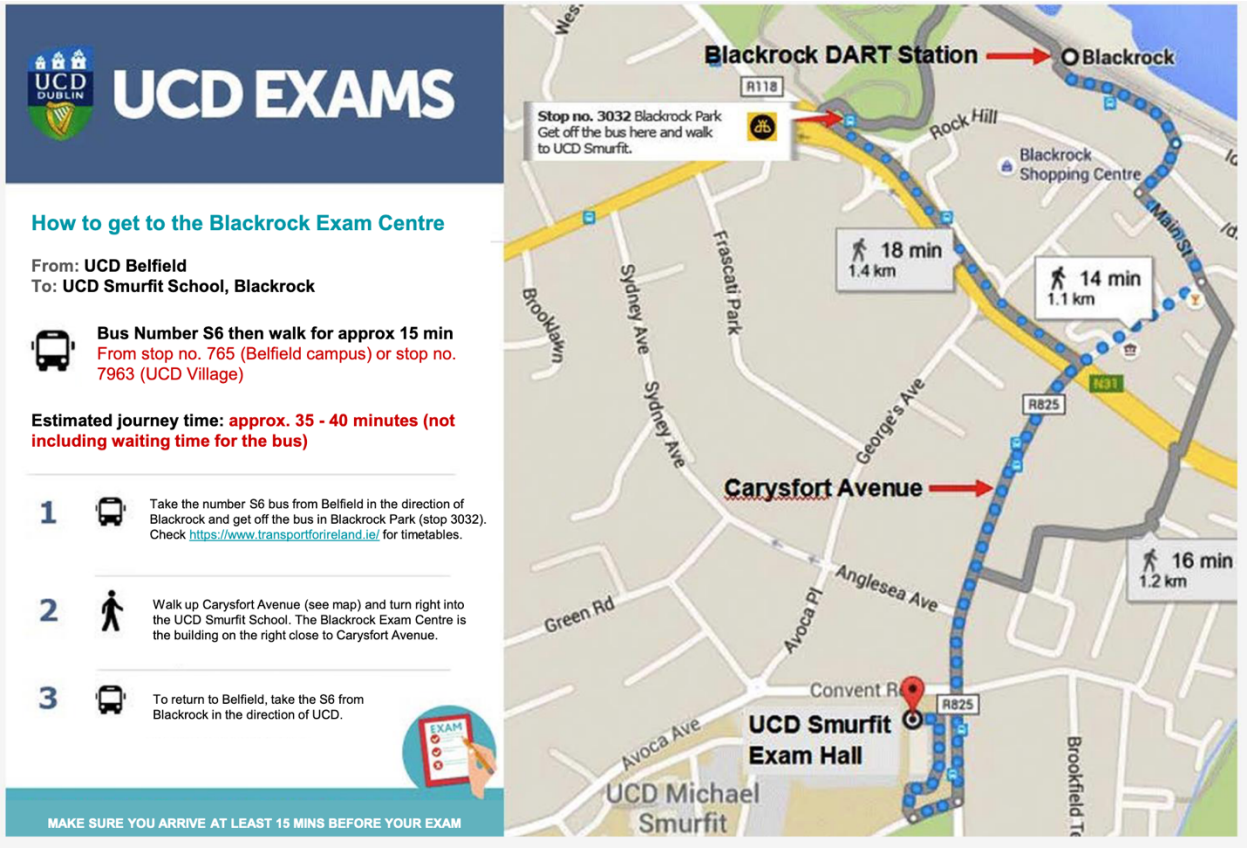
UCD Unicare:
Our campus, Our care...
Emergency Line: (01 716) **7999**



How to Find the Blackrock Exam Centre



For a Google Maps Pin, scan below: