

CS266-15 Data Analytics

24/25

Department

Computer Science

Level

Undergraduate Level 2

Module leader

Weiren Yu

Credit value

15

Module duration

10 weeks

Assessment

Multiple

Study location

University of Warwick main campus, Coventry

Description

Introductory description

This module provides a gateway for students to understand the fundamental principles, techniques, and tools that underpin the practice of data analytics, empowering them to make decisions based on analytical insights. It also serves as a valuable resource for students undertaking their 3rd-year projects, particularly those delving into the realms of machine learning and data mining.

Module aims

This module aims to provide students, regardless of their prior experience, with the necessary skills and knowledge to navigate the data analytics landscape. Students will learn how to gain insights from large and complicated data using statistical and machine learning methods, optimisation techniques, and predictive models. These acquired skills will be directly applicable to solving real-world data-driven problems, enhancing their comprehension of data analytics concepts, and preparing them effectively for their 3rd-year projects.

Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be covered. Actual sessions held may differ.

- Data analytic tools (e.g. AutoML, Python, R, SQL, R, Tableau, Excel)
- Data cleaning, data visualisation
- Time series, spatial-temporal learning, trajectory, and data flow analysis
- Anomaly, fraud, and malware detection
- Uncertain data (e.g. probabilistic data, fuzzy data), anonymization, differential privacy
- Graph data, representation learning, frequent pattern mining, link analysis
- Big data analytics, data streams, map-reduce, Hadoop, spark
- Reinforcement learning, transfer learning, federated learning (optional)

Learning outcomes

By the end of the module, students should be able to:

- Demonstrate a comprehensive understanding of the fundamental principles, methodologies, and tools necessary for extracting valuable insights from data.
- Gain a cross-disciplinary training in data-driven models, machine learning methods, and big data mining technologies, and prepare for their 3rd-year projects in complex data-driven environments.
- Develop practical programming skills and provide students with real-world case studies to apply theoretical data analytic knowledge in data analytics to practical scenarios.

Subject specific skills

1. Employ statistical and machine learning methods to analyse data, interpret results, and draw meaningful conclusions.
2. Build and evaluate predictive models using data-driven techniques to forecast outcomes based on historical data.
3. Devise optimization methods to enhance decision-making processes and improve the efficiency of data-driven solutions.
4. Apply theoretical knowledge to solve real-world data analytic problems through hands-on case studies and practical scenarios.

Transferable skills

1. Critical Thinking: Developing the ability to analyse complex data-driven problems, evaluate data, and make informed decisions based on data-driven insights.
2. Problem-Solving: Applying analytical techniques to address real-world challenges and optimize decision-making processes.
3. Adaptability: Cultivating adaptability in dealing with diverse datasets, understanding how data analytics integrates into various domains, and contributing to interdisciplinary projects.

Study

Study time

Type	Required
Lectures	20 sessions of 1 hour (13%)
Practical classes	10 sessions of 1 hour (7%)
Private study	120 hours (79%)
Assessment	2 hours (1%)
Total	152 hours

Private study description

Private study, background reading and revision

Costs

No further costs have been identified for this module.

Assessment

You do not need to pass all assessment components to pass the module.

Assessment group D

	Weighting	Study time
Individual Coursework	20%	
This assessment is eligible for self-certification (extension).		
Final Exam	80%	2 hours

- Answerbook Pink (12 page)
- Students may use a calculator

Assessment group R

	Weighting	Study time
Resit Exam	100%	

- Answerbook Pink (12 page)
- Students may use a calculator

Feedback on assessment

Individual written feedback on coursework

Availability

Courses

This module is Optional for:

- Year 2 of UCSA-I1N1 Undergraduate Computer Science with Business Studies

This module is Option list A for:

- UCSA-G500 Undergraduate Computer Science
 - Year 2 of G500 Computer Science
 - Year 2 of G500 Computer Science
 - Year 2 of G500 Computer Science
- UCSA-G503 Undergraduate Computer Science MEng
 - Year 2 of G500 Computer Science
 - Year 2 of G503 Computer Science MEng
 - Year 2 of G503 Computer Science MEng

This module is Option list B for:

- UCSA-G4G1 Undergraduate Discrete Mathematics
 - Year 2 of G4G1 Discrete Mathematics
 - Year 2 of G4G1 Discrete Mathematics
- Year 2 of UCSA-G4G3 Undergraduate Discrete Mathematics