Module Descriptor

Title	Big Data		
Session	2025/26	**Status**	Published
Code	COMP10087	**SCQF Level**	10
Credit Points	20	**ECTS (European Credit Transfer Scheme)**	10
School	**Computing, Engineering and Physical Sciences**		
Module Co-ordinator	Tahir Mahmood		

Summary of Module

This module is designed to expose students to the concepts, terminologies, tools, and techniques to work with big data. Big data is characterized by its large volume, velocity, and variety, posing challenges for traditional data processing methods. It has emerged as a key aspect underlying modern data-driven software systems across various industries and sectors. Understanding how to effectively store, process, and analyse the large amounts of data being generated is therefore a crucial skill for aspiring computing and software professionals.

Students will be introduced to big data, the current technological landscape and platforms as well as work on practical examples to process big data using tools such as Apache Hadoop and Spark.

The syllabus includes the following content:

Introduction to Big Data

- Definition and evolution
- 5 Vs of Big Data: Volume, Velocity, Variety, Veracity, and Value
- Ecosystem and Landscape
- Big Data Lifecycle: Generation, Acquisition, Storage, Processing, Analysis, and Visualization
- Ethical and Legal Implications of Big Data

Data Storage and Compute

- Introduction to Cluster Computing Models and distribution systems
- Structured and unstructured data
- Replication and Partitioning
- Data Mining

Big Data Infrastructure and Technologies

- Frameworks: Hadoop, Spark, and other distributed computing frameworks
- Distributed File Systems: Definition and examples (HDFS, GFS)

- Relational and Non-relational Databases for Big Data Storage including graph databases.
- Big Data Technology stack: Hadoop, HDFS, MapReduce, Yarn, Spark, Storm, Hive

Big Data Analytics

- Business intelligence (BI) and self-service BI
- Visualizations and reporting from large, diverse data sets using tools such as Tableau or Apache Superset
- Case Studies on real-world data and problems

This module will work to develop a number of the key 'I am UWS' Graduate Attributes to make those who complete this module:

- Universal: Critical Thinker; Ethically-minded; and Research-minded.
- Work-Ready: Problem-Solver; Effective Communicator; and Ambitious.
- Successful: Autonomous; Resilient; and Driven.

Module Delivery Method	**On-Campus**[1] ☐	**Hybrid**[2] ☒	**Online**[3] ☐	**Work -Based Learning**[4] ☐
Campuses for Module Delivery	☐ Ayr ☐ Dumfries	☒ Lanarkshire ☐ London ☐ Paisley	☒ Online / Distance Learning ☐ Other (specify) Online Delivery / Distance Learning applies to delivery in the BSc (Hons) Data, AI and Software Engineering programme only	

Terms for Module Delivery	Term 1	☐	Term 2	☒	Term 3	☐
Long-thin Delivery over more than one Term	Term 1 – Term 2	☐	Term 2 – Term 3	☐	Term 3 – Term 1	☐

[1] Where contact hours are synchronous/ live and take place fully on campus. Campus-based learning is focused on providing an interactive learning experience supported by a range of digitally-enabled asynchronous learning opportunities including learning materials, resources, and opportunities provided via the virtual learning environment. On-campus contact hours will be clearly articulated to students.

[2] The module includes a combination of synchronous/ live on-campus and online learning events. These will be supported by a range of digitally-enabled asynchronous learning opportunities including learning materials, resources, and opportunities provided via the virtual learning environment. On-campus and online contact hours will be clearly articulated to students.

[3] Where all learning is solely delivered by web-based or internet-based technologies and the participants can engage in all learning activities through these means. All required contact hours will be clearly articulated to students.

[4] Learning activities where the main location for the learning experience is in the workplace. All required contact hours, whether online or on campus, will be clearly articulated to students

Learning Outcomes	
L1	Demonstrate a detailed understanding of big data and how it is stored, processed, and analysed.
L2	Evaluate real-world data challenges, mapping them to big data solutions while considering ethical and legal implications.
L3	Select and justify appropriate methods, utilizing industry-standard tools across the big data lifecycle to address specific data problems.
L4	Implement and test solutions to given big data problems using appropriate tools, techniques, and technologies
L5	N/A

Employability Skills and Personal Development Planning (PDP) Skills	
SCQF Headings	**During completion of this module, there will be an opportunity to achieve core skills in:**
Knowledge and Understanding (K and U)	**SCQF 10** A critical understanding of the principal theories, concepts and principles within the field of big data Detailed knowledge and understanding of how to apply big data analytics
Practice: Applied Knowledge and Understanding	**SCQF 10** In using a wide range of the principal professional skills, techniques, practices to implement solutions to problems with big data Executing a defined project of research and development for a big data solution along the big data lifecycle
Generic Cognitive skills	**SCQF 10** Critically identify, define, conceptualise and analyse complex/professional problems and issues within the field of big data Offer professional sights, interpretations and solutions to problems and issues
Communication, ICT and Numeracy Skills	**SCQF 10** Use a range of ICT applications to work with big data Communicate with peers, senior colleagues and specialists on a professional level
Autonomy, Accountability and Working with Others	**SCQF 10** Exercise autonomy and initiative in some activities at a professional level during the practical classes and during the completion of the coursework.

Prerequisites	**Module Code**	**Module Title**
	Other	
Co-requisites	**Module Code**	**Module Title**

Learning and Teaching

In line with current learning and teaching principles, a 20-credit module includes 200 learning hours, normally including a minimum of 36 contact hours and maximum of 48 contact hours.

Learning Activities During completion of this module, the learning activities undertaken to achieve the module learning outcomes are stated below:	**Student Learning Hours** (Note: Learning hours include both contact hours and hours spent on other learning activities)
Lecture / Core Content Delivery	24
Laboratory / Practical Demonstration / Workshop	24
Independent Study	152
Please select	
Please select	
Please select	
TOTAL	200

Indicative Resources

The following materials form essential underpinning for the module content and ultimately for the learning outcomes:

Han, J. and Kamber, M. (2018) Data Mining : Concepts and Techniques. 3rd edn. Haryana, India ; Burlington, Ma: Elsevier.

Howson, C. (2013) Successful business intelligence : unlock the value of BI & big data. New York Mcgraw Hill Professional.Kleppmann, M. (2017) Designing Data-Intensive Applications. 'O'Reilly Media, Inc.'

Karau, H. and Warren, R., 2017. High performance Spark: best practices for scaling and optimizing Apache Spark. " O'Reilly Media, Inc.".

Singh, C. and Kumar, M., 2019. Mastering Hadoop 3: Big data processing at scale to unlock unique business insights. Packt Publishing Ltd. Birmingham, United Kingdom

Warren, J. and Marz, N., 2015. Big Data: Principles and best practices of scalable realtime data systems. Manning Publications Co., 20 Baldwin Road, PO Box 761, Shelter Island, NY 11964.

(N.B. Although reading lists should include current publications, students are advised (particularly for material marked with an asterisk*) to wait until the start of session for confirmation of the most up-to-date material)

Attendance and Engagement Requirements

In line with the Student Attendance and Engagement Procedure, Students are academically engaged if they are regularly attending and participating in timetabled on-campus and online teaching sessions, asynchronous online learning activities, course-related learning resources, and complete assessments and submit these on time.

For the purposes of this module, academic engagement equates to the following:

The School of Computing, Engineering and Physical Sciences considers attendance and engagement to mean a commitment to attending, and engaging in, timetabled sessions. You

will scan your attendance via the scanners each time you are on-campus and you will login to the VLE several times per week. Where you are unable to attend a timetabled learning session due to illness or other circumstance, you should notify the Programme Leader that you cannot attend. Across the School an 80% attendance threshold is set. If you fall below this, you will be referred to the Student Success Team to see how we can best support your studies.

Equality and Diversity
The University's Equality, Diversity and Human Rights Procedure can be accessed at the following link: UWS Equality, Diversity and Human Rights Code. Aligned with the University's commitment to equality and diversity, this module supports equality of opportunity for students from all backgrounds and learning needs. Using the VLE, material will be presented electronically in formats that allow flexible access and manipulation of content. This module complies with University regulations and guidance on inclusive learning and teaching practice. This module has lab-based teaching and as such you are advised to speak to the Module Co-ordinator to ensure that specialist assistive equipment, support provision and adjustment to assessment practice can be put in place, in accordance with the University's policies and regulations.
(N.B. Every effort will be made by the University to accommodate any equality and diversity issues brought to the attention of the School)

Supplemental Information

Divisional Programme Board	**Computing**
Overall Assessment Results	☐ **Pass / Fail** ☒ **Graded**
Module Eligible for Compensation	☐ **Yes** ☒ **No** **If this module is eligible for compensation, there may be cases where compensation is not permitted due to programme accreditation requirements. Please check the associated programme specification for details.**
School Assessment Board	Business & Applied Computing
Moderator	Jungkang Feng
External Examiner	A Jindal
Accreditation Details	
Module Appears in CPD catalogue	☐ **Yes** ☒ **No**
Changes / Version Number	1.01

Assessment (also refer to Assessment Outcomes Grids below)
Assessment 1
A written report that describes a planned outline of a solution to a big data problem considering methods, tools, technologies and ethical as well as legal implications. (40%)
Assessment 2
Portfolio of practical work in which students will use a real-world data set and industry-standard tools following the big data lifecycle to document and implement a solution to a big data problem. (60%)

Assessment 3
(N.B. (i) Assessment Outcomes Grids for the module (one for each component) can be found below which clearly demonstrate how the learning outcomes of the module will be assessed. (ii) An indicative schedule listing approximate times within the academic calendar when assessment is likely to feature will be provided within the Student Module Handbook.)

Component 1							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
Review/ Article/ Critique/ Paper	☒	☒	☐	☐	☐	40	

Component 2							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
Portfolio of Practical Work	☐	☒	☒	☒	☐	60	

Component 3							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
	☐	☐	☐	☐	☐		
Combined total for all components						100%	hours

Change Control

What	**When**	**Who**
Attendance and Engagement Procedure and Equality and Diversity	17/1/25	F.Valentine