Module Descriptor

Section A

1. Module Title

Data Transformation

2. SITS Module Code

UI108006

3. SCQF Level

8

4. SCQF Credit Points

20

5. Module Leader, include staff ID and email address

Philippe Gleizon – nwh1pg (philippe.gleizon@uhi.ac.uk)

6. Module Team Members, include staff IDs and email addresses

Charles McCrimmon – nwh21cm (charles.mccrimmon@uhi.ac.uk)

7. Faculty and Cognate Subject Group

Faculty: Science, Health and the Environment

CSG: Engineering, Computing and the Built Environment

8. Exam Board and Exam Board Module Sub-group

Exam Board: Science, Technology and the Environment
Sub-group: Computing

9. Date of Module Start / Most Recent Revision

September 2021 / December 2024

10. Semester

SC

11. Minimum / Maximum Student Numbers

Minimum numbers: 10
Maximum numbers: n/a

12. Pre-requisites

n/a

13. Co-requisites

n/a

14. Mode of Study

Table 1: Proportions of mode of study

Mode of study	Percentage	Hours
Face to face	0%	0
Video-conference (VC facilities on UHI campus or learning centre)	15.0%	30
Video-conference (other video technologies accessed via Internet)	0%	0
VLE (online, tutor-supported study)	12.5%	25
Audio conference	0%	0
Self-directed study	35.0%	70
Other (please specify) Team activities	37.5%	75
Total	**100%**	**200 Hours**

15. Assessment

Table 2: Assessment

Assessment number	Type	Details	Weighting	Component Threshold Mark	Submission week	Learning Outcome(s) assessed
1	Practical	Analyse, organise and transform data to enhance software performance	50%	40%	12 (S1)	LO1, LO4, LO5, LO6
2	Group work	Portfolio of evidence, equivalent to 3000 - 3500 words in total. Evidence submitted in	50%	40%	14 (S2)	All

		a variety of formats including project, practical, oral presentation, discussion board participation.				

16. Experiential Education

Highlight all that apply

Work placement	
Case studies	✓
Simulations	
Field trip	
Laboratory work	
Research project	
Internship	
Guest lecture	✓
Clinical practice	
Community engagement	
Service learning	
Job shadowing	
Study abroad	
Summer school	
Volunteering	
Co-operative education	✓
Capstone course	
Other	✓
Other detail:	group project

17. Specialist Learning Resources

Students are expected to sign up to several online services that will facilitate their learning and team work. This includes but is not limited to:

- IBM Cloud,
- Atlassian Jira,
- Bitbucket.

18. Additional Costs to Students

Students are expected to have access to a computer that they have complete control over. The following table has the recommended minimum requirements for a system. This is slightly higher than the UHI minimum requirements found at Information for Students - Buying your own device.

Minimum System Requirements		
	Windows	Mac
Operating system	Windows 10 or 11	MacOS 11 or newer
Processor	2 GHz or better, INTL or AMD is recommended (Must support virtual machines)	
Graphics	OpenGL version 1.2 or later compatible	
RAM	8GB or more	
Monitor	17" or larger (the bigger the better) (Laptop: 15" or larger screen)	
Microphone / headphones	USB headset with microphone	
Webcam	Built-in or external (it is easier to adjust the camera angle with an external)	
Broadband	Reliable connection required 1.0 Mbps (receive) 1.5 Mbps (send) (Cisco recommendations for good quality video calls)	

Students are expected to be willing to sign up to a range of industry standard tools located online. Students will not be required to pay for any software.

19. Employability / Graduate Attributes

Employability attributes (meta-skills) have been aligned with Skills Development Scotland's *Skills 4.0*, published in 2018.

The ability to focus on the present and deflect/avoid distractions	✓
The ability to exercise control over your own impulses, emotions and desires	✓
Being open to new ideas and approaches – having a growth mindset	✓
The ability to self educate without the guidance of others	✓
The ability to actively understand information provided by the speaker, and display interest in the topic discussed	✓
The ability to take the perspective of others in order to understand their feelings and motivations	✓
A sense of responsibility and concern for wider society	✓
Being aware of others' reactions and understanding why they react as they do	✓
The ability to energise and create a sense of direction, purpose, excitement and momentum	✓
Working to gain the agreement of others to a particular course of action	✓
Encouraging others to achieve goals, accomplish tasks, and complete objectives	✓
The ability to coach and constructively review the work of others to improve and advance their skills, knowledge and performance level	✓
Having the ability to ignite change	✓
Breaking down a complex problem or system into smaller, more manageable parts before developing a new way of addressing the problem	✓

Section B

20. Module Summary

This module aims to provide students with the knowledge and skills used for securing and manipulating data. Many successful products now use external and open data sets within them. Software developers need to understand how that data can be stored, but also how to manipulate it successfully using languages such as R and Python. In a business context this might include working alongside a Data Scientist or a member of the Marketing team. Alongside the technical goals you will be learning to develop your active listening skills as well as starting to look at case studies of products in a marketing context.

21. Module Keywords

Data, data science, data wrangling, databases, R, python, panda, numpy, dashboards, visualisation, animation, charts

22. Module Learning Outcomes

"On successful completion of this module, students should be able to…"

Learning Outcome 1 (LO1):

Agile: Apply industry-standard processes, methods, techniques, and tools to execute projects

Learning Outcome 2 (LO2):

Business: Differentiate between features and benefits, giving appropriate examples, and show how to use them effectively in a marketing

Learning Outcome 3 (LO3):

Meta-skills[1]: Explain what active listening is; demonstrate how to use it to appreciate others' views and contributions

Learning Outcome 4 (LO4):

Security: Examine technical aspects of info security (client data protection, data protection act)

Learning Outcome 5 (LO5):

Technical: Explain data mining algorithms for various mining goals; relate them to real-world problems including big data

Learning Outcome 6 (LO6):

Sustainability: Analyse and optimise data for storage and processing.

23. Indicative Content

Skills that will be practiced and developed:

- Continuing to grow your experience and understanding of Agile
- Develop active listening skills
- Building an understanding of legal requirements for storing and handling data
- Practice manipulating data in an appropriate language
- Building the foundation required to use machine learning algorithms effectively

Syllabus Content

- Teamworking and review
- Implications of information security law on technical methods
- Active listening
- Handling data in languages commonly used in Data Science
- Cleaning data
- Converting data into features
- Foundation in Statistics and Probability

[1] Meta-skills are also known as soft skills or employability skills.

- Working with probabilities
- Calculating conditional probabilities
- Modelling a discrete random variable
- Using the laws of expectation and variance
- Using discrete probability distributions
- Using continuous probability distributions
- Using the normal approximation to discrete probability distributions
- Produce appropriate charts and diagrams depending on data
- Using a variety of methods to produce predictions

Floating point calculations and precision vs accuracy

24. Library Resources

Talis Library Resource List

Recommended readings:

Author(s)	Title	Editor	Year	ISBN
Matthias Plaue	Data science – An introduction to statistics and machine learning	Springer	2023	ISBN 978-3-662-67881-7 ISBN 978-3-662-67882-4 (eBook)
Ian H Witten Eibe Frank Mark A Hall Christopher J. Pal	Data Mining: practical machine learning tools and techniques	Morgan Kaufmann	2017 (4th ed)	ISBN 978-0-12-804291-5