**Module Descriptor**

# Section A

1. **Module Title  
   Data as a Service**
2. **SITS Module Code  
   UI108005**
3. **SCQF Level  
   8**
4. **SCQF Credit Points  
   20**
5. **Module Leader, include staff ID and email address**

Mike Walkey NWH1MW

1. **Module Team Members, include staff IDs and email addresses**

|  |  |
| --- | --- |
| Charles McCrimmon | NWH21CM |

1. **Faculty and Cognate Subject Group**

**Faculty: Science, Technology and the Environment**

**CSG: Engineering, Computing and the Built Environment**

1. **Exam Board and Exam Board Module Sub-group  
     
   Computing & IT**
2. **Date of Module Start / Most Recent Revision  
     
   September 2020/September 2025**
3. **Semester  
     
   SC**
4. **Minimum / Maximum Student Numbers**

Minimum numbers: 5

Maximum numbers: n/a

1. **Pre-requisites  
     
   n/a**
2. **Co-requisites**
3. **Mode of Study**

Give estimate of proportions of mode of study but also highlight **main** mode of study.

Table 1: Proportions of mode of study

|  |  |  |
| --- | --- | --- |
| Video-conference (other video technologies accessed via Internet) | 15.0% | 30 hours |
| Online supervised practical work | 12.5% | 25 hours |
| **Team activities** | **37.5%** | **75 hours** |
| VLE (self-directed & team study) | 35.0% | 70 hours |
| **TOTAL** | **100.0%** | **200 hours** |

1. **Assessment**

Table 2: Assessment

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Type** | **Details** | **Weighting** | **Minimum threshold/**  **pass mark** | **Submission week** | **Learning Outcome(s) assessed** |
| **Assessment 1** | Group work | Portfolio of evidence, equivalent to 3000 - 3500 words in total. Evidence submitted in a variety of formats including essay, project, group work, practical, oral presentation, discussion board participation. | 50% | 40% | 14(S2) | ALL |
| **Assessment 2** | Written Report | Examine human aspects of information security including client data protection, GDPR and the data protection act. | 40% | 40% | 8 (S1) | 2 |
| **Assessment 3** | MCQ | Analyse the common pitfalls and mitigations of common security approaches | 10% | 40 | 8 (S2) | 4 |

1. **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:

1. **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,
* and Bitbucket.

These are available free to the student.

1. **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 https://www.uhi.ac.uk/en/lis/buying-your-own-device.

| **Minimum System Requirements** | | |
| --- | --- | --- |
|  | Windows | Mac |
| Operating system | Windows 7, 8 or 10 | Mac OS 10.10.x 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. 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.

1. **Employability / Graduate Attributes**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Employability attributes (meta-skills) have been aligned with Skills Development Scotland’s *Skills 4.0*, published in 2018.   |  |  | | --- | --- | | The ability to sort information into categories and to understand the relationship between information | X | | The ability to filter out non-essential information and focus on the essential problem at hand | X | | The act of making a considered choice after appropriately using intuition and careful thought | X | | Willingness to take risks, show initiative and undertake new ventures | X | | Understanding and mentally processing verbal or written communication | X | | The ability to actively understand information provided by the speaker, and display interest in the topic discussed | X | | A sense of responsibility and concern for wider society | X | | The ability to operate in different cultural settings | X | | The ability to notice behaviour or information and register it as being significant | X | | The ability to ask questions in order to increase understanding about a subject or experience | X | | The ability to filter resources and information to find information relevant to an issue or topic | X | | The acknowledgement and definition of a problem | X | | The ability to explore ideas of things that are not in our present environment, or perhaps not even real | X | | The ability to explore, through tinkering and making, in order to arrive at new ideas and solutions | X | | The process of classifying information into objects or classes based on key features | X | | The ability to see the big picture and understand subtle nuances of complex situations | X | | The process of organising, manipulating, pruning and filtering gathered data into cohesive structures for information building | X | | The ability to identify areas of opportunity for innovation | X | | A systematic examination and evaluation of data or information, by breaking it into its component parts to uncover their interrelationships | X | | Breaking down a complex problem or system into smaller, more manageable parts before developing a new way of addressing the problem | X | | The ability to identify, analyse and evaluate situations, ideas and information in order to formulate responses to problems | X | | The act or process of forming an opinion after careful thought | X | | The ability to translate vast amounts of data into abstract concepts and to understand data-based reasoning | X | |

**SDS Skills 2022 meta-skills** that this module supports:

**Self-Management -** Adapting to shifting project deadlines or changed requirements

**Social Intelligence -** Collaborating on code reviews, effectively communicating technical or security concerns.

**Innovation -** Experimenting with advanced data structures or algorithmic optimisations that also factor in sustainability.

# Section B

**Module Summary**This module provides an applied introduction to algorithms and data structures, focusing on real-world problem-solving within modern software environments. Students will learn how to select and implement effective data structures and leverage relevant language libraries to improve efficiency, handle memory-performance trade-offs, and address security pitfalls.

Throughout, the module emphasises agile approaches for tracking project milestones and handling deviations, as well as constructive peer feedback via code reviews and short reflective tasks. By embedding sustainability considerations into design decisions, students will gain the capacity to produce maintainable, resource-conscious solutions. A key theme is the balance of speed, memory, and ethical or environmental impact, ensuring graduates can adapt to an evolving tech landscape.

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

1. **Module Learning Outcomes**

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

|  |  |  |
| --- | --- | --- |
| **Number** | **Theme** | **Learning Outcome** |
| 1 | Agile | Evaluate the quality assurance processes that can be automated during software development to achieve and maintain project requirements. |
| 2 | Business | Examine human aspects of information security including client data protection, GDPR and the data protection act. |
| 3 | Meta-skills\*\* | With guidance, conduct research, using common industry literature and other media, into IT and business-related topics. |
| 4 | Security | Analyse the common pitfalls and mitigations of common security approaches. |
| 5 | Technical | Implement a data driven website, explaining the relevant technologies involved in each tier of the architecture and the accompanying performance trade-offs. |
| 6 | Sustainability | Evaluate the resource consumption (e.g., CPU cycles, memory usage) of key data structures or algorithms, proposing practical steps to reduce the environmental footprint while maintaining functionality. |

1. **Indicative Content**

**Skills that will be practiced and developed:**

* Practice automating tasks in your workflows
* Reflect on GDPR and other data protection law
* Grow your confidence in working with industry literature sources
* Practice writing methods for transferring data between applications
* Develop your skills in designing attractive visuals based on data
* Assessing the carbon footprint of data processes (streaming, batch jobs) and optimizing code for minimal overhead.
* Build confidence in working with third party libraries for displaying a variety of interactive components

**Syllabus Content**

* Information security law and responsibilities on business
* Trade-off between security, capability and automation
* Introduced to industry literature and organisations
* Learn about common attacks such as DDoS and countermeasures
* Data visualisations
* Incorporating data into a website

Manipulating data for purposes of analytics

1. **Library Resources**

[Talis Library Resource List](https://uhi.rl.talis.com/index.html)