**Module Descriptor**

# Section A

1. **Module Title :** Software Architecture
2. **SITS Module Code:** UI108008
3. **SCQF Level: 8**
4. **SCQF Credit Points: 20**
5. **Module Leader, include staff ID and email address:**

**Les Wright ar02lw ar02lw@uhi.ac.uk**

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

**tbc**

1. **Faculty and Cognate Subject Group**

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

1. **Exam Board and Exam Board Module Sub-group**

**CSG:** Computing & IT

1. **Date of Module Start / Most Recent Revision**

**September 2020/September 2020**

1. **Semester**

**SC**

1. **Minimum / Maximum Student Numbers**

Minimum numbers:10

Maximum numbers: N/A

1. **Pre-requisites**

n/a

1. **Co-requisites**

n/a

1. **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

| **Mode of study** | **Percentage** | **Hours** |
| --- | --- | --- |
| 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** |
| **Total** | **100%** | **200 Hours** |

1. **Assessment**

Table 2: Assessment

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Assessment number** | **Type** | **Details** | **Weighting** | **Component**  **Threshold 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 | ALL |
| **2** | Progress log/Vlog | Evidence of progress, and breadth and depth of knowledge/research. This may take the form of short written, oral or video progress report(s) detailing for example, project management, code reviews. | 50% | 40% | 6,14 | ALL |

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 may include but is not limited to:

* IBM Cloud
* Atlassian Jira
* Bitbucket.
* GitHub

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 focus on the present and deflect/avoid distractions | X |
| The ability to filter out non-essential information and focus on the essential problem at hand | X |
| The ability to think for one’s self and trust one’s own judgement | X |
| The act of making a considered choice after appropriately using intuition and careful thought | 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 |
| Working with others toward shared goals. Creating group synergy in pursuing collective goals | 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 |
| Proficiency at thinking and coming up with solutions and responses beyond that which is rote or rule-based | X |
| The process of classifying information into objects or classes based on key features | 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 |

Meta-skills from SDS 2022

* **Self-management**: Estimating and scheduling tasks.
* **Social intelligence**: Working in teams, fostering synergy.

**Innovation**: Identifying fresh architectural approaches or sustainability measures

# Section B

1. **Module Summary**

This module complements the Software Services modules by looking at systems as a whole and focusing on developing, as opposed to using, technologies such as API and libraries. This module deepens students’ understanding of software architecture across varied modern contexts - cloud, client-server, embedded. Focused on design patterns, threat modelling, and sustainable development, students learn agile-based planning and cost-estimation methods. By the end, you’ll be able to propose robust architectures that balance performance, security, and environmental impact.

1. **Module Keywords**

**Software Architecture, Agile, Sustainability, Security, API Development, Cloud computing, Threat assessment.**

1. **Module Learning Outcomes**

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

|  |  |  |
| --- | --- | --- |
| **Number** | **Theme** | **Learning Outcome** |
| 1 | Agile | Analyse digital development activities, estimating financial, effort, and environmental costs to effectively manage software development projects. |
| 2 | Business | Compare, from a provider’s perspective, threat, risk, and vulnerability, examining typical attacks and exploits that might arise in software architectures. |
| 3 | Meta-skills\*\* | Use analytical and critical thinking to develop technology solutions, with consideration given to systems security, systematically applying structured problem-solving techniques. |
| 4 | Security | Evaluate software vulnerabilities through common testing methods and implement strategies to enhance software resilience against threats. |
| 5 | Technical | Examine key components of technology solutions in modern business environments, assessing their interactions and comparing different system architectures (e.g., game consoles, smartphones, embedded systems). |
| 6 | Sustainability | Apply sustainable software development principles by considering energy efficiency, resource consumption, and long-term environmental impact in technology solutions. |

1. **Indicative Content**

Skills that will be practiced and developed:

• Managing the costs of a project and planning for different scenarios

• Presenting the threats that a service provider might face when exposed to the public.

• Practice creating an API for others to make use of

• Practice documenting an API so that others can effectively use it

• Managing the threats in different software architectures and product types

• Start to break down goals in a structured way and map these to standard methods

Syllabus Content

• Costing the development of a set of features

• Threat assessments for service providers

• Creating a server-side service and API

• Verifying credentials and using authentication services SAML and OAuth2

• Client-Server architecture

• Cloud architectures · Preserving state

• Architecting services for the cloud

• Creating high availability services

• Testing for common threats such as buffer overflows

1. **Library Resources**

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