UNIVERSITY OF LIVERPOOL

Module Specification
CSCK541 – Software Development in Practice

Contents

1. Module Details

Module Title:	Software Development in Practice
Short Title:	Software Development in Practice
Module Code:	CSCK541
Marketing Module Synopsis:	This module examines current approaches and techniques to provide robust and reliable software, investigating the key phases of software development to provide robust, safe and ethical software that meets clients' needs. Current tools for support and development (open source, GitHub, debuggers etc) are investigated to integrate theory with practice to provide students to be able to deliver software products on schedule and in budget.
Credits:	15
Level:	Level 7
Delivery Location(s)	Online

Semester:	Whole Session
Academic Year:	2021-22
Faculty:	Faculty of Science and Engineering
School/Institute (Level 2):	School of Electrical Engineering, Electronics and Computer Science
Curriculum Board (level 1):	Computer Science PGT
Module Coordinator:	Keith Dures
Other staff:	Helen Mattocks, Frans Coenen
External Examiner(s):	Neil Gordon, Dan Neagu
Pre-requisites:	N/A
Co-requisites:	N/A
Barred Combinations:	N/A
CE/CPD Provision:	No
Overview:	This module examines current approaches and techniques to software development. The key phases of programme design and development are examined in the context of the original problem definition through development and testing. Legal, ethical and risk factors are considered and popular development tools and paradigms are investigated to support the practice of software development. The module also provides students with plenty of opportunity to experiment with software solutions to problems using a modern programming language.

Notes:	21/22 Modification is minor and needs no further scrutiny. 20/21 Online module provided in collaboration with Kaplan Open Learning. Core for MSc Computer Science conversion. generalist programme.

Maximum Places:	250

Subject:	

HESA Cost Centre(s):	MUST BE COMPLETED FOR APPROVAL

Status:	Modification Approval

The table below is automatically completed from programme data held in Curriculum Manager; during 2019/20 it is likely to have no data or incomplete data until all programme records are in Curriculum Manager.

In Programmes:	**Programme Validation Status**	**Module Status:**	**Programme Stage / Group / / Sub-group**
Computer Science Master of Science (MSc) 2021-22	Validated	Mandatory	Online Flexible Learning Y1 Online Flexible Learning Y1 Mandatory Module 2
Data Science and Artificial Intelligence Master of Science (MSc) 2021-22	Validated	Required	Online Flexible Learning Y1 Online Flexible Learning Y1 Required Module 3

The table below must be completed for module approval, including confirmation that there are zero costs to the student.

Student Cost(s)					
				Costs range:	
Cost Type:	**Description:**	**Value type** (exact, approximate or max/min range)**:**	**Cost** (exact or approximate):	**Minimum Cost:**	**Maximum Cost:**
Student Cost	Over the anticipated 8 week module period, an estimated average cost of £12.50 per week for internet access and contribution to the cost of a personal computer (global variations may apply).	Approximate	100.00		

2. Aims and Content

Educational Aims:
1. To provide students with a comprehensive understanding of the theory and practice of modern software development. 2. To provide students with hands-on experience of a current programming language. 3. To provide students with a critical insight into the processes of interpreting and translating software procurer requirements into software realisation. 4. To provide a systematic overview into the process of evaluating and testing software systems. 5. To develop an appreciation of the legal, social, ethical and professional considerations pertinent to software development, and the risk factors involved.

Outline Syllabus:
Week 1: Software Engineering Principles Programming paradigms, user requirements, usage of software libraries, open source versus closed source software, software licensing. Week 2: Data and Operators The nature of data, logical and arithmetic operators on data, conversion, Input/Ouput (IO) control. Week 3: Control Structures and Recursion Efficient use of control structures, selection and iterative commands, recursive concepts and applications. Evaluation and testing.

Week 4: Data structures
Working with simple data structures, the concept of containers, types of simple data structure (lists, dictionaries, sets, tuples etc.).

Week 5: Graphical user interfaces
The importance of interface design, frames, text boxes, GUI components.

Week 6: Files, streams and I/O techniques
Secure file handling and verification/validation, exception handling.

Week 7: Advanced Data Structures:
Abstract data types, Object Oriented Programming (OOP), classes and objects

Week 8: Management of the Software Development Enterprise
Legal, social, ethical and professional considerations; risk factors.

Reading lists and resources:			
Type	**Category**	**Title**	**Description**

3. Module Outcomes (learning outcomes, skills and other attributes)

Ref No.	**Learning Outcome / Skill:**	**Category:**
M1	A deep and systematic understanding of the process of modern software development from end user requirements to software delivery.	Learning Outcomes: Master's
M2	A systematic knowledge of the theory underpinning modern programming techniques and the practical application of these techniques.	Learning Outcomes: Master's
M3	A comprehensive insight into the process and practice of evaluating software implementations.	Learning Outcomes: Master's
M4	A deep and systematic understanding of the risk factors pertaining to software development, and the associated legal, ethical, social and professional issues to be taken into consideration.	Learning Outcomes: Master's

Ref No.	Learning Outcome / Skill:	Category:
S1	Self-direction and originality in tackling and solving problems.	Skills
S2	Communication skills in electronic as well as written form.	Skills
S3	An ability to act autonomously and professionally when planning and implementing solutions to computer science problems.	Skills
S4	Experience of working in development teams, respecting others, co-operating, negotiating/persuading, awareness of interdependence with others.	Skills

4. Assessments

Assessment Strategy:
The module features two broad categories of assessment: discussion questions and practical assessments. The first has a focus on moderated active learning, where the faculty member responsible for the module posts discussion questions to which students respond individually and then consider each other's responses. Each discussion question runs over a three-week period. At the end of the first week each student posts a 500 word "initial response". During the second week each student selects two or three responses, made by other students in the first week, and writes a 500 word "follow-up" response. In the third week each student reviews the initial and follow-up responses from the previous two weeks and submits a 500 word executive critical summary with respect to the main themes identified by the responses. Practical assessment adopts the principle of authentic assessment where the assessment tasks to be undertaken are aligned with the kinds of task that students would be expected to undertake in a professional setting. 1. Due to nature of the on-line mode of instruction work is not marked anonymously. 2. Reassessment opportunities offered in line with Code of Practice on Assessment. 3. Penalties for late submission will be in line with Code of Practice on Assessment.

All fields in the table below must be completed for module approval.

Method	Description	Type	Units of Length	Length	Min	Max	Description (re length)	Weighting	Assessment period(s)	Group Work	Must Pass	Final Assessment
Project	Programming 2: Collaborative programming exercise addressing a practical problem, resulting in a demonstrable system and supporting analysis in the form of a brief report (500 words).	Summative	Hours	12	N/A	N/A	Software solution and report	30 %	Wk08	Yes	Yes	Yes
Practical assessment	Programming: Individual programming exercise addressing a practical problem, resulting in a demonstrable system and supporting analysis in the form of a brief report (500 words).	Summative	Hours	12	N/A	N/A	Software solution and report	30 %	Wk05	No	Yes	No
Coursework	Discussion Question 1: Participate actively in an online discussion to critically discuss experiences and opinions within the cohort regarding the	Summative	Words	N/A	1000	1500	N/A	20 %	Wk03	No	Yes	No

Method	Description	Type	Units of Length	Length	Min	Max	Description (re length)	Weighting	Assessment period(s)	Group Work	Must Pass	Final Assessment
	challenges of software development.											
Coursework	Discussion Question 2: Actively participate in online discussion on a module-specific topic, contributing original thought and understanding of key areas.	Summative	Words	N/A	1000	1500	N/A	20 %	Wk07	No	Yes	No

Please see Appendix 1 for details of the outcomes tested by the above assessments.

Module Specification Appendix 1: Assessments and the Outcomes Tested

Module Title	Software Development in Practice
Module Code	CSCK541

In the table below, all fields should be completed for approval, except for the **Weighting** field for a **Formative Type** assessment method.

Assessment Method	Type	Weighting	Marked out of	Pass Mark	Learning Outcomes / Skills Tested
Project	Summative	30 %	100	50	M1, M2, M3, M4, S1, S2, S3, S4
Practical assessment	Summative	30 %	100	50	M1, M2, S1, S2
Coursework	Summative	20 %	100	50	M1, M3, S2

Assessment Method	Type	Weighting	Marked out of	Pass Mark	Learning Outcomes / Skills Tested
Coursework	Summative	20 %	100	50	M1, M3, M4, S2

5. Learning and Teaching Methods

Summary of Learning and Teaching Methods:
The mode of delivery is by online learning, facilitated by a Virtual Learning Environment (VLE). This mode of study enables students to pursue modules via home study while continuing in employment. Module delivery involves the establishment of a virtual classroom in which a relatively small group of students (usually 10-25) work under the direction of a faculty member. Module delivery proceeds via a series of eight one-week online sessions, each of which comprises an online lecture, supported by other eLearning activities, posted electronically to a public folder in the virtual classroom. The mode of learning includes a range of required and optional eLearning activities, including but not limited to: lecture casts, live seminars, self-assessment opportunities, and required and suggested further reading and try-for-yourself activities. Communication within the virtual classroom is asynchronous, preserving the requirement that students are able to pursue the module in their own time, within the weekly time-frame of each online session. An important element of the module provision is active learning through collaborative, cohort-based, learning using discussion fora where the students engage in assessed discussions facilitated by the faculty member responsible for the module. This in turn encourages both confidence and global citizenship (given the international nature of the online student body).

The following table must be completed for module approval, accounting for all hours associated with the credit value of the module, e.g. for 15 credits there should be 150 hours of learning and teaching activity, including independent learning.

Learning and Teaching Method:	**Length (Minutes):**	**Times per Week** (if applicable):	**Number of Weeks** (if applicable):	**Calculated Hours** (if applicable):	**Hours:**
Self-Directed Learning	N/A	N/A	N/A	N/A	62
Assignment	N/A	N/A	N/A	N/A	40
E-lecture	N/A	N/A	N/A	N/A	24
Online Discussions	N/A	N/A	N/A	N/A	24

6. Supplementary Information

If a risk assessment is required for this module for students under 18, please record a summary of the risks:	N/A