University of the West of Scotland
Module Descriptor

Session: 2022/23

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Title of Module: Emerging Topics in Computing

Code: COMP11060	SCQF Level: 11 (Scottish Credit and Qualifications Framework)	Credit Points: 10	ECTS: 5 (European Credit Transfer Scheme)
School:	School of Computing, Engineering and Physical Sciences		
Module Co-ordinator:	Muhammad Zeeshan Shakir		

Summary of Module

This module is research-informed and exposes students to the latest, start-of-the-art knowledge and developments in the field. The module will be delivered by research active academic staff from UWS. Leaders in research from other institutes or industry will also be invited to present seminars and/or lectures. Experiments on developed testbeds will be arranged to enhance the hands-on skills of the students and also to enhance the width and depth of knowledge presented in lectures. In addition, this module complements the Research Design & Methods module by incorporating specific research and ethics issues in the context of the future computing technologies. Students will be encouraged to engage with existing research ideas and projects presented in this module as the basis for the assessment in the Research Design and Methods module. It is anticipated that such engagement will be developed into the student's MSc project, thereby providing a coherent pathway through the PgD and into the MSc.

Following are some of the topics we will cover in this module:

- Smart cities and IoT applications
- 5G Cyber security systems
- Unmanned aerial systems for future connectivity
- 5G network applications e.g., Health care, multi-media networks, vehicular networks and smart grid
- Robotics and control
- Artificial Intelligence / machine learning and big data analytics
- Cloud computing architectures
- Blockchain and applications
- Quantum computing and communications
- Digital twin and immersive technologies
- 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 • Research-minded Work Ready • Problem-Solver • Effective Communicator • Ambitious Successful • Autonomous • Resilient • Driven

Module Delivery Method					
Face-To-Face	**Blended**	**Fully Online**	**HybridC**	**HybridO**	**Work-based Learning**
	✓				

Face-To-Face
Term used to describe the traditional classroom environment where the students and the lecturer meet synchronously in the same room for the whole provision.

Blended
A mode of delivery of a module or a programme that involves online and face-to-face delivery of learning, teaching and assessment activities, student support and feedback. A programme may be considered "blended" if it includes a combination of face-to-face, online and blended modules. If an online programme has any compulsory face-to-face and campus elements it must be described as blended with clearly articulated delivery information to manage student expectations

Fully Online
Instruction that is solely delivered by web-based or internet-based technologies. This term is used to describe the previously used terms distance learning and e learning.

HybridC
Online with mandatory face-to-face learning on Campus

HybridO
Online with optional face-to-face learning on Campus

Work-based Learning
Learning activities where the main location for the learning experience is in the workplace.

Campus(es) for Module Delivery

The module will **normally** be offered on the following campuses / or by Distance/Online Learning: (Provided viable student numbers permit)

Paisley:	Ayr:	Dumfries:	Lanarkshire:	London:	Distance/Online Learning:	Other:
✓						

Term(s) for Module Delivery

(Provided viable student numbers permit).

Term 1		Term 2	✓	Term 3	

Learning Outcomes: (maximum of 5 statements)

On successful completion of this module the student will be able to:

L1. Demonstrate a comprehensive and systemic understanding of the latest computing technologies

L2. Develop skills of algorithms development and implementation and ability to evaluate the current state of the art in a critical manner.

L3. Demonstrate a critical understanding of the latest developments and applications of computation technologies.

L4. Recognise the legal, social, ethical and professional issues involved in the exploitation of advanced computing technologies.

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 Level 11. Students will learn the latest technologies in computing by presentations from forefront researchers and critical review of the latest developments across the world. Students will be familiar with a depth of knowledge of few key technologies in the area and develop critical review of technologies in the future.
Practice: Applied Knowledge and Understanding	SCQF Level 11. Students will gain in-depth and critical awareness of knowledge in computing technologies, and apply this in planning, implementing, deploying and managing smart cities. They will also develop capability in applying a range of standard and specialized research skills, tools/software, development kit and related techniques in response to application requirements for their written assignment and lab tasks. In addition, presentation skills and critical review skills are to be developed through presentation and literature review.
Generic Cognitive skills	SCQF Level 11. Students will build skills to integrate information and apply knowledge from various sources including technology advances informed by research and

industry so as to complete their written reports and related tasks.

Communication, ICT and Numeracy Skills	SCQF Level 11. Working in interacting groups, students will develop communication skills as well as the ability to write technical reports and documentation. Presentation skills will be developed through presentation. Literature review of the latest technologies will further develop critical thinking and review skills.
Autonomy, Accountability and Working with others	SCQF Level 11. Each student in each group will be responsible for finding and summarizing information about the assigned tasks in the classroom. Students will elect a coordinator and develop a sense of accountability to the group members.

Pre-requisites:	Before undertaking this module the student should have undertaken the following:	
	Module Code:	Module Title:
	Other:	
Co-requisites	Module Code:	Module Title:

* Indicates that module descriptor is not published.

Learning and Teaching	
The module will be delivered by means of lectures and lab demonstration, and tutorials on implementing algorithms and hardware systems. The lectures will introduce the concepts, theories, and algorithms of the technologies. The lab demos will enhance the learning by demonstrating technologies and systems/test-beds developed by the researchers at UWS and allow students to exploit some technologies for their projects. The tutorial sessions will help consolidate both the lecture material and the skills practiced during the lab demos.	
Learning Activities During completion of this module, the learning activities undertaken to achieve the module learning outcomes are stated below:	**Student Learning Hours** (Normally totalling 200 hours): (Note: Learning hours include both contact hours and hours spent on other learning activities)
Lecture/Core Content Delivery	18
Asynchronous Class Activity	12
Personal Development Plan	6
Independent Study	64
	100 Hours Total

**Indicative Resources: (eg. Core text, journals, internet access)
The following materials form essential underpinning for the module content and ultimately for the learning outcomes: Core references: Module resources: Follow module site (AULA) for the most up-to-date information on material/topics and references. Shakir, M. Z., & Ramzan, N. (Eds.) (2020). AI for Emerging Verticals: Human-Robot Computing, Sensing and Networking. IET. ISBN-13: 978-1-78561-982-3 UWS Library: https://uws-primo.hosted.exlibrisgroup.com/permalink/f/1a10t95/44PAI_ALMA5159263000003931 McClellan, S., Jimenez, J., Koutitas, G. (2018). Smart Cities Applications, Technologies, Standards, and Driving Factors, Springer International Publishing. DOI: 10.1007/978-3-319-59381-4 UWS Library: https://uws-primo.hosted.exlibrisgroup.com/permalink/f/1a10t95/44PAI_ALMA5153593000003931 Other references:

IEEE Future Directions
https://www.ieee.org/about/technologies/index.html

IEEE Transactions on Emerging Topics in Computing
http://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=6245516

IEEE Communications Magazine
http://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=35

IEEE Computational Intelligence Magazine
http://ieeexplore.ieee.org/xpl/tocresult.jsp?isnumber=33585

IEEE Robotics & Automation Magazine
http://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=100

IEEE Systems Journal
http://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=4267003

IEEE Vehicular Technology Magazine
http://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=10209

(**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)

Engagement Requirements

In line with the Academic Engagement Procedure, Students are defined as academically engaged if they are regularly engaged with timetabled teaching sessions, course-related learning resources including those in the Library and on the relevant learning platform, and complete assessments and submit these on time. Please refer to the Academic Engagement Procedure at the following link: Academic engagement procedure

Supplemental Information

Programme Board	Computing
Assessment Results (Pass/Fail)	No
Subject Panel	Business & Applied Computing
Moderator	Jose Alcaraz-Calero
External Examiner	C Luo
Accreditation Details	
Version Number	2.03

Assessment: (also refer to Assessment Outcomes Grids below)

The module will be assessed by written assignment (report), presentation and critical review (peer assessment). Students are required to write technical reports to review the latest technologies in the field, and demonstrate learnt skills of algorithms/systems development and implementation and ability to evaluate the current state of the art. Then each student will present his/her findings to the lecturers and fellow students. Critical review report will also be required for the students to learn from each other and to enhance their critical thinking skills.

Weights of assessment:
Component 1:
Written assignment (report): 60% (LO1, LO2)

Component 2:
Presentation: 20% (LO3)
Critical review report: 20% (LO1, LO4)

(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 Handbook.)

Assessment Outcome Grids (Footnote A.)

Component 1

Assessment Type (Footnote B.)	Learning Outcome (1)	Learning Outcome (2)	Learning Outcome (3)	Learning Outcome (4)	Weighting (%) of Assessment Element	Timetabled Contact Hours
Case study	✓	✓			60	0

Component 2

Assessment Type (Footnote B.)	Learning Outcome (1)	Learning Outcome (2)	Learning Outcome (3)	Learning Outcome (4)	Weighting (%) of Assessment Element	Timetabled Contact Hours
Review/ Article/ Critique/ Paper			✓		20	0
Presentation	✓			✓	20	0
Combined Total For All Components					100%	0 hours

Footnotes
A. Referred to within Assessment Section above
B. Identified in the Learning Outcome Section above

Note(s):
1. More than one assessment method can be used to assess individual learning outcomes.
2. Schools are responsible for determining student contact hours. Please refer to University Policy on contact hours (extract contained within section 10 of the Module Descriptor guidance note).
   This will normally be variable across Schools, dependent on Programmes &/or Professional requirements.

Equality and Diversity

The University policies on equality and diversity will apply to this module.
In order for the student to complete this module the student will be required to view photographic image materials. Students whose vision and hearing is substantially impaired should be assessed and counselled prior to them selecting courses requiring this module.
When a student discloses a disability a special needs advisor will agree the appropriate adjustments to be made, consulting with the module coordinator if necessary.

Diversity in cultures, backgrounds, abilities, learning and cognitive styles and individual differences are valued and appreciated. The assessments have taken this into account.

(N.B. Every effort will be made by the University to accommodate any equality and diversity issues brought to the attention of the
School.)

UWS Equality and Diversity Policy

(N.B. Every effort will be made by the University to accommodate any equality and diversity issues brought to the attention of the School)