Module Descriptor

Title	Applied Cryptography		
Session	2025/26	**Status**	Published
Code	COMP11077	**SCQF Level**	11
Credit Points	10	**ECTS (European Credit Transfer Scheme)**	5
School	**Computing, Engineering and Physical Sciences**		
Module Co-ordinator	Graham Parsonage		

Summary of Module

This module aims towards delivering a complete cryptography mechanism by advancing students from basics of cryptography to advanced authentication protocols, its verification and validation.

This module introduces the domain philosophies in cryptography protocols based on various topics such as cryptographic protocols designed and developed based on encryption or hashing techniques, PKI (public key infrastructure) mechanism, authentication protocols and schemes implemented on various domains of specialization using one-factor, two-factors, three-factors, or multifactor authentication. This module also covers a detailed cryptanalysis of authentication protocols, based on various factors like authentication threats, attacks, calculation techniques, and performance analysis. This module also covers a more validated approach towards validating various authentication protocols using security automated validating tools.

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	On-Campus[1] ☒	Hybrid[2] ☐	Online[3] ☐	Work -Based Learning[4] ☐
Campuses for Module Delivery	☐ Ayr ☐ Dumfries	☒ Lanarkshire ☒ London ☐ Paisley	☐ Online / Distance Learning ☐ Other (specify)	

Terms for Module Delivery	Term 1	☐	Term 2	☒	Term 3	☐
Long-thin Delivery over more than one Term	Term 1 – Term 2	☐	Term 2 – Term 3	☐	Term 3 – Term 1	☐

Learning Outcomes	
L1	Demonstrate a critical understanding of cryptographic schemes, their development and design.
L2	Develop and implement rigorous cryptographic protocols based on varied factors of authentication.
L3	Analyse and critically validate cryptographic protocols using cryptanalysis or automated security verification and validation techniques
L4	
L5	

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 11** Students will learn systematic and comprehensive knowledge cryptography. Students are expected to be familiar with the design and development of cryptographic schemes.
Practice: Applied Knowledge and Understanding	**SCQF 11** Students will develop and implement rigorous cryptographic protocols based on varied factors of authentication.
Generic Cognitive skills	**SCQF 11**

[1] Where contact hours are synchronous/ live and take place fully on campus. Campus-based learning is focused on providing an interactive learning experience supported by a range of digitally-enabled asynchronous learning opportunities including learning materials, resources, and opportunities provided via the virtual learning environment. On-campus contact hours will be clearly articulated to students.

[2] The module includes a combination of synchronous/ live on-campus and online learning events. These will be supported by a range of digitally-enabled asynchronous learning opportunities including learning materials, resources, and opportunities provided via the virtual learning environment. On-campus and online contact hours will be clearly articulated to students.

[3] Where all learning is solely delivered by web-based or internet-based technologies and the participants can engage in all learning activities through these means. All required contact hours will be clearly articulated to students.

[4] Learning activities where the main location for the learning experience is in the workplace. All required contact hours, whether online or on campus, will be clearly articulated to students

	Students will build skills to integrate information and apply knowledge from various sources including technology advances informed by research and industry.
Communication, ICT and Numeracy Skills	**SCQF 11** Working in groups, students will develop communication skills as well as the ability to write technical reports and documentation.
Autonomy, Accountability and Working with Others	**SCQF 11** Exercise a substantial ability to work autonomously, demonstrating critical inquiry in producing quality work underpinned by rigorous investigation. Learn effectively for the purpose of continuing personal development planning through interacting with others in academic and professional bodies and organisations relevant to m-business. Demonstrate an ability to manage and work autonomously with a range of selfdirected m-business related learning resources.

Prerequisites	**Module Code**	**Module Title**
	Other	
Co-requisites	**Module Code**	**Module Title**

Learning and Teaching	
In line with current learning and teaching principles, a 20-credit module includes 200 learning hours, normally including a minimum of 36 contact hours and maximum of 48 contact hours. The module will be delivered by means of lectures and supervised hands-on lab work. Lectures will cover the theoretical background and practical applicability in real life problems. Concepts will be introduced by posing a practical problem and working out the needed theoretical knowledge to solve them. The delivery will encourage student participation to ensure an active learning experience. Group discussions will be held to promote critical thinking and boost informed decisions on the suitability of different state-of-the-art methods. Lab exercises will help student develop their knowledge in incremental fashion using a learning-by-doing approach. This will support the development of knowledge and understanding of the topics.	
Learning Activities During completion of this module, the learning activities undertaken to achieve the module learning outcomes are stated below:	**Student Learning Hours** (Note: Learning hours include both contact hours and hours spent on other learning activities)
Lecture / Core Content Delivery	7
Tutorial / Synchronous Support Activity	7
Laboratory / Practical Demonstration / Workshop	14
Independent Study	72
Please select	

Please select	
TOTAL	100

Indicative Resources

The following materials form essential underpinning for the module content and ultimately for the learning outcomes:

Katz, A and Lindell, Y. (2014) 2nd Ed. Introduction to Modern Cryptography. Chapman and Hall/CRC

Jean-Philippe Aumasson. (2017) Serious Cryptography. No Starch Press

Ferguson et al. (2010) Cryptography Engineering: Design Principles and Practical Applications. Wiley

Paar, C and Pelzl, J. (2010) Understanding cryptography: a textbook for students and practitioners. Springer

VirtualBox software and VBOX extension

(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)

Attendance and Engagement Requirements

In line with the Student Attendance and Engagement Procedure, Students are academically engaged if they are regularly attending and participating in timetabled on-campus and online teaching sessions, asynchronous online learning activities, course-related learning resources, and complete assessments and submit these on time.

For the purposes of this module, academic engagement equates to the following:

The School of Computing, Engineering and Physical Sciences considers attendance and engagement to mean a commitment to attending, and engaging in, timetabled sessions. You will scan your attendance via the scanners each time you are on-campus and you will login to the VLE several times per week. Where you are unable to attend a timetabled learning session due to illness or other circumstance, you should notify the Programme Leader that you cannot attend. Across the School an 80% attendance threshold is set. If you fall below this, you will be referred to the Student Success Team to see how we can best support your studies.

Equality and Diversity

The University's Equality, Diversity and Human Rights Procedure can be accessed at the following link: UWS Equality, Diversity and Human Rights Code.

Aligned with the University's commitment to equality and diversity, this module supports equality of opportunity for students from all backgrounds and learning needs. Using the VLE, material will be presented electronically in formats that allow flexible access and manipulation of content. This module complies with University regulations and guidance on inclusive learning and teaching practice. This module has lab-based teaching and as such you are advised to speak to the Module Co-ordinator to ensure that specialist assistive

equipment, support provision and adjustment to assessment practice can be put in place, in accordance with the University's policies and regulations.
(N.B. Every effort will be made by the University to accommodate any equality and diversity issues brought to the attention of the School)

Supplemental Information

Divisional Programme Board	**Computing**
Overall Assessment Results	☐ **Pass / Fail** ☒ **Graded**
Module Eligible for Compensation	☐ **Yes** ☒ **No** **If this module is eligible for compensation, there may be cases where compensation is not permitted due to programme accreditation requirements. Please check the associated programme specification for details.**
School Assessment Board	Business & Applied Computing
Moderator	Althaff Mohideen
External Examiner	A Esfahani
Accreditation Details	
Module Appears in CPD catalogue	☐ **Yes** ☒ **No**
Changes / Version Number	1.06

Assessment (also refer to Assessment Outcomes Grids below)
Assessment 1
Practical Coursework (60%)
Assessment 2
Project Report (40%)
Assessment 3
(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 Module Handbook.)

Component 1							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
Clinical/ Fieldwork/ Practical skills assessment/ Debate/ Interview/ Viva voce/ Oral	☒	☒	☒	☐	☐	60	0

Component 2							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
Dissertation/ Project report/ Thesis	☒	☒	☒	☐	☐	40	0

Component 3							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
	☐	☐	☐	☐	☐		
Combined total for all components						100%	0 hours

Change Control

What	When	Who
Attendance and Engagement and EDI update	21/01/2025	A Adamson
External Examiner Updated	22/01/2025	A Adamson