University of the West of Scotland

Module Descriptor

Session: 2024/25

Title of Module: Applied Maths for Games and User Research			
Code: COMP08099	**SCQF Level: 8** (Scottish Credit and Qualifications Framework)	**Credit Points: 20**	**ECTS: 10** (European Credit Transfer Scheme)
School:	School of Computing Engineering and Physical Sciences		
Module Co-ordinator:	Marco Gilardi		

Summary of Module

Computer games and interactive applications lie their foundations in mathematics.

This module introduce students to Linear Algebra and Statistics applied to computer games and game user research from the point of view of the game developer, programmer, and game user researcher and quality assurance person. Giving students the ability to conceptualise problems and solve them programmatically within a game engine using game industry mathematical libraries and summarise and critically analyse data using industry statistical packages.

Emphasis is put on the concepts and programming API used to develop computer games rather than the formal language and manual manipulation of equations and formulae.

The module aims at providing students with the maths foundations and concepts that are needed to develop computer games and conduct game user research and quality assurance. The module will cover:

1. Concept of reference frame for a space and their use through APIs

2. Concepts of vector, matrix, point and their use through APIs

3. Vector and Matrix Operators and their use through APIs

4. Concepts of Linear and Affine Space

5. Geometrical transformations and the Transform Matrix and their use through APIs

6. Concepts of mean, variance, standard deviation, correlation and their use and interpretation through a statistical package

7. Concept of Statistical Distribution and their use through use and interpretation through a statistical package

8. Introduction to test of Hypothesis (t-Test and non-parametric tests) and use and interpretation through a statistical package.

This module embeds the key “I am UWS” graduate attributes and in particular:

- Universal(critical and analytical thinking, Collaborative),
- Work Ready(digitally literate, problem solver, effective communicator, Motivated, Potential leader, Ambitious)
- and Successful (Autonomous, Innovative, Driven, Transformational)

Module Delivery Method					
Face-To-Face	**Blended**	**Fully Online**	**HybridC**	**Hybrid 0**	**Work-Based Learning**
☒	☐	☐	☐	☐	☐
See Guidance Note for details.					

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) (tick as appropriate)						
Paisley:	Ayr:	Dumfries:	Lanarkshire:	London:	Distance/Online Learning:	Other:
☒	☐	☐	☐	☐	☐	Add name

Term(s) for Module Delivery					
(Provided viable student numbers permit).					
Term 1	☒	Term 2	☐	Term 3	☐

Learning Outcomes: (maximum of 5 statements) **These should take cognisance of the SCQF level descriptors and be at the appropriate level for the module.** At the end of this module the student will be able to:	
L1	Demonstrate understanding of linear algebra and statistical concepts

L2	Demonstrate mathematical reasoning in solving problems applied to computer games and game user research and quality assurance
L3	Demonstrate the ability of applying critical reasoning to interpret and visualise data

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 **8** Demonstrate and/or work with: • A knowledge of the scope, defining features, and main areas of the subject. • A discerning understanding of a defined range of core theories, concepts, principles and terminology. • Awareness and understanding of research and equivalent scholarly/academic processes
Practice: Applied Knowledge and Understanding	SCQF Level **8** Apply knowledge, skills and understanding: • In using a range of professional skills, techniques, practices and/or materials associated with the subject, a few of which are advanced and/or complex. • In carrying out routine lines of enquiry, development or investigation into professional level problems and issues.
Generic Cognitive skills	SCQF Level **8** Undertake critical analysis, evaluation and/or synthesis of ideas, concepts, information and issues that are within the common understandings in a subject/discipline/sector. Use a range of approaches to formulate and critically evaluate evidence-based solutions/responses to defined and/or routine problems and issues
Communication, ICT and Numeracy Skills	SCQF Level **8** Use a wide range of routine skills and some advanced and specialised skills associated with the subject: • Use a range of standard ICT applications to process and obtain data.

	• Use and evaluate numerical and graphical data to measure progress and achieve goals/targets.	
Autonomy, Accountability and Working with others	SCQF Level **8** Exercise autonomy and initiative in some activities at a professional level in practice or in a subject/discipline/sector. • Manage resources within defined areas of work. • Take the lead on planning in familiar or defined contexts. • Practise in ways that show awareness of own and others' roles, responsibilities and contributions when carrying out and evaluating tasks. • Work, under guidance, with others to acquire an understanding of current professional practice.	
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	
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.	
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	10
Laboratory/Practical Demonstration/Workshop	20
Tutorial/Synchronous Support Activity	18
Independent Study	152
	Hours Total 200

****Indicative Resources: (eg. Core text, journals, internet access)**

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

E. Lengyel, Foundations of Game Engine Development, Volume 1: Mathematics, Terathon Software LLC

P. Dalgaard, Introductory statistics with R, Springer

Click or tap here to enter text.

Please ensure the list is kept short and current. Essential resources should be included, broader resources should be kept for module handbooks / Aula VLE.

Resources should be listed in Right Harvard referencing style or agreed professional body deviation and in alphabetical order.

(**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: • Attend the in-person lectures and laboratories regularly • Complete the required activities during the lectures and laboratories • Submitting the required coursework on time

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.
(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
Assessment Results (Pass/Fail)	Yes ☐ No ☒
School Assessment Board	Creative Computing
Moderator	Thomas Hainey
External Examiner	Nicola Witton
Accreditation Details	TIGA
Changes/Version Number	1.03

Assessment: (also refer to Assessment Outcomes Grids below)
This section should make transparent what assessment categories form part of this module (stating what % contributes to the final mark). Maximum of 3 main assessment categories can be identified (which may comprise smaller elements of assessment). **NB: The 30% aggregate regulation (Reg. 3.9) (40% for PG) for each main category must be taken into account. When using PSMD, if all assessments are recorded in the one box, only one assessment grid will show and the 30% (40% at PG) aggregate regulation will not stand. For the aggregate regulation to stand, each component of assessment must be captured in a separate box.** Please provide brief information about the overall approach to assessment that is taken within the module. In order to be flexible with assessment delivery, be brief, but do state assessment type (e.g. written assignment rather than "essay" / presentation, etc) and keep the detail for the module handbook. Click or tap here to enter text. The assessment for this module is based on authentic assessment and will be independent work. The assessment has two components: 1 Students will be required to produce a simple game that utilises the linear algebra concepts covered in the lectures (60% of the total mark) 2 Students will be required to analyse a dataset provided to them and produce a statistical report using a statistical package (40% of the mark)
Assessment 1 – Program solving Linear Algebra problem applied to Computer Games (60%)
Assessment 2 – Data Analysis and report using a statistical package (40%)
Assessment 3 – Free Text
(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.)

Assessment Outcome Grids (See Guidance Note)

Component 1							
Assessment Type (Footnote B.)	**Learning Outcome (1)**	**Learning Outcome (2)**	**Learning Outcome (3)**	**Learning Outcome (4)**	**Learning Outcome (5)**	**Weighting (%) of Assessment Element**	**Timetabled Contact Hours**
Creative output/ Audiotapes/ Videotapes/ Games/ Simulations	X	X				60	0

Component 2							
Assessment Type (Footnote B.)	**Learning Outcome (1)**	**Learning Outcome (2)**	**Learning Outcome (3)**	**Learning Outcome (4)**	**Learning Outcome (5)**	**Weighting (%) of Assessment Element**	**Timetabled Contact Hours**
Written Assignment/ Report		X	X			40	0

Component 3							
Assessment Type (Footnote B.)	**Learning Outcome (1)**	**Learning Outcome (2)**	**Learning Outcome (3)**	**Learning Outcome (4)**	**Learning Outcome (5)**	**Weighting (%) of Assessment Element**	**Timetabled Contact Hours**
Combined Total for All Components						**100%**	**0 hours**

Change Control:

What	When	Who
Further guidance on aggregate regulation and application when completing template	16/01/2020	H McLean
Updated contact hours	14/09/21	H McLean
Updated Student Attendance and Engagement Procedure	19/10/2023	C Winter
Updated UWS Equality, Diversity and Human Rights Code	19/10/2023	C Winter
Guidance Note 23-24 provided	12/12/23	D Taylor
General housekeeping to text across sections. .	12/12/23	D Taylor

Version Number: MD Template 1 (2023-24)