Module Descriptor

Title	Applied Maths for Games and User Research		
Session	2025/26	**Status**	Published
Code	COMP08099	**SCQF Level**	8
Credit Points	20	**ECTS (European Credit Transfer Scheme)**	10
School	**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	**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 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
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 8** Demonstrate and/or work with: • A knowledge of the scope, defining features, and main areas of the subject.

[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

	• 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 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 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 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 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

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.

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	10
Laboratory / Practical Demonstration / Workshop	20
Tutorial / Synchronous Support Activity	18
Independent Study	152
Please select	
Please select	
TOTAL	200

Indicative Resources
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
(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	**Please select**
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	Creative Computing
Moderator	Thomas Hainey
External Examiner	Professor Sylvester Arnab
Accreditation Details	TIGA
Module Appears in CPD catalogue	☐ **Yes** ☒ **No**
Changes / Version Number	1

Assessment (also refer to Assessment Outcomes Grids below)
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
(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**
Creative output/ Audiotapes/ Videotapes/ Games/ Simulations	☒	☒	☐	☐	☐	60	0

Component 2							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
Written Assignment/Report	☐	☒	☒	☐	☐	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**
Updated Extenal Examiner to new appointee	13 March	Marco Gilardi
Adjusted number of contact hours to sum to 48	13 March	Marco Gilardi