

Session: 2022/23

Last modified: 15/07/2022 20:25:57

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 and programmer. Giving students the ability to conceptualise problems and solve them programmatically within a game engine using game industry mathematical libraries and statistical packages. Emphasis is put on the concepts and programming API used to develop computer games rather than the fromal language and manual manipulation of equations and fomulae.

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

1. Concept of reference frame for a space and their API implementations
 2. Concepts of vector, matrix, point and their API implementations
 3. Vector and Matrix Operators and their API implementations
 4. Concepts of Linear and Affine Space
 5. Geometrical transformations and the Transform Matrix and their API implementations
 6. Concepts of mean, variance, standard deviation, correlation and their API implementations
 7. Concept of Statistical Distribution and their API implementations
 8. Introduction to test of Hypothesis (t-Test and non parametric tests) and their API implementations.
- Introduce students to Linear Algebra and Statistics within the context of computer games
 - Introduce students to mathematical libraries for games within game engines
 - Introduce student to a statistical package to analyse data
 - 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	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 understanding of linear algebra and statistical concepts
- L2. Demonstrate mathematical reasoning in solving problems applied to computer games and game user research
- 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: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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. • To adapt routine practices within accepted standards

Generic Cognitive skills	<p>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</p>	
Communication, ICT and Numeracy Skills	<p>SCQF Level 8. Use a wide range of routine skills and some advanced and specialised skills associated with the subject:</p> <ul style="list-style-type: none"> • 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	<p>SCQF Level 8. Exercise autonomy and initiative in some activities at a professional level in practice or in a subject/discipline/sector.</p> <ul style="list-style-type: none"> • 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	
<p>This module is delivered by means of lectures and practical lab work and provides a vehicle for deepening the student's practical exposure to using mathematics for games development and user research.</p> <p>The module aims to develop the knowledge and skills required to confidently understand and solve mathematic problems in the context of computer games and game user reseach using game engine libraries and statistical software.</p> <p>The approach attempts to develop self reliance and enhance motivation and commitment by setting the student, exploratory, project oriented tasks, in areas relevant to the Module aims. The lectures introduce and discuss general conceptual issues.</p> <p>The practical work is conducted using a Problem Based Learning approach with formative assessment employed to give feedback to students with their software development and to develop problem solving skills relevant to the summative coursework assessments.</p>	
<p>Learning Activities During completion of this module, the learning activities undertaken to achieve the module learning outcomes are stated below:</p>	<p>Student Learning Hours (Normally totalling 200 hours): (Note: Learning hours include both contact hours and hours spent on other learning activities)</p>

Lecture/Core Content Delivery	10
Laboratory/Practical Demonstration/Workshop	24
Independent Study	166
	200 Hours Total
**Indicative Resources: (eg. Core text, journals, internet access)	
<p>The following materials form essential underpinning for the module content and ultimately for the learning outcomes:</p> <p>E. Lengyel, Foundations of Game Engine Development, Volume 1: Mathematics, Terathon Software LLC</p> <p>P. Dalgaard, Introductory statistics with R, Springer.</p>	
<p>(**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)</p>	
Engagement Requirements	
<p>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</p> <p>Where a module has Professional, Statutory or Regulatory Body requirements these will be listed here: Students will be required to engage with the module by attending synchronous lectures and completing weekly lab assignments</p>	

Supplemental Information

Programme Board	Computing
Assessment Results (Pass/Fail)	No
Subject Panel	Creative Computing
Moderator	Thomas Hainey
External Examiner	N Whitton
Accreditation Details	
Version Number	1.02

Assessment: (also refer to Assessment Outcomes Grids below)
Coursework - Program solving Linear Algebra problem applied to Computer Games (60%)
Coursework - Data Analysis and report of a given set of data from User Research using a statistical package (40%)

(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)	Weighting (%) of Assessment Element	Timetabled Contact Hours	
Creative output/ Audiotapes/ Videotapes/ Games/ Simulations	✓	✓		60	0	
Component 2						
Assessment Type (Footnote B.)	Learning Outcome (1)	Learning Outcome (2)	Learning Outcome (3)	Weighting (%) of Assessment Element	Timetabled Contact Hours	
Creative output/ Audiotapes/ Videotapes/ Games/ Simulations		✓	✓	40	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: the content and assessment are based on the ability to communicate in English but are otherwise culture-neutral. This module is heavily computer based and students must be proficient computer users within a windows, icons and mouse pointer environment with the use of suitable aids where required. For students with additional support needs, an advisor from enabling support will agree the appropriate adjustments to be made, consulting with the module coordinator if necessary. Further guidance available from Student Services, School Disability Co-ordinators or the University's Equality and Diversity Co-ordinator.

(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)