

Module Template for New and Revised Modules¹

Module Code	EEMT15
Module Name	PROGRAMMING INTERACTIVE SYSTEMS
ECTS Weighting²	5 ECTS
Semester taught	Semester 2
Module Coordinator/s	Mr. Hugh O'Dwyer
<u>Module Learning Outcomes</u> with reference to the <u>Graduate Attributes</u> and how they are developed in discipline	<p>On successful completion of this module, students should be able to:</p> <p>LO1. Specify appropriate software and hardware strategies for a wide range of problems and design contexts. LO2. Analyse, specify, design, write and test effective Arduino code. LO3. Design code for the management and mapping of data from sensors deployed in a multimedia installation context. LO4. Analyse, specify, design, write and test Max programs for the real-time processing of video and computer graphics LO5. Analyse, specify, design, write and test digital signal processing algorithms using the Processing coding language.</p> <p>Graduate Attributes: levels of attainment</p> <p>To act responsibly – Attained. To think independently – Attained. To develop continuously – Enhanced. To communicate effectively – Enhanced.</p>
Module Content	<p>This module covers advanced interactive multimedia systems design, building on the Semester 1 module, Creative Coding, which is a pre-requisite. The module has a practical orientation, providing hands-on instruction that enables learners to develop interactive systems for their own creative projects. The module enables learners to build electronic hardware, and to program their own software, for contexts that include interactive multimedia installation, interactive music performance and real-time audiovisual processing. Topics covered include digital signal processing, electronics, Arduino, sensors, rapid prototyping, video processing, networking and the Processing coding language. The approach adopted provides the student with a concrete set of tools for use, while also developing the ability to experiment and create new solutions for</p>

¹ [An Introduction to Module Design](#) from AISHE provides a great deal of information on designing and re-designing modules.

² [TEP Glossary](#)

particular projects.

Module Content

Interface and Interactive Installation
Hardware Controllers
Sensors
Principles of interface design
Introduction to DSP
Signals
Sampling
Mixing
Periodic Signals
Working with Audio Files
Delay
Filters
Arduino
Introduction
Serial Communications.
Electronic Components
Arduino Input
Variable Resistor, Push Button, Multiple Input Sensors, Input
Arduino Output
Sound Synthesis, Pulse Width Modulation, LED, Servomotors
Arduino and Max
Microsoft Kinect
Real-time video processing in Jitter
video mixing
live video input
OpenGL & 3D graphics processing
Networking and OSC

Teaching and Learning Methods

Students are required to complete 2 assignments. These assignments are worth 50% each. The first assignment consists of a set of problem-solving exercises based on material covered in the first several weeks. Students will be required to build small programming modules and to provide a written report detailing their conceptual understanding of their work. For this first assignment, marks are awarded as follows: Report – 10%; Programming 40%.

The second assignment requires that students design and implement a complete interactive multimedia system with sensor input. This student is expected to display the ability to innovate based on the material presented in class. A report detailing conceptual framework and details of design must be submitted. For this second assignment, marks are awarded as follows: Report 10%; Programming 40%.

Assessment Details³ Please include the following: <ul style="list-style-type: none"> • Assessment Component • Assessment description • Learning Outcome(s) addressed • % of total • Assessment due date 	Assessment Component	Assessment Description	LO Addressed	% of total	Week due			
	Assignment 1	Coding project w/report	1-3	50%	8			
	Assignment 2	Coding project w/report	1-5	50%	12			
Reassessment Requirements	n/a							
Contact Hours and Indicative Student Workload³	<table border="1"> <tr> <td> Contact hours: 11x 2-hour lectures 6 x 1-hour tutorials </td> </tr> <tr> <td> Independent Study (preparation for course and review of materials): 35 hours </td> </tr> <tr> <td> Independent Study (preparation for assessment, incl. completion of assessment): 34 hours </td> </tr> </table>					Contact hours: 11x 2-hour lectures 6 x 1-hour tutorials	Independent Study (preparation for course and review of materials): 35 hours	Independent Study (preparation for assessment, incl. completion of assessment): 34 hours
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Recommended Reading List	Smith, S. The Scientist & Engineer's Guide to DSP http://www.dspguide.com/ Arduino website. Arduino.cc Igoe, T. Making Things Talk, Second Edition September 2011 https://learn.adafruit.com							
Module Pre-requisite	Creative Coding (MMT Semester 1)							
Module Co-requisite	n/a							
Module Website	https://www.tcd.ie/eleceng/mmt/postgraduate/semester-2/programming/index.php							

³ [TEP Guidelines on Workload and Assessment](#)

Are other Schools/Departments involved in the delivery of this module? If yes, please provide details.

Module Approval Date

Approved by

Academic Start Year

Academic Year of Date