MEDI H1606: Principles of Light and Sound

Module Title:	Principles of Light and Sound
Language of Instruction:	English

Credits:	10

NFQ Level:	6

Module Delivered In	No Programmes

Teaching & Learning Strategies:	A combination of lectures, laboratory practicals, demonstrations and projects will be used. Particular emphasis will be placed on active learning especially problem/project based learning and team work. In parallel with the lecture programme, each student will be asked to complete a range of practical assignments. Lectures: A series of lectures, using whiteboard, data projector and video, will initiate and broaden the students' knowledge of the scientific principles. Practicals: A series of demonstrations and practical exercises designed to motivate the students and develop their learning of scientific principles. The practical sessions will focus the students on the concepts in order to enhance their understanding and develop their analytical skills.

Module Aim:	The aim of this course is to give students an understanding of: the characteristics of sound and light; how light and sound is captured, stored, processed and transmitted electronically; human physiology in relation to sight and hearing.

Learning Outcomes	
On successful completion of this module the learner should be able to:	
LO1	Understand the fundamentals of measurement science
LO2	Describe the properties of light and sound
LO3	Explain the technical aspects of how light/sound is captured, stored, processed and transmitted
LO4	Demonstrate and apply the technical skills and knowledge required to measure specific properties of light and sound, e.g. wavelength, frequency
LO5	Apply the knowledge of light and sound to TV/Media applications, working autonomously and as a member of a team on selected applied projects
LO6	Identify and recommend appropriate approaches solutions to applied problems

Pre-requisite learning
Module Recommendations *This is prior learning (or a practical skill) that is recommended before enrolment in this module.*
No recommendations listed
Incompatible Modules *These are modules which have learning outcomes that are too similar to the learning outcomes of this module.*
No incompatible modules listed
Co-requisite Modules
No Co-requisite modules listed
Requirements *This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed.*
No requirements listed

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Module Content & Assessment

Indicative Content
Waves/Units SI units Speed, velocity and acceleration Types of waves and their uses Amplitude, wavelength, frequency, velocity, periodic time, phase. Exchange different units State units of measurement of energy and power Power to energy
Sound Nature of sound waves. Decibels, intensity of sound Frequency range of audible sound Speed of sound in various materials Main properties of sound including absorption, reflection. Applications of ultrasonic waves. Mathematically representation of a sound wave using a sinusoidal function Characteristics of a musical note i.e. periodic signal, envelope of sound. Frequency domain. Exponential functions to represent the envelope of the sound. Pitch perception Sensation and perception in hearing
Light EM spectrum Wavelength and frequency Units of light intensity Light reflection, refraction and absorption Opto-electronics e.g. LCD, fibre optic cables Electromagnetic spectrum Visual acuity Colour temperature Colour science, colour perception
Images Digital image storage e.g. film vs. ccd Digital imaging i.e. pixels; Image quality; colour images creation; Image enhancement techniques and special effects Brightness, contrast, etc., of digital images movies creation from still images; Temporal Sampling Rate Human influences on frame rate Frame rate and scanning methods Slow or fast images recording
Optics Features of an image Image capture–lens projection system f numbers Image quality and first order aberrations
Television TV standards Display –types and options Displays –merits/limitations e.g. luminance, angle, resolution, speed, quality etc. Future displays
Signal Conversion Analogue to digital conversion
Human Physiology Structure of the human ear and how humans perceive sound Structure of the human eye and how humans perceive light

Assessment Breakdown	%
Continuous Assessment	30.00%
Practical	30.00%
End of Module Formal Examination	40.00%

Continuous Assessment

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Other	Continuous Assessment (30%) In the course of the module students will be expected to complete assignments. Each assignment will test a different set of learning outcomes e.g.: Assessment 1 : Portfolio of Light; Assessment 2 : Examination of lecture material. Assessment 3 : Media and Science- Technical Analysis	1,2,3,4,5,6	30.00	n/a

No Project

Practical

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Practical/Skills Evaluation	Practical sessions will be held incorporating demonstrations and individual exercises for each student. The student will be expected to write a report for each demonstration / exercise. Some of these reports may be research–based only	4,5,6	30.00	Every Week

End of Module Formal Examination

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Formal Exam	No Description	1,2,3,4,5,6	40.00	End-of-Semester

SETU Carlow Campus reserves the right to alter the nature and timings of assessment

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Module Workload

Workload: Full Time		
Workload Type	*Frequency*	*Average Weekly Learner Workload*
Laboratory	Every Week	2.00
Lecture	Every Week	1.00
Estimated Learner Hours	Every Week	1.00
	Total Hours	4.00