MODULE DESCRIPTION FORM

DEPARTMENT OF MECHANICAL AND AEROSPACE ENGINEERING

16293 ENVIRONMENTAL ENGINEERING SCIENCE 1

Module Registrar: Dr D Cóstola daniel.costola@strath.ac.uk	**Taught To (Course): Cohorts for whom class is compulsory / elective**		
Other Lecturers Involved: none	**Credit Weighting: 10**	**Semester: 1**	
Assumed Prerequisites: none	**Compulsory: elective class for MAE**	**Academic Level: 2**	**Suitable for Exchange: Y**

Module Format and Delivery (HOURS i.e. 1 credit = 10hrs of study):

Lecture	Tutorial	Laboratory	Groupwork	External	Online	Project	Assignments	Private Study	**Total**
	10						30	60	100

Educational Aim

This module introduces students to the fundamental and basic principles underlying the interaction of human beings and the environment which exists in and around buildings. The main considerations are the effects of heat, humidity and light within buildings. The class also deals with climatic effects, energy use, sick buildings and other topics which underline the need for an integrated approach to the study and design of environmental systems. The subjects are developed from basic principles which assume the minimum knowledge of science and mathematics.

Learning Outcomes

On completion of the module the student is expected to be able to:

LO1 Understand the basic heat transfer processes of conduction, convection and radiation and be able to carry out simple fabric and ventilation heat loss calculations, and energy consumption calculations, for buildings.

LO2 Understand the concepts of indoor environmental quality – particularly thermal comfort, lighting comfort and indoor air quality.

LO3 Understand the basic psychrometric properties associated with air-water vapour mixtures, be able to use a psychrometric chart, carry out surface and interstitial condensation predictions and understand the causes and remedies of building condensation.

LO4 Understand that the indoor environmental involves an understanding of various sub-systems and how they combine, by consideration of climate-responsive buildings and integrated design.

Syllabus

The module will teach the following:

1. Principles of Heat: nature of heat, heat transfer mechanisms, vapours and gases, heating systems.
2. Thermal Insulation: insulating materials, U-values, structural temperatures.
3. Thermal comfort, comfort indices, indoor air quality, natural ventilation, mechanical ventilation
4. Heat losses, heat gains, heat balance, heat load, thermal energy, energy consumption.
5. Humidity, psychrometric chart, condensation in buildings.
6. Electromagnetic radiation, nature of vision, measurement of lighting, colour.
7. Lamps, luminaires, lighting design, natural light sources, daylight factors, combined factors.
8. Climate, energy conservation, high-performance buildings, integrated building design.
9. Modelling and simulation.

Assessment of Learning Outcomes

For each Module Learning Outcome, the following criteria will be used to make judgements on student learning.

LO1 C1 Ability to carry out simple calculations to quantify energy and environmental performance.

LO2 C1 Ability to evaluate indoor comfort as a function of various factors and link these factors to the performance/design of buildings and heating, cooling and ventilation systems.

LO3 C1 Ability to conduct analysis related to changes in psychrometric properties of the air and link these properties to the performance/design of buildings and systems.

LO4 C1 Ability to conduct multi-criteria analysis of buildings and systems.

The standards set for each criterion per Module Learning Outcome to achieve a pass grade are indicated on the assessment sheet for all assessment.

Principles of Assessment and Feedback
(within Assessment and Feedback Policy at: https://www.strath.ac.uk/professionalservices/staff/policies/academic/)

- Formal, summative feedback is provided by the return of examination marks to students after assessment. Individual feedback on examination performance will be given on request.
- Informal feedback is provided weekly in relation to the formative on-line questions on Myplace.
- Performance in an individual assignment will be used to gauge student progress, with feedback given in group sessions that address collective shortcomings in relation to the learning outcomes. The coursework assignment comprises a survey and assessment of environmental performance of a dwelling.

Assessment Method(s) Including Percentage Breakdown and Duration of Exams *(individual weightings)*

Examination				Coursework		Practical		Project	
Number	Month(s)	Duration	***Weighting***	Number	***Weighting***	Number	***Weighting***	Number	***Weighting***
1	December	2 hours	50%	2	50%				
*All				*All		*		*	

* ***L/Os:*** *Indicate which Learning Outcomes (L01, L02, etc) are to be assessed by exam/coursework/practical/project as required.*

Coursework / Submissions deadlines (*academic weeks*): Week 6 and 11

Resit Assessment Procedures:
Submission of alternate ^^coursework(s) prior to commencement of the August exam diet.

^^Students must contact the module Registrar for details as soon as results confirm that a resit is required.

PLEASE NOTE:
Students must gain a summative mark of 40% to pass the module. Students who fail the module at the first attempt will be re-assessed prior the August diet. This re-assessment will consist entirely of coursework. No marks from any previous attempts will be transferred to a new resit attempt.

Recommended Reading

*****Purchase recommended **Highly recommended reading *For reference (do NOT purchase)**

- R McMullan, 'Environmental Science in Building' 8th edition, Palgrave Macmillan. **
- Case studies available at http://www.hpbmagazine.org *

Additional Student Feedback
(Please specify details of when additional feedback will be provided)

Date	Time	Room No
Announced in class		Check timetable webpages for details.

Session: 2021/22

Approved:

Course Director Signature: Dr E Henderson (SG)

Date of Last Modifications: September 3, 2021

(Updated August 2021)

MODULE TIMETABLE

Module Code:	**16293**	**Module Title:**	**Environmental Engineering Science 1**

Brief Description of Assessment:

Coursework comprising the survey and performance analysis of a building covering the contents of weeks 1-5 (coursework 1) and 6 to 10 (coursework 2).
Exam covering the whole course content – December diet.

Assessment Timing:-

Indicate on the table below the start/submission dates for each assignment/project and the timing of each exam/assessment using the dropdowns provided. Dropdowns can be left blank. Add extra notes below the dropdowns.

Please note: Timings can and will change, this should only be used as a guide.

Semester One	W&D Wk	WK1	WK2	WK3	WK4	WK5	WK6	WK7	WK8	WK9	WK10	WK11	Exam Period
	Course work Set	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Course work Submit	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Course work Submit	Exam

Semester Two	C&D Wk	WK1	WK2	WK3	WK4	WK5	WK6	WK7	WK8	WK9	WK10	WK11	Exam Period
	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item.