Module Registrar: Dr P A Strachan  
  paul@esru.strath.ac.uk

Taught To (Course): Cohorts for whom class is compulsory / optional

Other Lecturers Involved: none

Credit Weighting: 10 (ECTCS 5)

Semester: 1

Assumed Prerequisites: none

Compulsory class forEnv Health and Arch Eng;  
optional class for MAE

Compulsory class for Env Health and Arch Eng;  
optional class for MAE

Academic Level: 2

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

<table>
<thead>
<tr>
<th>Lecture</th>
<th>Tutorial</th>
<th>Laboratory</th>
<th>Groupwork</th>
<th>External</th>
<th>Online</th>
<th>Project</th>
<th>Assignments</th>
<th>Private Study</th>
<th>Total</th>
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<tr>
<td>20</td>
<td>4</td>
<td>6</td>
<td>7</td>
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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 sick buildings, climate-responsive buildings and integrated design.

Syllabus

The module will teach the following:

1. Introduction: need, overview, units, numbers
2. Principles of Heat: nature of heat, heat transfer mechanisms
4. Thermal Insulation: insulating materials, U-values
5. Thermal Insulation: structural temperatures
6. Thermal Energy: thermal comfort, comfort indices
7. Thermal Energy: indoor air quality, natural ventilation, mechanical ventilation
9. Thermal Energy: energy consumption, degree days, fuel consumption
10. Thermal Energy: revision
11. Humidity and Condensation: humidity, psychrometric chart
12. Humidity and Condensation: condensation in buildings
13. Humidity and Condensation: condensation conditions
14. Principles of Light: electromagnetic radiation, nature of vision, measurement of lighting, colour
15. Artificial Lighting: lamps, luminaires, lighting design
16. Natural Lighting: natural light sources, daylight factors, combined factors
17. Environmental Buildings: climate, energy conservation
18. Environmental Buildings: sick buildings, green buildings
19. Environmental Buildings: intelligent buildings, integrated building design
20. Coping with Complexity: modelling and simulation, IT
Assessment of Learning Outcomes

Criteria
For each of the Module Learning Outcomes the following criteria will be used to make judgements on student learning:

| LO1 – LO4: The assessment is made in examination and it will test the student as follows |
| C1 Understanding of the basic concepts of topics covered in the syllabus |
| C2 Ability of students to carry out simple calculations to quantify energy and environmental performance |

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

12 Principles of Assessment and Feedback
(online Learning & Teaching web pages: www.strath.ac.uk/learnteach/informationforstaff/staff/assessfeedback/12principles/)

The mechanism for feedback is through the use of tutorials and on-line questions. There are a set of tutorial questions throughout the module; answers to some of these are covered in class, others are covered in dedicated tutorial sessions towards the end of the module. There will also be sets of on-line questions on MyPlace which will be discussed collectively in class.

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

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<tr>
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<th>Examinations</th>
<th>Courseworks</th>
<th>Projects</th>
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<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Month(s)</td>
<td>Duration</td>
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<tr>
<td>All</td>
<td>1</td>
<td>January</td>
<td>2hrs</td>
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Coursework / Submissions deadlines: N/A
Resit Assessment Procedures:
2 hour examination in August diet.

PLEASE NOTE:
Students need to gain a summative mark of 40% to pass the module. Students who fail the module at the first attempt will be re-examined during the August diet. This re-examination will consist entirely of exam.

Recommended Reading


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

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Session: 2014/15
Formal, summative feedback will be provided by the return of examination marks to students after assessment (note: exam scripts will not be returned to students and no individual or collective discussion of exam performance will be facilitated).

Formative feedback will be provided in two ways. Firstly, tutorials will include verbal discussion with individuals or groups on tutorial exercises attempted in advance by students (note: to receive this feedback students should participate in these tutorials but attendance is not mandatory). Secondly, on-line questions should be attempted by students midway through the course – the results from these will be discussed collectively in class.

Approved:

Course Director Signature: [Signature]

Date of Last Modifications: 28 August 2014
# MODULE TIMETABLE

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

**Brief Description of Assessment:**  
2 hour exam

**Assessment Timing:-**

Indicate on the table below the start/submission dates for each assignment/project and the timing of each exam/assessment(s).

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<th>WK1</th>
<th>WK2</th>
<th>WK3</th>
<th>WK4</th>
<th>WK5</th>
<th>WK6</th>
<th>WK7</th>
<th>WK8</th>
<th>WK9</th>
<th>WK10</th>
<th>WK11</th>
<th>WK12</th>
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<td>2hr exam January</td>
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<th>WK10</th>
<th>WK11</th>
<th>WK12</th>
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