**Liverpool** John Moores University

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| Title: | ALTERNATIVE BUILDING MATERIALS AND DESIGN |
| Status: | Definitive |
| Code: | **5015TECH** (105310) |
| Version Start Date: | 01-08-2016 |
| Owning School/Faculty: | Maritime and Mechanical Engineering |
| Teaching School/Faculty: | Maritime and Mechanical Engineering |

| Team | Leader |
|---|---|
| Geraint Phylip-Jones | Y |

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| **Academic Level:** | FHEQ5 | **Credit Value:** | 24 | **Total Delivered Hours:** | 72 |
| **Total Learning Hours:** | 240 | **Private Study:** | 168 | | |

**Delivery Options**
Course typically offered: Standard Year Long

| Component | Contact Hours |
|---|---|
| Lecture | 24 |
| Practical | 48 |

**Grading Basis:** 40 %

**Assessment Details**

| Category | Short Description | Description | Weighting (%) | Exam Duration |
|---|---|---|---|---|
| Essay | AS1 | Building Environmental Assessment | 25 | |
| Essay | AS2 | Passive Building Design Project | 75 | |

**Aims**

*This module examines the design of modern ecological buildings from an all encompassing perspective. It also covers site considerations and the use of sustainable building materials.*

**Learning Outcomes**

After completing the module the student should be able to:

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| 1 | Critically evaluate a buildings ecological footprint based on it's situation, design and material selection. |
| 2 | Identify and use passive design principles to a new domestic and industrial build project. |
| 3 | Select suitable alternative materials for a range of building features. |
| 4 | Use a range of modelling software to aid the building design process. |

**Learning Outcomes of Assessments**

The assessment item list is assessed via the learning outcomes listed:

| | | | | |
|---|---|---|---|---|
| CW | 1 | | | |
| CW | 2 | 3 | 4 | |

**Outline Syllabus**

*The whole house approach to design for ecological building: site considerations; space and structure; legislation and standards; Ecological building materials; Healthy buildings; The low energy house; Ecological renovation. Climate influences on the design of buildings;*

*Passive design principles; Environment sensitive design: housing, commercial buildings.*

*Solar water heating.  Introduction to flat plate collectors; solar water installation; Controls; System assembly.*

*Principles of natural ventilation; Cooling techniques: ventilation; ground; night; radiation; evaporation; breathing walls.*

*Water collection and economy in buildings; Waste water disposal; Dampness and condensation.*

*Alternative building methods. Classification of soils by particle size from clay, silt and gravel to rock; Stabilised soil; appropriate methods of soil stabilisation; Composite materials; Frames and membranes; Straw bale building; Timber preservation; round pole and sawn timber, plywood.*

*Daylight and daylight factors; Artificial light; lighting: three dimensional effects; Sunlight and solar geometry; Solar irradiance. Daylight factor measurement in real buildings; Model study of daylight factor; real skies; Model studies of daylight factor; artificial sky; Computer evaluation of daylight factor. Energy Efficient Lighting, upgrading of existing systems to include energy saving lamps/tubes and electronic ballast.*

*Energy performance of buildings. Energy consumption breakdown in building types.*

*Thermal properties of buildings; thermal comfort. Description of materials within an environmental context; Embodied energy of building materials; Materials index.*

*Demonstration of computer application: dynamic thermal simulation, lighting simulation, computational fluid dynamics.*

## Learning Activities

This module focuses on a practical approach to learning with work-based learning activities relating to building design and ecological materials. A range of structured lectures case study sessions will also be employed. Students will also be expected to complete a field trip to the Centre of Alternative Technology.

## Notes

This module will be delivered in a practical manner, using a range a learner centred activities, case studies, design and build activities, some of which will be completed at the Centre of Alternative Technology.