

### Summary Information

<b>Module Code</b>	5300DCIV
<b>Formal Module Title</b>	Materials II
<b>Owning School</b>	Civil Engineering and Built Environment
<b>Career</b>	Undergraduate
<b>Credits</b>	20
<b>Academic level</b>	FHEQ Level 5
<b>Grading Schema</b>	40

### Module Contacts

#### Module Leader

Contact Name	Applies to all offerings	Offerings
Md Sadique	Yes	N/A

#### Module Team Member

Contact Name	Applies to all offerings	Offerings
Abhijit Ganguli	Yes	N/A

#### Partner Module Team

Contact Name	Applies to all offerings	Offerings
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### Teaching Responsibility

LJMU Schools involved in Delivery
Civil Engineering and Built Environment

### Learning Methods

Learning Method Type	Hours
Lecture	22
Online	22
Practical	8
Workshop	11

### Module Offering(s)

Offering Code	Location	Start Month	Duration
SEP-CTY	CTY	September	12 Weeks

### Aims and Outcomes

<b>Aims</b>	To develop more in-depth and advanced understanding of the main materials that are used in civil engineering. This includes the way some materials develop and gain their properties. Also to explore the effects of using sustainable cement replacement materials and environmentally friendly recycled materials.
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### Learning Outcomes

After completing the module the student should be able to:

Code	Description
MLO1	Evaluate how concrete develop its strength and durability through consideration of its microstructure development and its macroscale behaviour.
MLO2	Carry out mix design of concrete that satisfies the different requirements in terms of fresh and hardened properties.
MLO3	Understand the source and properties of sustainable supplementary cementitious materials and environmentally friendly alternative and recycled aggregates and their effects on the enhancement of concrete properties and behaviour.
MLO4	Explore the degradation of concrete and steel including the factors contributing to their deterioration.
MLO5	Assess the properties and behaviour of bituminous materials including the use of different testing methods and application in the civil engineering industry.

## Module Content

### Outline Syllabus

Explore more closely on a microstructural level the behaviour of concrete that would lead to the development of its strength and durability. The required mix design procedure for the production of concrete based on the fresh and hardened properties. Consideration of the different types of cement replacement materials including their source. Evaluate the use of cement replacement materials in terms of their effects on sustainability and property enhancement. Study the environmental development of concrete through the use of recycled aggregates and their effects on concrete properties and application, with an appreciation of the carbon impact. Investigate the degradation of concrete, steel, and timber through the varying effects of the environment and exposure to fire. Assess the properties and behaviour of bituminous and asphalt materials including their use in pavements and road construction. The different test techniques used to determine their properties are also considered and the overall impact on carbon emissions.

### Module Overview

#### Additional Information

This module develops further the ability for evaluating and understanding the main materials associated with civil engineering in terms of the mechanisms for their property development and behaviour. This also includes the use of sustainable materials and their effects on property improvement. All this would be enhanced by laboratory practical sessions that also support the understanding of materials degradation through fire, fibre reinforced concretes, and bituminous materials testing.

### Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Learning Outcome Mapping
Report	Journal Style Lab Report	25	0	MLO2, MLO1, MLO3
Centralised Exam	Examination	75	2	MLO4, MLO2, MLO1, MLO5, MLO3