

## Liverpool John Moores University

Title: MATERIALS  
Status: Definitive  
Code: **5028BEUG** (102774)  
Version Start Date: 01-01-2012

Owning School/Faculty: Built Environment  
Teaching School/Faculty: Built Environment

Team	Leader
William Atherton	Y

**Academic Level:** FHEQ5  
**Credit Value:** 12.00  
**Total Delivered Hours:** 50.00  
**Total Learning Hours:** 120  
**Private Study:** 70

### Delivery Options

Course typically offered: Semester 2

Component	Contact Hours
Lecture	24.000
Practical	12.000
Tutorial	12.000

**Grading Basis:** 40 %

### Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	AS1	4 questions from 6	70.0	2.00
Portfolio	AS2		30.0	

### Aims

*To expand the student's knowledge of the engineering properties of the principal construction materials, based upon scientific principles.  
To consider the importance of durability and to expand upon the principles governing the choice and specification of materials used in construction.*

### Learning Outcomes

After completing the module the student should be able to:

- 1 Analyse the composition, manufacturing processes and engineering properties of the major construction materials.
- 2 Design a concrete mix for defined strength, workability and durability and be able to perform associated standard tests.
- 3 Produce performance specifications for concrete, steel and timber and justify the selections made.
- 4 Discuss the processes involved in the degradation/failure of construction materials and be aware of the various methods by which quality and durability are assured.
- 5 Exercise significant judgement in selecting repair methods for common defects found in structural concrete.

### **Learning Outcomes of Assessments**

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

EXAM	1	3	4	5
CW	2	4		

### **Outline Syllabus**

*The structure and properties of steels and non-ferrous metals including heat treatments and the effects of welding.*

*Modes of failure of materials including yielding, fast fracture, fatigue, thermal degradation and corrosion together with methods of mitigation including corrosion protection techniques.*

*Specification and quality control of concrete production including mix design and compliance criteria.*

*Hardened properties of concrete, strength, deformation, shrinkage and durability together with in-situ testing.*

*Stress grading of structural timber and effects of moisture, biological degradation methods of preservation.*

*Properties of polymers used in civil engineering including the use of adhesives and sealants.*

### **Learning Activities**

The module is based on a lecture and tutorial programme including video and Power-Point presentations together with a number of practical/demonstration sessions.

Students should develop a competence in using scientific equipment to perform testing in line with British/European Standards.

Laboratory work will have an emphasis on the manipulation, interpretation and analysis of the data, which should allow reasoned conclusions and recommendations to be made as to the suitability of various construction materials for specific applications.

Assignments will be formulated to link the selection of materials to suitable applications within the construction industry and will include aspects of durability, maintenance and repair.

Case studies will be used to demonstrate the modes of degradation/failure of construction materials and the possible methods of mitigation.

## References

<b>Course Material</b>	Book
<b>Author</b>	Callister, W.D.
<b>Publishing Year</b>	2006
<b>Title</b>	Materials Science and Engineering
<b>Subtitle</b>	An Introduction
<b>Edition</b>	
<b>Publisher</b>	John Wiley & Sons
<b>ISBN</b>	0471736961

<b>Course Material</b>	Book
<b>Author</b>	Illston, J.M. and Domone, P.L.T.
<b>Publishing Year</b>	2001
<b>Title</b>	Construction Materials
<b>Subtitle</b>	Their Nature and Behaviour
<b>Edition</b>	3rd Edition
<b>Publisher</b>	Spon Press
<b>ISBN</b>	0419258604

<b>Course Material</b>	Book
<b>Author</b>	Jackson, N. and Dhir, R.K.
<b>Publishing Year</b>	1997
<b>Title</b>	Civil Engineering Materials
<b>Subtitle</b>	
<b>Edition</b>	5th Edition
<b>Publisher</b>	Palgrave Macmillan
<b>ISBN</b>	033363683X

<b>Course Material</b>	Book
<b>Author</b>	Taylor, G.D.
<b>Publishing Year</b>	2000
<b>Title</b>	Materials in Construction
<b>Subtitle</b>	An Introduction
<b>Edition</b>	3rd Edition
<b>Publisher</b>	Longman
<b>ISBN</b>	0582368898

<b>Course Material</b>	Book
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<b>Author</b>	Taylor, G.D.
<b>Publishing Year</b>	2001
<b>Title</b>	Materials in Construction
<b>Subtitle</b>	Principles, Practice and Performance
<b>Edition</b>	2nd Edition
<b>Publisher</b>	Longman
<b>ISBN</b>	0582369347

<b>Course Material</b>	Book
<b>Author</b>	BSEN 12620
<b>Publishing Year</b>	2002
<b>Title</b>	Aggregates for Concrete
<b>Subtitle</b>	
<b>Edition</b>	
<b>Publisher</b>	British Standards Institute
<b>ISBN</b>	

<b>Course Material</b>	Book
<b>Author</b>	BSEN 934
<b>Publishing Year</b>	2001
<b>Title</b>	Admixtures for Concrete, Mortar and Grout
<b>Subtitle</b>	
<b>Edition</b>	
<b>Publisher</b>	British Standards Institute
<b>ISBN</b>	

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## Notes

The module takes the student beyond the work completed at level 1, concentrating upon the practical applications of construction materials, whilst maintaining the close link between engineering properties, manufacture, composition and structure. The concept of durability and the importance of specification are further explored as a basis for future employment in the industry and for further study.