Module Descriptor

Title	Advanced Construction Materials		
Session	2025/26	**Status**	Published
Code	ENGG10016	**SCQF Level**	10
Credit Points	20	**ECTS (European Credit Transfer Scheme)**	10
School	**Computing, Engineering and Physical Sciences**		
Module Co-ordinator	J Hughes		

Summary of Module

The Module is to further extend students' knowledge/understanding of construction materials and particularly to help them to develop an in-depth understanding of the behaviour and characteristics of special and high-performance concrete, stone masonry and repair/conservation materials. It is also to make them aware of the recent advances & development trends in the materials and sustainable construction domain, and to illustrate it on practical examples. These include use of natural renewable/low-carbon engineering materials, nanomaterials and multifunctional materials, waste/recycled materials, etc in the construction industry and the built environment, and material compatibility issues in conservation of built heritage, and the significance in terms of sustainability and the environment. Much of the module is research informed teaching.

The Module will consist of a balanced programme of lectures by experts in the field, supported by a number of laboratory/practical work including demonstrations and exercises, where students will learn the relevant standards, and specialist, state-of-the-art testing and building condition surveying techniques.

Main Content:

Special and high-performance concrete materials: modern constituent materials, self-compacting concrete, fibre reinforced concrete, high strength/durability/performance concrete, environmental impact and sustainability issues, use of waste/recycled/alternative materials, performance-based design, etc.

Built Heritage: historic materials and new materials for conservation and repair.

Stone masonry: deterioration and effects of repair and cleaning.

Nanotechnology application in construction materials: current development and future potentials.

This module will work to develop a number of the following key 'I am UWS' graduate attributes: Critical thinker, Inquring, Collaborative, Research-minded, Knowledgeable, autonomous, innovative and driven.

Module Delivery Method	On-Campus[1] ☒	Hybrid[2] ☐	Online[3] ☐	Work -Based Learning[4] ☐
Campuses for Module Delivery	☐ Ayr ☐ Dumfries	☐ Lanarkshire ☐ London ☒ Paisley	☐ Online / Distance Learning ☐ Other (specify)	

Terms for Module Delivery	Term 1	☐	Term 2	☒	Term 3	☐
Long-thin Delivery over more than one Term	Term 1 – Term 2	☐	Term 2 – Term 3	☐	Term 3 – Term 1	☐

Learning Outcomes	
L1	Competently assess the latest advances & developments in the construction materials domain. Demonstrate critical awareness of current problems and/or trends associated with the developments.
L2	Develop comprehensive and practical understanding of several important test standards and common techniques for building condition surveying for stone masonry.
L3	Further understand the key characteristics and behaviour of the existing and new construction materials and their main differences, hence apply them most appropriately in the construction industry.
L4	N/A
L5	N/A

Employability Skills and Personal Development Planning (PDP) Skills	
SCQF Headings	**During completion of this module, there will be an opportunity to achieve core skills in:**
Knowledge and Understanding (K and U)	**SCQF 10** Gain and consolidate knowledge and understanding of some more advanced aspects of construction materials and sustainability issues. Develop critical awareness of some of the recent important developments in construction materials, their benefits, potentials and limitations.

[1] Where contact hours are synchronous/ live and take place fully on campus. Campus-based learning is focused on providing an interactive learning experience supported by a range of digitally-enabled asynchronous learning opportunities including learning materials, resources, and opportunities provided via the virtual learning environment. On-campus contact hours will be clearly articulated to students.

[2] The module includes a combination of synchronous/ live on-campus and online learning events. These will be supported by a range of digitally-enabled asynchronous learning opportunities including learning materials, resources, and opportunities provided via the virtual learning environment. On-campus and online contact hours will be clearly articulated to students.

[3] Where all learning is solely delivered by web-based or internet-based technologies and the participants can engage in all learning activities through these means. All required contact hours will be clearly articulated to students.

[4] Learning activities where the main location for the learning experience is in the workplace. All required contact hours, whether online or on campus, will be clearly articulated to students

Practice: Applied Knowledge and Understanding	**SCQF 10** • Use a range of specialised skills, techniques, practices and/or materials that are at the forefront of, or informed by forefront developments- through group laboratory work and demonstrations • Use a significant range of the principal professional skills, techniques, practices and/or materials associated with the subject/discipline/sector – through coursework.
Generic Cognitive skills	**SCQF 10** Apply critical analysis, evaluation and synthesis to forefront issues, or issues that are informed by forefront developments in the subject/discipline/sector – through coursework. Critically review, consolidate and extend knowledge, skills, practices and thinking in a subject/discipline/sector – through coursework. Apply appropriate quantitative methods to the experiment and results analysis.
Communication, ICT and Numeracy Skills	**SCQF 10** Develop practical engineering and ICT skills through group project work and individual coursework/report. Undertake critical evaluations of a range of numerical and graphical data.
Autonomy, Accountability and Working with Others	**SCQF 10** Further develop skills in planning self-learning and improving performance. Exercise substantial autonomy and initiative in lab/practical activities. Take responsibility for own work and/or significant responsibility for the work of others.

Prerequisites	**Module Code**	**Module Title**
	Other	
Co-requisites	**Module Code**	**Module Title**

Learning and Teaching	
In line with current learning and teaching principles, a 20-credit module includes 200 learning hours, normally including a minimum of 36 contact hours and maximum of 48 contact hours.	
Learning Activities During completion of this module, the learning activities undertaken to achieve the module learning outcomes are stated below:	**Student Learning Hours** (Note: Learning hours include both contact hours and hours spent on other learning activities)
Lecture / Core Content Delivery	28
Laboratory / Practical Demonstration / Workshop	16
Tutorial / Synchronous Support Activity	4

Independent Study	152
n/a	0
n/a	0
TOTAL	200

Indicative Resources

The following materials form essential underpinning for the module content and ultimately for the learning outcomes:

Various handout materials, resources available on VLE, Construction Information Services data base.

Extension Resources: Consultation of the undernoted resources is recommended and material from these resources may be of benefit to the student in the assessment process:

- A.M. Neville: “Properties of Concrete”, 4th Edition, Longman, 1995.

- A.Bentur: “Fibre reinforced Cementitious Composites”, London, Elsevier, 1990.

- EFNARC, et al, “The European Guidelines for Self Compacting Concrete”, 2005, http://www.efnarc.org/pdf/SCCGuidelinesMay2005.pdf.

- NRMCA: “Self-consolidating Concrete”, 2006, http://www.selfconsolidatingconcrete.org/default.htm-

-Forster, A., “Building conservation philosophy for masonry repair: part 1 – “ethics””, Structural Survey, Vol. 28 No. 2, 2010, pp. 91-107

-Fitzner, Bernd , (2004), "Documentation and evaluation of stone damage on monuments", 10th International congress on deterioration and conservation of stone, Stockholm, p 677-690

-Hyslop, Ewan K.; Albornoz-Parra, Luis J.; Fisher, Lydia C.; Hamilton, Sarah L.. 2006 “Safeguarding Glasgow's stone built heritage skills and materials requirements : facade surveys and building stone analysis.” Nottingham, UK, British Geological Survey, 52pp. (CR/06/077N) (Unpublished)

-Warke, P., Curran, J.M., Turkington, A.V. & Smith, B.J. (2003). “Condition assessment for building stone conservation: a staging system approach.” Building and Environment, 38(9-10), 1113–1123. doi:10.1016/S0360-1323(03)00085-4

-ICOMOS-ISCS : Illustrated glossary on stone deterioration patterns Glossaire illustré sur les formes d’altération de la pierre - available at https://www.icomos.org/publications/monuments_and_sites/15/pdf/Monuments_and_Sites_15_ISCS_Glossary_Stone.pdf

(N.B. Although reading lists should include current publications, students are advised (particularly for material marked with an asterisk*) to wait until the start of session for confirmation of the most up-to-date material)

Attendance and Engagement Requirements

In line with the Student Attendance and Engagement Procedure, Students are academically engaged if they are regularly attending and participating in timetabled on-campus and online teaching sessions, asynchronous online learning activities, course-related learning resources, and complete assessments and submit these on time.

For the purposes of this module, academic engagement equates to the following:

The School of Computing, Engineering and Physical Sciences considers attendance and engagement to mean a commitment to attending, and engaging in timetabled sessions.

Students will scan their attendance via the attendance scanners each time they are on-campus. Students will have attendance recorded in class and they will be expected to login to the VLE several times per week. Students who are unable to attend a timetabled learning session, due to illness or other circumstance, should notify their Programme Leader. Across the School an 80% attendance threshold is set. Students who fall below this, will be referred to the Student Success Team to see how they can be best supported in their studies.

Equality and Diversity
The University's Equality, Diversity and Human Rights Procedure can be accessed at the following link: UWS Equality, Diversity and Human Rights Code. Aligned with the University's commitment to equality and diversity, this module supports equality of opportunity for students from all backgrounds and learning needs. Using the VLE, material will be presented electronically in formats that allow flexible access and manipulation of content. This module complies with University regulations and guidance on inclusive learning and teaching practice. This module has lab-based teaching and as such students are advised to speak to the Module Co-ordinator to ensure that specialist assistive equipment, support provision and adjustment to assessment practice can be put in place, in accordance with the University's policies and regulations.
(N.B. Every effort will be made by the University to accommodate any equality and diversity issues brought to the attention of the School)

Supplemental Information

Divisional Programme Board	**Engineering Physical Sciences**
Overall Assessment Results	☐ **Pass / Fail** ☒ **Graded**
Module Eligible for Compensation	☐ **Yes** ☒ **No** **If this module is eligible for compensation, there may be cases where compensation is not permitted due to programme accreditation requirements. Please check the associated programme specification for details.**
School Assessment Board	Civil Engineering and Quality Management
Moderator	W Zhu
External Examiner	AN Robinson
Accreditation Details	This module is accredited by the Joint Board of Moderators as part of BEng (Hons) Civil Engineering.
Module Appears in CPD catalogue	☐ **Yes** ☒ **No**
Changes / Version Number	2.14 Update of external examiner. Assessment 1 to closed book invigilated class test.

Assessment (also refer to Assessment Outcomes Grids below)
Assessment 1
On campus invigilated closed book class test. (60%)
Assessment 2
Coursework (40%) (Two reports, worth 20% each)

Assessment 3
(N.B. (i) Assessment Outcomes Grids for the module (one for each component) can be found below which clearly demonstrate how the learning outcomes of the module will be assessed. (ii) An indicative schedule listing approximate times within the academic calendar when assessment is likely to feature will be provided within the Student Module Handbook.)

Component 1							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
Closed book class test	☒	☒	☐	☐	☐	60	2

Component 2							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
Reports on practical and field work	☒	☒	☒	☐	☐	40	0

Component 3							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
N/A	☐	☐	☐	☐	☐		
Combined total for all components						100%	2 hours

Change Control

What	**When**	**Who**
2.14 Update of external examiner. Assessment 1 to closed book invigilated class test.	March 2025	J Hughes