MODULE TITLE	**Engineering Materials and the Environment**	**CREDIT VALUE**	**15**
MODULE CODE	**ECMM160**	**MODULE CONVENER**	**Prof Oana Ghita (Coordinator)**

DURATION: TERM	**1**	**2**	**3**
DURATION: WEEKS	**3 weeks**	**0**	**0**

Number of Students Taking Module (anticipated)	**24**

DESCRIPTION - summary of the module content

This module will cover recycling technologies (methods and issues), discuss reuse, remanufacturing and sustainable manufacture, waste hierarchy, legislation & directives, sustainability, and examples of evolving business models such as the circular economy.
This module is likely to have an impact on your career, helping you understand the Resource Revolution and familiarising you with a new way of thinking. This is important as we enter a time where resources scarcity and clean, carbon neutral, manufacturing technologies will be key business drivers in many engineering sectors.
Some of the latest developments in engineering materials researched at Exeter (e.g. auxetic materials, additive manufacturing materials, natural materials), including their properties, manufacturing processes and applications, will be presented in the context of Resource Efficiency and the Circular Economy.
Additive Manufacturing will be discussed as an example of greener technology, near net shape process able 1) to design for lightweighting; 2) to approach near zero waste regarding material utilization; 3) to achieve localised manufacturing.
Prerequisite module: ECM3154, ECM3160 or equivalent

AIMS - intentions of the module

To give you an insight into the very latest developments in materials engineering that are likely to have an impact on their future careers.

INTENDED LEARNING OUTCOMES (ILOs) (see assessment section below for how ILOs will be assessed)

This is a constituent module of one or more degree programmes which are accredited by a professional engineering institution under licence from the Engineering Council. The learning outcomes for this module have been mapped to the output standards required for an accredited programme, as listed in the current version of the Engineering Council's 'Accreditation of Higher Education Programmes' document (AHEP-V3).

This module contributes to learning outcomes: **SM1m, SM1fl, SM2m, SM3m, SM4m, SM2fl, SM6m, SM3fl, EA1m, EA3m, EA1fl, EA4m, EA5m, EA2fl, D2m, D6m, D7m, D2fl, D8m, D3fl, ET1m, ET1fl, ET3m, ET3fl, ET4m, ET4fl, ET5m, ET5fl, ET6m, ET6fl, EP1m, EP2m, EP1fl, EP4m, EP10m, EP3fl**
A full list of the referenced outcomes is provided online: http://intranet.exeter.ac.uk/emps/studentinfo/subjects/engineering/accreditation/
The AHEP document can be viewed in full on the Engineering Council's website, at http://www.engc.org.uk/

On successful completion of this module ***you should be able to***:
Module Specific Skills and Knowledge
1. Demonstrate a full awareness, as an autonomous learner, of materials engineering as a rapidly changing area, and the ability to, independently, explain and predict future potential developments by the use of source research materials
2. Understand at least 4 selected areas in materials engineering at the forefront of current research;â€¨
3. Independently analyze novel materials research and fully explain its implications for the development of engineering applications and their resource efficiency;
4. Understand the importance of materials sustainability, recycling and reuse and carbon neutral manufacturing;
5. Independently analyze new ways of recycling complex materials;

Discipline Specific Skills and Knowledge
6. Accurately and independently summarise research articles from peer reviewed journals;â€¨ papers, without guidance.;
7. Use library and electronic literature search tools to obtain research information independently as a fully autonomous learner;
8. Independently critically analyse and summarise research

Personal and Key Transferable / Employment Skills and Knowledge
9. Obtain information independently and evaluate it critically;â€¨
10. Analyse information from a variety of sources and use it to synthesise your own arguments;
11. Communicate in writing at a professional standard.

SYLLABUS PLAN - summary of the structure and academic content of the module

A selection of topics, on advanced materials engineering from research currently underway in the College, which may include some of the following:
Auxetic materials;
Additive manufacturing materials and processes;
Recycling methods and reuse of materials (composites);â€¨ on-line technologies minimize waste towards zero carbon emissions combined with materials characterization
Different engineering materials will be used as examples to demonstrate the current recycling issues along with discussing the latest state-of the art technologies in recycling, reuse and remanufacturing. Ways of minimizing waste in manufacturing and improving energy and materials efficiency will be also presented.

LEARNING AND TEACHING

LEARNING ACTIVITIES AND TEACHING METHODS (given in hours of study time)

Scheduled Learning & Teaching Activities	22.00	**Guided Independent Study**	128.00	**Placement / Study Abroad**	0.00

DETAILS OF LEARNING ACTIVITIES AND TEACHING METHODS

Category	Hours of study time	Description
Scheduled learning and teaching activities	22	Lectures/seminars
Guided independent study	128	Guided independent study

ASSESSMENT

FORMATIVE ASSESSMENT - for feedback and development purposes; does not count towards module grade

Form of Assessment	Size of Assessment (e.g. duration/length)	ILOs Assessed	Feedback Method

SUMMATIVE ASSESSMENT (% of credit)

Coursework	40	Written Exams	60	Practical Exams	0

DETAILS OF SUMMATIVE ASSESSMENT

Form of Assessment	% of Credit	Size of Assessment (e.g. duration/length)	ILOs Assessed	Feedback Method
Written exam – closed book	60	2 hours - January Exam	All	Exam Mark
A study on separation, recycling, remanufacture and reuse of a multi-material	20	3 pages, 17 hours	3, 5, 6, 7, 8	Written report
An exercise in summarising a research paper in the field of auxetic materials	10	3 pages, 17 hours	3, 5, 6, 7, 8	Written report
An exercise in looking at the importance of Poisson's ratio in solid mechanics from a study of standard texts	10	3 pages, 17 hours	3, 5, 6, 7, 8	Written report

DETAILS OF RE-ASSESSMENT (where required by referral or deferral)

Original Form of Assessment	Form of Re-assessment	ILOs Re-assessed	Time Scale for Re-assessment
All above	Examination (100%)	All	August Ref/Def Period

RE-ASSESSMENT NOTES

If a module is normally assessed entirely by coursework, all referred/deferred assessments will normally be by assignment.
If a module is normally assessed by examination or examination plus coursework, referred and deferred assessment will normally be by examination. For referrals, only the examination will count, a mark of 50% being awarded if the examination is passed. For deferrals, candidates will be awarded the higher of the deferred examination mark or the deferred examination mark combined with the original coursework mark.

RESOURCES

INDICATIVE LEARNING RESOURCES - The following list is offered as an indication of the type & level of information that you are expected to consult. Further guidance will be provided by the Module Convener

Basic reading:

ELE:
http://vle.exeter.ac.uk
Web based and Electronic Resources:

Other Resources:

Reading list for this module:
There are currently no reading list entries found for this module.

CREDIT VALUE	15	ECTS VALUE	7.5
PRE-REQUISITE MODULES	None		
CO-REQUISITE MODULES	None		
NQF LEVEL (FHEQ)	7	AVAILABLE AS DISTANCE LEARNING	No
ORIGIN DATE	Wednesday 11 January 2017	LAST REVISION DATE	Thursday 05 April 2018
KEY WORDS SEARCH	Auxetic materials; additive layer manufacturing; composite recycling and reuse, remanufacturing.		