

UNIVERSITY OF WARWICK

Proposal Form for New or Revised Modules (MA1 - version 7 - April 2014)

Approval information	
Approval Type	<input checked="" type="checkbox"/> New module <input type="checkbox"/> Revised module <input type="checkbox"/> Discontinue module
Date of Introduction/Change	01/10/2018
If new, does this module replace another? If so, enter module code and title:	Replaces ES2A5 Forensic Engineering.
If revised/discontinued, please outline the rationale for the changes:	
Confirmation that affected departments have been consulted:	Changes were made in consultations between the School of Engineering and WMG.
Module Summary	
1. Module Code (if known)	ES2C9
2. Module Title	Forensic Engineering
3a. Lead department:	School of Engineering
3b. Teaching Split (if known):	100% School of Engineering
4. Name of module leader	Professor J.T. Mottram
5. Level	UG: <input type="checkbox"/> Level 4 (Certificate) <input checked="" type="checkbox"/> Level 5 (Intermediate) <input type="checkbox"/> Level 6 (Honours) PG: <input type="checkbox"/> Level 7 (Masters) <input type="checkbox"/> Level 8 (Doctoral) See Guidance Notes for relationship to years of study
6. Credit value(s) (CATS)	15 credits
7. Principal Module Aims	<p>The influence of developments in materials technology and analytical techniques through the centuries provide a fascinating introduction to the discipline of structural integrity. Students should be exposed to historical precedents through the use of case studies.</p> <p>By developing understanding of qualitative analysis and forensic engineering techniques students will be able to investigate failures and learn from disasters.</p>

Approval information	
	Failures will also be used to introduce the need for safety and the concept of the management of risk. The module's contents will provide a direct link to wider engineering issues such as human factors, legislation, ethics and expert witnesses.
8. Principal Learning Outcomes	By the end of the module the student should be able to... <ul style="list-style-type: none"> • Apply scientific and engineering principles to forensic engineering investigations within the context of an interdisciplinary approach to engineering. • Explain how and why structures and complex systems have failed. • Show that much can be learnt from disasters and that the lessons learnt can prevent similar failures from happening again. • Demonstrate knowledge of topics related to structural reliability, risk assessment and limit state design. • Demonstrate an awareness of what constitutes the profession of forensic engineering. • Discuss the types of organisations and independent bodies who review and monitor matters relating to the safety of an industrial sector.
9. Timetabled Teaching Activities (summary)	20 Lectures (2 per week) and 10 hours of seminars. Lectures in Term 2 (weeks 15 to 24) with seminar programme from Weeks 15 to 31. Total of 30 hours.
10. Departmental Web-link	http://www2.warwick.ac.uk/fac/sci/eng/eso/modules/year2
11. Other essential notes	Office hours are available for answering questions on the lecture material (theory and examples) and past examination questions.
12. Assessment methods (summary)	60% written examination (2 hrs); 25% Trade Magazine Article (Group) 4000 words; 15% Seminar Presentations (Individual); 0% peer assessment of group work.

For use by Strategic Planning and Analytics Office only - Do not fill in this section

Level	JACS3 Code	Teaching Split
		<i>If not provided in 3b above</i>

External Credit Level	Scheme

Module Context				
13. Please list all departments involved in the teaching of this module. If taught by more than one department, please indicate percentage split.				
School of Engineering (100%).				
14. Availability of module				
Degree Code	Title	Study Year	C/OC/A/B/C	Credits
H113	BEng Engineering	2	B	15
H114	MEng Engineering	2	B	15
H216	BEng Civil Engineering	2	C	15
H217	MEng Civil Engineering	2	C	15
H315	BEng Mechanical Engineering	2	A	15
H316	MEng Mechanical Engineering	2	A	15
HN11	BSc Engineering and Business Studies	2	B	15
15. Minimum number of registered students required for module to run				
1 (core module).				
16. Pre- and Post-Requisite Modules				
None.				

Module Content and Teaching	
17. Teaching and Learning Activities (<i>totals for module – please see guidance</i>)	
Module duration (weeks)	12
Lectures	20 x 1 hr
Seminars	10 x 1 hr
Tutorials	None
Project Supervision	None
Demonstration	None
Practical Class/Workshops	None
Supervised time in studio/workshop	None
Fieldwork	None
External visits	None
Work based learning	None
Placement	None
Year abroad	None
Other activity (<i>please describe</i>): e.g.	120 hours of guided independent learning

Module Content and Teaching		
<i>distance-learning, intensive weekend teaching etc.</i>		
18. Assessment Method (Standard)		
Type of assessment	Length	% weighting
Written Examinations	2 Hours	60
Practical Examinations		
Assessed essays/coursework	Trade Magazine Article 4000 Words (Group)	25
	Seminar Presentation (Individual)	15
	Peer Assessment of Group Work	0
18a. Final chronological assessment (<i>please see guidance</i>)	Written Examination.	

19. Methods for providing feedback on assessment.
Trade Magazine Article will use both oral and written (specific form) methods for feedback from marker. Further feedback will be generated during discussion on Trade Magazine topics during the seminar programme. Model solutions to past examination papers will be available.
20. Outline Syllabus
<p>Basic concepts in the definition of satisfactory structural performance.</p> <p>Key elements in structural performance.</p> <p>Types of failures, ranging from reduced serviceability to total collapse.</p> <p>Failure sources and their root cause allocation.</p> <p>The forensic engineers tool kit.</p> <p>Illustration by case studies of real disasters (e.g., Ronan Point tower, Piper Alpha, BP Deepwater Horizon, Twin Towers, Comet aircraft, Point Pleasant Bridge, etc.).</p> <p>Failure prevention mechanisms.</p> <p>Risk and Probability of failure</p> <p>Introduction to limit state design principles.</p> <p>Trade magazine articles.</p> <p>Human factors.</p> <p>Ethics.</p>
21. Illustrative Bibliography
<p>Because this module is about historical case studies for engineering failures the most suitable publications are not published within the last 10 years. Many sources are to be sourced directly from the Internet.</p> <p>Levy, M. and Salvadori, M., 'Why Buildings Fall Down,' W. W. Norton & Co., New York, 2002. ISBN 039331152X</p> <p>Delatte, N.J., 'Beyond Failure: Forensic Case Studies for Civil Engineers,' American Society Civil</p>

Engineers, Reston, VA, 2009. ISBN-10: 0784409730

Chiles, J. R., 'Inviting Disaster: Lessons from the Edge of Technology,' Harper Business, New York, 2002. ISBN 0-06-662082-1

Petroski, H., 'Success through Failure: The Paradox of Design,' Princeton University Press, 2008. ISBN-10: 0691136424

For journal articles on case studies:

'Journal of Performance of Constructed Facilities,' American Society of Civil Engineers (ASCE)

ISSN: 0887-3828 eISSN: 1943-5509 <http://ascelibrary.org/journal/jpcfey>

'Journal of Forensic Engineering,' Proceedings of the ICE. ISSN: 2043-9903 E-ISSN: 2043-9911

<http://www.icevirtuallibrary.com/content/serial/feng>

Teams are required to read the investigation report to the case study for their trade magazine article; these are either on the Internet or (rarely) with module leader (and ESO).

22. Learning outcomes

Successful completion of the module leads to the learning outcomes. The learning outcomes identify the knowledge, skills and attributes developed by the module.

Learning Outcomes should be presented in the format "By the end of the module students should be able to..." using the table at the end of the module approval form:

Resources

23. List any additional requirements and indicate the outcome of any discussions about these.

N/A

Approval

24. Module leader's signature

Professor Toby Mottram

25. Date of approval

Teaching Policy Committee 9 February 2017

26. Name of Approving Committee (include minute reference if applicable)

School of Engineering and WMG Teaching Policy Committee

27. Chair of Committee's signature

Professor Gillian Cooke

28. Head of Department(s) signature

Professor Nigel Stocks

Examination Information		
A1. Name of examiner (if different from module leader)		
A2. Indicate all available methods of assessment in the table below		
% Examined	% Assessed by other methods	Length of examination paper
60%	25% Trade Magazine Article 4000 Words (Group) 15% Seminar Presentation (Individual) 0% Peer Assessment of Group Work	2 hours
A3. Will this module be examined together with any other module (sectioned paper)? If so, please give details below.		
N/A		
A4. How many papers will the module be examined by?	<input checked="" type="checkbox"/> 1 paper	<input type="checkbox"/> 2 papers
A5. When would you wish the exam take place (e.g. Jan, April, Summer)?	Summer	
A6. Is reading time required?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
A7. Please specify any special exam timetable arrangements.		
N/A		
A8. Stationery requirements		
No. of Answer books?	1	
Graph paper?	Yes	
Calculator?	Yes	
Any other special stationery requirements (e.g. Data books, tables etc)?		
A9. Type of examination paper		
Seen?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Open Book?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Restricted?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No

Examination Information	
If restricted, please provide a list of permitted texts:	N/A

LEARNING OUTCOMES		
(By the end of the module the student should be able to....)	Which teaching and learning methods enable students to achieve this learning outcome? (reference activities in section 17)	Which summative assessment method(s) will measure the achievement of this learning outcome? (reference activities in section 18)
Apply scientific and engineering principles to forensic engineering investigations within the context of an interdisciplinary approach to engineering.	Lectures, seminars and private study, videos, Intranet	Oral presentation in seminars Trade Magazine Article and Examination
Explain how and why structures and complex systems failed.	Lectures, seminars and private study	Oral presentation in seminars Trade Magazine Article and Examination
Show that much can be learnt from disasters and that the lessons learnt can prevent similar failures from happening again.	Lectures, seminars and private study, videos, Intranet	Oral presentation in seminars Trade Magazine Article
Demonstrate knowledge of topics related to structural reliability, risk assessment and limit state design.	Lectures, private study	Oral presentation in seminars Examination
Demonstrate an awareness of what constitutes the profession of forensic engineering.	Seminars and private study, Trade Magazine Article assignment	Oral presentation in seminars, Trade Magazine Article
Discuss the types of organisations and independent bodies who review and monitor matters relating to the safety of an industrial sector.	Seminars and private study, Trade Magazine Article assignment	Oral presentation in seminars, Trade Magazine Article