UNIVERSITY OF WARWICK

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

Approval information	
Approval Type	☐ New module ☒ Revised module ☐ Discontinue module
Date of Introduction/Change	02/10/2018
If new, does this module replace another? If so, enter module code and title:	
If revised/discontinued, please outline the rationale for the changes:	Modifications in number of hours for labs and formative assessment for laboratory report. Changed assessment to 70% 3-hour examination, 30% written laboratory report.
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)	ES196
2. Module Title	Statics and Structures
3a. Lead department:	School of Engineering
3b. Teaching Split (if known):	100% School of Engineering
4. Name of module leader	Mr E. Gironacci
5. Level	UG: ☒ Level 4 (Certificate) ☐ Level 5 (Intermediate) ☐ Level 6 (Honours) PG: ☐ Level 7 (Masters) ☐ Level 8 (Doctoral) See Guidance Notes for relationship to years of study
6. Credit value(s) (CATS)	15

Module Summary	
7. Principal Module Aims	The aim of this module is to build fundamental knowledge of statics and behaviour of structures that underpin many branches of engineering science. This will provide the knowledge required for further study in the design and analysis of structures from buildings to spacecraft, motor vehicles and wind turbines. The module will increase the students' ability with mathematical analysis and in particular its application to solving problems in structures. The module will further help in developing experimental skills and awareness of health and safety issues applicable to working in a supervised laboratory.
8. Principal Learning Outcomes	By the end of the module the student should be able to: • Demonstrate knowledge and understanding of basic theory, concepts and methodology necessary to solve problems related to structures under static loading. • Become familiar with mathematical analysis and its application to solving engineering problems related to the behaviour of structures under static loading. • Record and interpret the results of observed practical experiments. • Demonstrate experimental skills. • Demonstrate awareness of health and safety issues applicable to working in a supervised laboratory. • Demonstrate an ability to make appropriate assumptions to simplify and thus model real-life engineering problems.
9. Timetabled Teaching Activities (summary)	30 hours of lectures, 8x1 hours of examples classes, 2x1 hours of revision lectures, 1x4 hours + 3x2 hours of laboratory exercises, 2x1 hours of computer-based formative test. **Total of 52 hours**.
10. Departmental Web-link	http://www2.warwick.ac.uk/fac/sci/eng/eso/modules/year1
11. Other essential notes	Advice and feedback hours are available for answering questions on the lecture material (theory and examples) and past examination questions.
12. Assessment methods (summary)	70% written examination (3 hrs); 30% marked laboratory report (6 pages length).

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

Level	**JACS3 Code**		**Teaching Split**
			If not provided in 3b above
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	1	C	15
H114	MEng Engineering	1	C	15
H161	BEng Biomedical Systems Engineering	1	C	15
H163	MEng Biomedical Systems Engineering	1	C	15
H216	BEng Civil Engineering	1	C	15
H217	MEng Civil Engineering	1	C	15
H315	BEng Mechanical Engineering	1	C	15
H316	MEng Mechanical Engineering	1	C	15
H335	BEng Automotive Engineering	1	C	15
H336	MEng Automotive Engineering	1	C	15
H605	BEng Electrical and Electronic Engineering	1	C	15
H606	MEng Electrical and Electronic Engineering	1	C	15
H63W	BEng Electronic Engineering	1	C	15
H63X	MEng Electronic Engineering	1	C	15
HH35	BEng Systems Engineering	1	C	15
HH31	MEng Systems Engineering	1	C	15
HH75	BEng Manufacturing and Mechanical Engineering	1	C	15
HH76	MEng Manufacturing and Mechanical Engineering	1	C	15
HN11	BSc Engineering and Business Studies	1	C	15
HN15	BEng Engineering Business Management	1	C	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 *(totals for module – please see guidance)*

Module duration (weeks)	10

Module Content and Teaching	
Lectures	30 hours
Seminars	None
Tutorials	None
Project Supervision	None
Demonstration	None
Practical Class/Workshops	10 hours (Four lab exercises; 1 x 4 hours and 3 x 2 hours = 10 hours)
Supervised time in studio/workshop	None
Fieldwork	None
External visits	None
Work based learning	None
Placement	None
Year abroad	None
Other activity *(please describe): e.g. distance-learning, intensive weekend teaching etc.*	• 8 x 1hr = 8 hours of examples classes • 2 x 1hr = 2 hours computer-based formative test • 2 x 1hr = 2 hours revision lectures • 98 hours of guided independent learning

18. Assessment Method (Standard)		
Type of assessment	**Length**	**% weighting**
Written Examinations	3 hours	70
Practical Examinations		
Assessed essays/coursework	Written report on one of the four laboratory exercises (6 pages length).	30
18a. Final chronological assessment *(please see guidance*)	Written examination.	

19. Methods for providing feedback on assessment.

- Model solutions to past papers.
- Support through office hours.
- Written feedback on marked laboratory report.
- Cohort-level feedback on computer-based formative test.
- Cohort-level feedback on final exam.

20. Outline Syllabus

Part A: Equilibrium and Reactions

1. Forces
2. Moments
3. Friction

4. Hydrostatic pressure
5. Equilibrium
6. Support conditions
7. Reactions

Part B: Truss structures

1. Basic principles; Building with triangles
2. Method of joints
3. Method of sections

Part C: Statically determinate beams and frames

1. Free body diagrams
2. Internal forces and moments in statically determinate beams
3. Internal forces in statically determinate frames

Part D: Deformation of statically determinate beams

1. Bending of elastic beams (elastic curve; moment-curvature relation)
2. Bernoulli beam theory

Part E: Stresses and Strains

1. Stress
2. Strain
3. Stress and strain transformations
4. Principal stresses and strains in a plane
5. Mohr's circle

Part F: Bending, Shear and Torsion of beams

1. Stresses and strains
2. Cross-section analysis (neutral axis; second moment of area; deflection line)

Part G: Elastic buckling, Failure criteria (Tresca, von Mises, Mohr) and Design of structural components

The module includes 4 laboratory exercises.

21. Illustrative Bibliography

Bedford, A. & Fowler, W., 2003, "Engineering Mechanics: Statics & Dynamics Principles", Prentice-Hall. ISBN 9780130082091.

Cain, J.A. & Hulse, R., 2000, "Structural Mechanics", 2nd Ed., Palgrave Macmillan. ISBN 978-0333804575

Hibbeler, R.C., 2014, "Statics and Mechanics of Materials", 4th Ed., Pearson Prentice Hall. ISBN-13: 978-0133451603.

Krenk, S. & Høgsberg, J., 2013, "Statics and Mechanics of Structures". ISBN: 978-94-007-6112-4.

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	Mr Elia Gironacci
25. Date of approval	14 March 2018
26. Name of Approving Committee (include minute reference if applicable)	School of Engineering and WMG Course and Module Approval Committee (CMAC) Minute 127-17/18
27. Chair of Committee's signature	Professor Gillian Cooke
28. Head of Department(s) signature	Professor David Towers

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**
70	30	3 hours
A3. Will this module be examined together with any other module (sectioned paper)? If so, please give details below.		
No.		
A4. How many papers will the module be examined by?	☒ 1 paper	☐ 2 papers
A5. When would you wish the exam take place (e.g. Jan, April, Summer)?	January	
A6. Is reading time required?	☐ Yes	☒ 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)?	Engineering Data Book	
A9. Type of examination paper		
Seen?	☐ Yes	☒ No
Open Book?	☐ Yes	☒ No
Restricted?	☐ Yes	☒ No
If restricted, please provide a list of permitted texts:		

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 15)**	**Which summative assessment method(s) will measure the achievement of this learning outcome? (reference activities in section 16)**
Demonstrate knowledge and understanding of basic theory, concepts and methodology necessary to solve problems related to structures under static loading.	Lectures, Examples Classes, Laboratory Exercises, and Formative Test.	Examination.
Become familiar with mathematical analysis and its application to solving engineering problems related to the behaviour of structures under static loading.	Lectures, Examples Classes, Laboratory Exercises, and Formative Test.	Examination.
Record and interpret the results of observed practical experiments.	Laboratory Exercises. Written laboratory report.	Laboratory report.
Demonstrate experimental skills.	Laboratory Exercises.	Laboratory report.
Demonstrate awareness of health and safety issues applicable to working in a supervised laboratory.	Laboratory Exercises.	Laboratory report.
Demonstrate an ability to make appropriate assumptions to simplify and thus model real-life engineering problems.	Lectures, Examples Lectures, Laboratory Exercises, and Formative Tests	Examination, Laboratory report.