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	02/10/2017
If new, does this module replace another? If so, enter module code and title:	
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)	ES4E3
2. Module Title	Structural Dynamics and Vibration
3a. Lead department:	School of Engineering (100%)
3b. Teaching Split (if known):	100% Engineering
4. Name of module leader	Dr Stana Zivanovic
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
7. Principal Module Aims	To explore the principles of structural dynamics and vibration assessment of civil engineering structures
8. Principal Learning Outcomes	• Demonstrate an advanced understanding of the principles of dynamic behaviour of structures • Demonstrate comprehensive understanding of complexities

Module Summary	
	involved in the vibration serviceable designs of modern (slender, light, lightly-damped and vibration sensitive) civil engineering structures and critically evaluate their relative importance • Critically assess uncertainties associated with loading estimates and vibration predictions by analysing an advanced experimental setup on a laboratory bridge • Demonstrate a systematic knowledge of the design and signal\ processing principles that underpin the development of vibration data acquisition systems • Constructively evaluate and criticise designs of civil engineering structures, vibration suppression solutions and performance of relevant vibration serviceability design guidelines
9. Timetabled Teaching Activities (summary)	27 hrs lectures, 8 hrs example classes, 6 hrs of laboratory, 6h seminars. **Total of 47 hours.**
10. Departmental Web-link	http://www2.warwick.ac.uk/fac/sci/eng/eso/modules/year4
11. Other essential notes	Advice and feedback hours are available for answering questions on the lecture material (theory and examples).
12. Assessment methods (summary)	Unseen 3 hr examination = 80% Laboratory Report 2000 words = 20%

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

14. Availability of module

Degree Code	Title	Study Year	C/OC/ A/B/C	Credits
H211	MEng Civil Engineering	4	A	15
H212	MEng Civil Engineering with Intercalated year	5	A	15
H213	MEng Civil Engineering with a Year in Research	5	A	15
H20B	MEng Civil Engineering with Sustainability	4	B	15
H20A	MEng Civil Engineering with Business Management	4	A	15
H107	MEng Engineering and Variants	4	A	15
H109	MEng Engineering with Intercalated Year	5	A	15
H110	MEng Engineering with a Year in Research	5	A	15

15. Minimum number of registered students required for module to run

10

16. Pre- and Post-Requisite Modules

Pre-requisites
ES3D1 Concrete Structures
ES3D2 Steel Structures
ES3D3 Civil Engineering Materials & Structural Analysis

Module Content and Teaching

17. Teaching and Learning Activities *(totals for module – please see guidance)*

Module duration (weeks)	10
Lectures	27x1hours lectures
Seminars	6x1 hours
Tutorials	
Project Supervision	
Demonstration	
Practical Class/Workshops	Lab work: 6hours
Supervised time in	

Module Content and Teaching		
studio/workshop		
Fieldwork		
External visits		
Work based learning		
Placement		
Year abroad		
Other activity *(please describe): e.g. distance-learning, intensive weekend teaching etc.*	103 hours guided independent learning 8x1hours example classes	
18. Assessment Method (Standard)		
Type of assessment	**Length**	**% weighting**
Written Examinations	3 hrs	80%
Practical Examinations		
Assessed essays/coursework	Laboratory Report 2000 Words	20%
18a. Final chronological assessment *(please see guidance*)	Examination	

19. Methods for providing feedback on assessment.

Coursework: individual feedback returned, and 1h feedback session for the whole class after return of the coursework.
Examination: publication of recent past examination papers and model solutions or mock paper and solutions where past papers do not exist. Cohort level feedback on examinations.

20. Outline Syllabus

- Introduction to structural dynamics and vibrations in civil engineering
- Single-degree-of-freedom systems
- Multiple-degree-of-freedom systems
- Signal representation in time- and frequency-domain; basics of signal processing
- Components of a vibration measurement system
- Principles of vibration serviceability assessment of structures such as footbridges, floors, stadia and stairs
- Understanding and applying design guidance
- Design of vibration suppression solutions (e.g. tuned-mass dampers)

21. Illustrative Bibliography

Williams, M., 2016. *Structural Dynamics*, CRC Press, Taylor and Francis.
Inman, D. J., 2013. *Engineering Vibration*, Pearson, 4th ed.
Thorby, D., 2008. *Structural Dynamics and Vibration in Practice: An Engineering Handbook*, Butterworth-Heinemann.

Module Content and Teaching

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	Dr Stana Zivanovic
25. Date of approval	Teaching Policy Committee Chair's Action 30 March 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**
80	**20**	**3h**
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)?	**Summer**	
A6. Is reading time required?	☐ Yes	☒ No
A7. Please specify any special exam timetable arrangements.		
None		
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 17)**	**Which summative assessment method(s) will measure the achievement of this learning outcome? (reference activities in section 18)**
Demonstrate an advanced understanding of the principles of dynamic behaviour of structures	Lectures, example classes, private study	Unseen written examination
Demonstrate comprehensive understanding of complexities involved in the vibration serviceable designs of modern (slender, light, lightly-damped and vibration sensitive) civil engineering structures and critically evaluate their relative importance	Lectures, example classes, seminars, private study	Unseen written examination
Critically assess uncertainties associated with loading estimates and vibration predictions by analysing an advanced experimental setup on a laboratory bridge	Lectures, example classes, seminars, laboratory work, private study	Coursework
Demonstrate a systematic knowledge of the design and signal\ processing principles that underpin the development of vibration data acquisition systems	Lectures, example classes, laboratory work, private study	Unseen written examination and/or Coursework
Constructively evaluate and criticise designs of civil engineering structures, vibration suppression solutions and performance of relevant vibration serviceability design guidelines	Lectures, example classes, laboratory work, private study	Unseen written examination