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	October 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:	Revised as part of the curriculum review.
Confirmation that affected departments have been consulted:	Changes were made in consultation with the School of Engineering and WMG.

Module Summary	
1. Module Code (if known)	ES3A7
2. Module Title	Design and Management of Lean Operations
3a. Lead department:	WMG
3b. Teaching Split (if known):	100% WMG
4. Name of module leader	Dr Neil Davis
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 CATS
7. Principal Module Aims	To develop understanding of the principles of lean operations and where and how they can be applied. To describe the limits of lean operation: what factors are constraining application and how various industries have sought to relieve these constraints.

Module Summary	
	To help prepare the future technology manager to exploit recent thinking and overcome resistance to change by giving them an opportunity to explore the subject from various perspectives.
. Principal Learning Outcomes	By the end of the module, students will be able to; • Identify where and how Lean Operations can be applied. • Analyse a manufacturing process using Value Stream Mapping critique and propose lean solutions using the map as foundation • Calculate and identify key resource requirements and identify resource constraints using analytical techniques. • Develop a basic layout for implementing lean manufacturing including methods for managing the human – equipment interface.
9. Timetabled Teaching Activities (summary)	Lectures 25 x 1hr = 25 hours 1 x 2 hours of exercises 3 x 1 hour seminars 2 x 1 hour examples classes Revision classes 2 x 1hr = 2 hours **Total contact hours = 34**
10. Departmental Web-link	http://www2.warwick.ac.uk/fac/sci/eng/eso/modules/year3/es3a9
11. Other essential notes	Advice and feedback hours are available for answering questions on the lecture material, theory and lab exercises.
12. Assessment methods (summary)	Examination (3 hours) 70% Peer review of Term 1 Formative Tasks 0% Individual assignment 2500 words 20% Group assignment (poster), including peer assessment 10% Students must pass the examination and pass the coursework overall.

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.

100% WMG

14. Availability of module

Degree Code	Title	Study Year	C/OC/ A/B/C	Credits
HH73	**BEng Manufacturing and Mechanical Engineering**	**3**	**Core**	**15 CATS**
HH37	**MEng Manufacturing and Mechanical Engineering**	**3**	**Core**	**15 CATS**
HH38	**MEng Manufacturing and Mechanical Engineering with Intercalated Year**	**3**	**Core**	**15 CATS**
HH39	**MEng Manufacturing and Mechanical Engineering with a Year in Research**	**3**	**Core**	**15 CATS**
HN12	**BEng Engineering Business Management**	**3**	**O**	**15 CATS**
H106	**BEng Engineering**	**3**	**O**	**15 CATS**
H107	**MEng Engineering**	**3**	**O**	**15 CATS**
H109	**MEng Engineering with Intercalated Year**	**3**	**O**	**15 CATS**
H110	**MEng Engineering with a Year in Research**	**3**	**O**	**15 CATS**

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

1 (core)

16. Pre- and Post-Requisite Modules

n/a

Module Content and Teaching

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

Module duration (weeks)	**15**
Lectures	**25 hrs**
Seminars/Examples classes	**2 x 1 hour (examples) whole class** **3 x 1 hour seminars in groups (scheduled for whole class)**
Tutorials	
Project Supervision	
Demonstration	
Practical Class/Workshops	**1 x 2hr extended exercise**

Module Content and Teaching		
Supervised time in studio/workshop		
Fieldwork		
External visits		
Work based learning		
Placement		
Year abroad		
Other activity *(please describe): e.g. distance-learning, intensive weekend teaching etc.*	**2 hrs revision class** **116 hrs guided independent learning**	
18. Assessment Method (Standard)		
Type of assessment	**Length**	**% weighting**
Written Examinations	3 Hours	**70%**
Practical Examinations	Hours	
Assessed essays/coursework	**Individual Assignment up to 2,500 words** **Group Assignment (Poster), including peer assessment** **Peer review of Term 1 formative tasks**	**20%** **10%** **0%**
18a. Final chronological assessment *(please see guidance*)	**Examination**	

19. Methods for providing feedback on assessment.
Written comments on assignment Cohort level feedback on examinations
20. Outline Syllabus
Introduction: The module explains the techniques available for the effective management of lean production operations. The Toyota Production System (TPS) is used as the exemplar of Lean principles and forms a backbone around which industrial engineering, quality (through variability and waste reduction) and other technical subjects are organised. Value Stream Mapping (VSM) is introduced and used subsequently in laboratory sessions and/or assignments. Alternative policies for the control of physical resources throughout the production system are compared, primarily Pull vs. Push (JIT and MRP/ERP). Industrial Engineering: Techniques for work measurement. Time and Method study. Human factors including job design and ergonomics. Flexibility of facilities and equipment. Cell design principles, single piece work flow, setup reduction and work standardisation.

Waste elimination: Inventory Management techniques for lean operation.

Organisation and management of distribution: linkages with manufacturing control system.

21. Illustrative Bibliography

Lean Thinking, Womack and Jones, 2nd edition, 2003
The Toyota Way, Jeffrey Liker, 2004.
Toyota Kata, Mike Rother, 2010.
Lean Production Simplified, Pascal Dennis, 3rd edition, 2015.
The Machine That Changed the World, Womack & Jones, 1991
Learning To See, Rother and Shook, Lean Enterprise Institute, 1999
Seeing The Whole, Womack & Jones, Lean Enterprise Institute, 2002
The Toyota Production System. Monden, Yosuhiro. 2d ed. Atlanta: Institute of Industrial Engineers, 1993.

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.

Approval

24. Module leader's signature	Dr Neil Davis
25. Date of approval	Teaching Policy Committee Chair's Action 5 October 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 Gill 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%	**20% written assignment up to 2,500 words** **10% Group Assignment (Poster), including peer assessment**	**3 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?	☒ 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.		
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 databook**	
A9. Type of examination paper		
Seen?	☐ Yes	☒ No
Open Book?	☐ Yes	☒ No
Restricted?	☐ Yes	☒ No

Examination Information	
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?**	**Which summative assessment method(s) will measure the achievement of this learning outcome?**
Identify where and how Lean Operations can be applied.	Lectures to give basic understanding of lean systems thinking and techniques, and to contrast with conventional (MRP-style) ways of working. Exercises on internal and external Kanban control. Group work (self study) Discussion seminars.	Examination Individual assignment Group coursework (Poster)
Analyse a manufacturing process using Value Stream Mapping critique and propose lean solutions using the map as foundation.	Lectures + Extended exercise	Individual Assignment and/or Examination question
Calculate and identify key resource requirements and identify resource constraints using analytical techniques.	Lectures + self study group work and Example classes.	Examination
Develop a basic layout for implementing lean manufacturing including methods for managing the human – equipment interface.	Lectures + self study group work	Individual Assignment and/or Examination question