

## UNIVERSITY OF WARWICK

Proposal Form for New or Revised Modules (MA1 - version 7 - November 2016)

Approval information	
Approval Type	<input type="checkbox"/> New module <input checked="" type="checkbox"/> Revised module <input type="checkbox"/> Discontinue module
Date of Introduction/Change	October 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:	Revised to add 2 x 2-hour laboratory classes and change the assessment to 70% 3-hour examination and 30% coursework (2 x 15% Laboratory Assignments).
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)	ES96Z
2. Module Title	Electrical Machines and Drives
3a. Lead department:	School of Engineering
3b. Teaching Split (if known):	100% School of Engineering
4. Name of module leader	Dr Layi Alatise
5. Level	UG: <input type="checkbox"/> Level 4 (Certificate) <input type="checkbox"/> Level 5 (Intermediate) <input type="checkbox"/> Level 6 (Honours) PG: <input checked="" 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
7. Principal Module Aims	Electrical machines and drives are the core enabling technology which allows conversion between electrical and mechanical energy. This module will develop an advanced understanding of the present state of practice and future developments.

Module Summary	
<b>8. Principal Learning Outcomes</b>	By the end of the module the student should be able to: <ul style="list-style-type: none"> <li>• Demonstrate advanced understanding AC machines.</li> <li>• Demonstrate advanced understanding DC machines.</li> <li>• Design DC electrical drive control systems.</li> <li>• Design AC electrical drive control systems.</li> </ul>
<b>9. Timetabled Teaching Activities (summary)</b>	30 hours of Lectures 2x2 hours labs 2 x 1 hour of revision classes  <b>Total 36 hours</b>
<b>10. Departmental Web-link</b>	<a href="http://www2.warwick.ac.uk/fac/sci/eng/eso/modules/year4/es96z/">http://www2.warwick.ac.uk/fac/sci/eng/eso/modules/year4/es96z/</a>
<b>11. Other essential notes</b>	Advice and feedback hours are available for answering questions on the lecture material (theory and examples) and past examination questions.
<b>12. Assessment methods (summary)</b>	Exam 70% (3 hours) Two 1500 word Laboratory assignment reports 30% (15% each)

**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

<b>Module Context</b>				
<b>13. Please list all departments involved in the teaching of this module. If taught by more than one department, please indicate percentage split.</b>				
School of Engineering				
<b>14. Availability of module</b>				
Degree Code	Title	Study Year	C/OC/A/B/C	Credits
H650	MSc Energy and Power Engineering	1	C	15
<b>15. Minimum number of registered students required for module to run</b>				
1 (Core)				
<b>16. Pre- and Post-Requisite Modules</b>				
N/A				
<b>Module Content and Teaching</b>				
<b>17. Teaching and Learning Activities</b> ( <i>totals for module – please see guidance</i> )				
Module duration (weeks)	10			
Lectures	30 x 1 hour			
Seminars	None			
Tutorials	None			
Project Supervision	None			
Demonstration	None			
Practical Class/Workshops	2 x 2 hours labs			
Supervised time in studio/workshop	None			
Fieldwork	None			
External visits	None			
Work based learning	None			
Placement	None			
Year abroad	None			
<b>Other activity</b> ( <i>please describe</i> ): e.g. distance-learning, intensive weekend teaching etc.	Revision class 2 x 1 hour 114 hours of guided independent learning			

<b>18. Assessment Method (Standard)</b>		
<b>Type of assessment</b>	<b>Length</b>	<b>% weighting</b>
<b>Written Examinations</b>	3 Hours	<b>70%</b>
<b>Practical Examinations</b>		
<b>Assessed essays/coursework</b>	<b>Laboratory Assignment 1 1500 words</b>	<b>15%</b>
	<b>Laboratory Assignment 2 1500 words</b>	<b>15%</b>
<b>18a. Final chronological assessment (please see guidance)</b>	<b>examination</b>	

<b>19. Methods for providing feedback on assessment.</b>
<ul style="list-style-type: none"> <li>• Support through advice and feedback hours.</li> <li>• Cohort-level feedback on final exam.</li> <li>• Feedback on lab assignment report</li> </ul>
<b>20. Outline Syllabus</b>
<ul style="list-style-type: none"> <li>• Maxwell's equations</li> <li>• Magnetic circuits and quantities</li> <li>• Rotating magnetic fields</li> <li>• Synchronous machines</li> <li>• Induction Machines</li> <li>• DC Machines</li> <li>• Reference frame theory of AC machines</li> <li>• Dynamic analysis of electrical machines</li> <li>• Open and closed loop control of electrical machines</li> <li>• Electrical drives including power electronic converters and pulse width modulation</li> </ul>
<b>21. Illustrative Bibliography</b>
<p>Electric Machinery Fundamentals, S.J. Chapman, 5<sup>th</sup> edition, McGraw-Hill, 2012.</p> <p>Vector Control of Three-Phase AC Machines - System Development in the Practice, 2<sup>nd</sup> edition, N.P. Quang, J.-A. Dittrich, Springer, 2015.</p> <p>Analysis of electric machinery and drive systems, P. Krause, O. Wasynczuk, S. Sudhoff, S. Pekarek, Wiley, 2013.</p>
<b>22. Learning outcomes</b>
<p><i>Successful completion of the module leads to the learning outcomes. The learning outcomes identify the knowledge, skills and attributes developed by the module.</i></p> <p><i>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:</i></p>

<b>Resources</b>	
<b>23. List any additional requirements and indicate the outcome of any discussions about these.</b>	
N/A	

<b>Approval</b>	
<b>24. Module leader's signature</b>	Dr Layi Alatise
<b>25. Date of approval</b>	25 April 2018
<b>26. Name of Approving Committee (include minute reference if applicable)</b>	School of Engineering and WMG Course and Module Approval Committee (CMAC), Minute 268-17/18
<b>27. Chair of Committee's signature</b>	Professor Gillian Cooke
<b>28. Head of Department(s) Signature</b>	Professor David Towers

<b>Examination Information</b>		
<b>A1. Name of examiner (if different from module leader)</b>		
<b>A2. Indicate all available methods of assessment in the table below</b>		
<b>% Examined</b>	<b>% Assessed by other methods</b>	<b>Length of examination paper</b>
70%	15 Laboratory Assignment 1 1500 words 15 Laboratory Assignment 2 1500 words	3 hours
<b>A3. Will this module be examined together with any other module (sectioned paper)? If so, please give details below.</b>		
N		
<b>A4. How many papers will the module be examined by?</b>	<input checked="" type="checkbox"/> 1 paper <input type="checkbox"/> 2 papers	
<b>A5. When would you wish the exam take place (e.g. Jan, April, Summer)?</b>	June	
<b>A6. Is reading time required?</b>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
<b>A7. Please specify any special exam timetable arrangements.</b>		
<b>A8. Stationery requirements</b>		
<b>No. of Answer books?</b>	2	
<b>Graph paper?</b>	Y	
<b>Calculator?</b>	Y	
<b>Any other special stationery requirements (e.g. Data books, tables etc)?</b>	Engineering Data Book	
<b>A9. Type of examination paper</b>		
<b>Seen?</b>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
<b>Open Book?</b>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
<b>Restricted?</b>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

**Examination Information****If restricted, please provide  
a list of permitted texts:**

<b>LEARNING OUTCOMES</b>		
<b>(By the end of the module the student should be able to....)</b>	<b>Which teaching and learning methods enable students to achieve this learning outcome? (reference activities in section 15)</b>	<b>Which summative assessment method(s) will measure the achievement of this learning outcome? (reference activities in section 16)</b>
Demonstrate advanced understanding of AC machines.	Lectures and laboratory	Exam and lab assignment report
Demonstrate advanced understanding of DC machines.	Lectures	Exam
Design DC electrical drive control systems.	Lectures	Exam
Design AC electrical drive control systems.	Lectures and laboratory	Exam and lab assignment report