Programme Specification – 2016/17

NB: *denotes information pertaining to the MEng only

1. Awarding body
University of Surrey

2. Teaching institution (if different)
N/A

3. Final award and programme/pathway title
BEng (Hons) Mechanical Engineering
*MEng Mechanical Engineering

4. Subsidiary award(s) and title(s)

<table>
<thead>
<tr>
<th>Award</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>*BEng (Hons)</td>
<td>Mechanical Engineering</td>
</tr>
<tr>
<td>BEng (Ord)</td>
<td>Mechanical Engineering</td>
</tr>
<tr>
<td>Dip HE</td>
<td>Mechanical Engineering</td>
</tr>
<tr>
<td>Cert HE</td>
<td>Mechanical Engineering</td>
</tr>
</tbody>
</table>

5. FHEQ Level
4, 5, 6, *7

6. [Credits and ECTS credits]
360 UK credits, 180 ECTS credits
*480 UK credits, 240 ECTS credits

7. Name of Professional, Statutory or Regulatory Body (PSRB)
Institution of Mechanical Engineers (IMechE)

8. Mode of study and route code

<table>
<thead>
<tr>
<th>Mode of study</th>
<th>Route code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full-time</td>
<td>Y</td>
</tr>
<tr>
<td>Full-time with PTY</td>
<td>Y</td>
</tr>
<tr>
<td>Part-time</td>
<td>N</td>
</tr>
<tr>
<td>Distance learning</td>
<td>N</td>
</tr>
<tr>
<td>Short course</td>
<td>N</td>
</tr>
</tbody>
</table>

9. JACs code

10. QAA Subject benchmark statement (if applicable)
Engineering

11. Other internal and / or external reference points
The Accreditation of Higher Education Programmes : UKSPEC (Engineering Council UK)

12. Faculty and Department/School
Faculty of Engineering and Physical Sciences
Department of Mechanical Engineering Sciences

13. Programme Leader
Mrs Charlotte Foreman

14. Date of production/revision of the specification
September 2016

15. Educational aims of the programme

**BEng (Hons)**
To provide a broad education in Mechanical Engineering that :-
- Develops in graduates the knowledge, understanding, practical and inter-personal transferable skills so as to prepare them for practice as professional engineers and scientists in industry, the public services and the academic world.
- Incorporates specialisation in mechanical engineering.
- Provides an accredited educational base facilitating progression to chartered engineer status.

**MEng**
To provide a broad education in Mechanical Engineering that :-
- Develops in graduates the knowledge, understanding, practical and inter-personal transferable skills so as to prepare them for practice as professional engineers and scientists in industry, the public services and the academic world.
- Incorporates specialisation in mechanical engineering.
- Provides additional deepening and broadening in both theory and application beyond the BEng
programme.

- Matches the standards required for the full educational base of a chartered engineer.

16. Programme learning outcomes – the programme provides opportunities for students to develop and demonstrate knowledge and understanding, skills, qualities and other attributes in the following areas:

( ) UK-SPEC specific learning outcomes

### Knowledge and understanding

<table>
<thead>
<tr>
<th>Level</th>
<th>Knowledge and understanding</th>
</tr>
</thead>
</table>
| **Level 4:** | K1. Fundamental mathematical & computer methods relevant to mechanical engineering *(US2,3, E3)*  
K2. Fundamental scientific principles and, methodologies applied to mechanical and related engineering disciplines *(US1, E1)*  
K3. Fundamental engineering design processes & customer needs *(D1,2,4)*  
K4. A limited range of engineering materials & components *(P1)*  
K5. Information sources *(P4,5)*  
K6. Health & safety considerations *(D1, S3,4,5)* |
| **Level 5:** | K1. Well established mathematical & computer methods relevant to mechanical engineering *(US2,3, E3)*  
K2. Well established scientific principles and, methodologies applied to mechanical and related engineering disciplines *(US1, E1)*  
K3. Well established engineering design processes & customer needs *(D1,2,4)*  
K4. A limited range of engineering materials & components *(P1)*  
K5. The practice of design, manufacture and evaluation *(D3,5,6)*  
K6. Information sources & intellectual property *(P4,5)*  
K7. Health & safety, environmental & sustainability considerations *(D1, S3,4,5)*  
K8. How to apply & integrate knowledge from other disciplines to the field of mechanical Engineering *(US3)* |
| **Level 6:** | K1. A range of mathematical & computer methods relevant to mechanical engineering *(US2,3, E3)*  
K2. A range of scientific principles, methodologies & emerging concepts applied to mechanical and related engineering disciplines *(US1, E1)*  
K3. A range of engineering design processes & of customer needs *(D1,2,4)*  
K4. A range of engineering materials & components *(P1)*  
K5. A range of management and business practices *(S1,2, P5,6,7)*  
K6. The practice of design, manufacture and evaluation *(D3,5,6)*  
K7. Information sources & intellectual property *(P4,5)*  
K8. Health & safety, environmental & sustainability considerations *(D1, S3,4,5)*  
K9. How to apply & integrate knowledge from other disciplines to the field of mechanical engineering *(US3)* |
| **Level 7:** | K1. A comprehensive range of mathematical & computer methods relevant to mechanical engineering *(US2/m, E3/m)*  
K2. A comprehensive range of scientific principles, methodologies & emerging concepts applied to mechanical and related engineering disciplines *(US1/m, E1/m)*  
K3. A comprehensive range of engineering design processes & of customer needs *(D1/m,2,4, P1m)*  
K4. A wide range of engineering materials & components *(P1,2m)*  
K5. An extensive range of management and business practices *(S1/m,2/m, P5,6,7)*  
K6. The practice of design, manufacture and evaluation *(D3,5,6)*  
K7. Information sources & intellectual property *(P4,5)* |
K8. Health & safety, environmental & sustainability considerations *(D1, S3,4,5)*
K9. How to apply & integrate knowledge from other disciplines to the field of mechanical engineering *(US3/m,4m)*

### Intellectual / cognitive skills

#### Level 4:
- C1. Appreciate the contexts in which engineering knowledge can be applied *(P3)*
- C2. Apply appropriate mathematical & engineering principles *(E1)*
- C3. Apply engineering solutions to practical problems *(D1)*

#### Level 5:
- C1. Appreciate the contexts in which engineering knowledge can be applied *(P3)*
- C2. Apply appropriate mathematical & engineering principles *(E1)*
- C3. Develop engineering solutions to practical problems *(D1)*
- C4. Analyse systems and propose solutions using a systems approach *(D4, E2,4)*
- C5. Plan and manage complex projects *(D6)*
- C6. Work with technical uncertainty *(P8)*

#### Level 6:
- C1. Appreciate the contexts in which engineering knowledge can be applied *(P3)*
- C2. Select and apply appropriate mathematical & engineering principles *(E1)*
- C3. Develop engineering solutions to practical problems *(D1)*
- C4. Analyse systems and synthesise solutions using a systems approach *(D4, E2,4)*
- C5. Plan and manage complex projects *(D6)*
- C6. Work with technical uncertainty *(P8)*

#### Level 7:
- C1. Appreciate the contexts in which engineering knowledge can be applied *(P3)*
- C2. Select and apply appropriate mathematical & engineering techniques to investigate new & emerging technologies *(E1/m)*
- C3. Develop engineering solutions to practical problems and adapt them to unfamiliar situations taking into account commercial & industrial constraints *(D1/m,4m, P8m)*
- C4. Innovate & analyse systems and synthesise solutions using a systems approach *(D4/m, E2/m,4)*
- C5. Plan and manage complex projects *(D6)*
- C6. Work with technical uncertainty *(P8)*

### Professional practical skills

#### Level 4:
- P1. Apply appropriate mathematical methods *(US2)*
- P2. Demonstrate competence in laboratory and workshop practice *(P1,2)*
- P3. Demonstrate familiarity with IT and computing tools related to mechanical engineering *(E3)*
- P4. Conduct the design process from concept to product including technical analysis and critical analysis of outcomes *(D1-6)*
- P5. Research information to develop ideas *(P4-6)*

#### Level 5:
- P1. Apply appropriate mathematical methods *(US2)*
- P2. Demonstrate competence in laboratory and workshop practice *(P1,2)*
- P3. Demonstrate familiarity with IT and computing tools related to mechanical engineering *(E3)*
- P4. Conduct the design process from concept to product including technical analysis and critical analysis of outcomes *(D1-6)*
- P5. Research information to develop ideas *(P4-6)*
- P6. Use research methods to conduct an individual project
Level 6:
P1. Apply appropriate mathematical methods (us2)
P2. Demonstrate competence in laboratory and workshop practice (p1,2)
P3. Demonstrate familiarity with IT and computing tools related to mechanical engineering (e3)
P4. Conduct the design process from concept to product including technical analysis and critical analysis of outcomes (d1-6)
P5. Research information to develop ideas (p4-6)
P6. Use research methods to conduct an individual project

Level 7:
P1. Apply appropriate mathematical methods (US2)
P2. Demonstrate a thorough understanding & competence in laboratory and workshop practice (P1/m,2)
P3. Demonstrate familiarity with IT and computing tools related to mechanical engineering (E3/m)
P4. Conduct the design process from concept to product including technical analysis and critical analysis of outcomes (D1-6)
P5. Research information to develop ideas (P4-6)
P6. Use research methods to conduct an individual project

Key / transferable skills

Level 4:
T1. Use of scientific evidence and logical thought in the presentation of ideas
T2. Evaluate information and requirements (d2)
T3. Effectively communicate using oral and written skills
T4. Manage time effectively
T5. Use common IT and computing resources to present reports and data (e3)

Level 5:
T1. Use of scientific evidence and logical thought in the presentation of ideas
T2. Evaluate information and requirements (d2)
T3. Use creativity and innovation in problem solving (d4)
T4. Effectively communicate using oral and written skills
T5. Manage time effectively
T6. Lead and be part of a technical team
T7. Use common IT and computing resources to present reports and data (e3)

Level 6:
T1. Use of scientific evidence and logical thought in the presentation of ideas
T2. Evaluate information and requirements (D2)
T3. Use creativity and innovation in problem solving (D4)
T4. Effectively communicate using oral and written skills
T5. Manage time effectively
T6. Lead and be part of a technical team
T7. Use common IT and computing resources to present reports and data (E3)

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T6. Lead and be part of a technical team
T7. Use common IT and computing resources to present reports and data (e3)
17. Programme structure – including the route / pathway / field requirements, levels modules, credits, awards and further information on the mode of study.

All programmes operate on a 15 credit modular structure over two semesters. All taught modules are semester based and are worth 15 credits, which is indicative of 150 hours of learning, comprised of student contact, private study and assessment. Project and dissertation modules can be 15, 30, 45 or 60 credits.

The BEng programme is studied full-time over three or four academic years: three years without a Professional Training Year and four years with a Professional Training Year. In order to achieve the principal award of BEng (Hons) a student must complete 360 credits, 120 credits at FHEQ levels 4, 5 and 6 respectively. In order to achieve the principal award with a professional training year students must also complete 120 credits at level P. Students are also eligible to exit the programme with the following subsidiary awards:

- BEng (Ord) – 300 credits with a minimum of 60 credits at FHEQ level 6
- Diploma of Higher Education (Dip HE) – 240 credits with a minimum of 120 credits at FHEQ level 5
- Certificate of Higher Education (Cert HE) – 120 credits at FHEQ level 4

The BEng Programme includes two project modules worth 30 credits and an individual project worth 30 credits. The individual project takes place at FHEQ Level 6 and runs over semesters 1 and 2. This is a research based project which may involve laboratory work.

In order for students to progress they must achieve a minimum average of 40% and have completed all 120 credits at FHEQ levels 4 and 5 (and level P if taken).

BEng students may transfer onto the equivalent level of the corresponding MEng Programme at any time following the completion of FHEQ Level 4 up until the beginning of semester 1 of FHEQ Level 6, provided that they achieve an average of at least 60% in the preceding level (excluding PTY) prior to the date of transfer.

The BEng programme is accredited by the IMechE on behalf of the Engineering Council for the purposes of partially meeting the academic requirement for registration as a Chartered Engineer, and fully meeting that for registration as an Incorporated Engineer.

*The MEng programme is studied full-time over four or five academic years: four years without a Professional Training Year and five years with a Professional Training Year. In order to achieve the principal award of MEng (Hons) a student must complete 480 credits, 120 credits at FHEQ levels 4, 5, 6 and 7 respectively. Students are also eligible to exit the programme with the following subsidiary awards:

- BEng (Hons) – 360 credits with a minimum of 120 credits at FHEQ level 6, to include an individual project
- BEng (Ord) – 300 credits with a minimum of 60 credits at FHEQ level 6
- Diploma of Higher Education (Dip HE) – 240 credits with a minimum of 120 credits at FHEQ level 5
- Certificate of Higher Education (Cert HE) – 120 credits at FHEQ level 4

* The MEng includes three project modules each worth 30 credits and an individual project worth 45 credits. The individual project takes place at FHEQ Level 7 and runs over semesters 1 and 2 or may be taken entirely in semester 2 depending on other option choices. This is a research based project which may involve laboratory work. The Multidisciplinary Design Project (MDDP) takes place at FHEQ Level 7 in Semester 1. This is a design based project where the student is a member of a design team made up with students from all the engineering disciplines within the Faculty. Each
The project is devised by a visiting professor funded by the Royal Society for Engineering, who is also part of the academic-led supervisory team.

*Note that for MEng students the PTY may be taken either between FHEQ levels 5 & 6, or between FHEQ levels 6 & 7.

*To remain on the MEng Programme or to transfer in from the BEng programme, a student, in addition to the normal progression requirements, is normally required to achieve an aggregate mark of at least 60% at the end of FHEQ Level 5. MEng students dropping below an aggregate mark of 50% in FHEQ level 6 and above, but otherwise satisfying the normal progression requirements, will be required to transfer to the corresponding BEng programme. All completed MEng assessments will be transferred to the equivalent BEng programme and will then be assessed according to the BEng assessment procedure. This will require them to complete a BEng Individual Project at level FHEQ 6 before they can be eligible for the BEng award.

*Students following the MEng 4 or 5 year programmes may be permitted to transfer to the equivalent level of the corresponding BEng degree programme at any time before the beginning of semester 1 FHEQ Level 6.

*The MEng programme is accredited by the IMechE on behalf of the Engineering Council for the purposes of fully meeting the academic requirement for registration as a Chartered Engineer.

Programme adjustments (if applicable)

N/A

FHEQ Level 4: potential awards – Cert HE

<table>
<thead>
<tr>
<th>Module code</th>
<th>Module title</th>
<th>Core /compulsory /optional</th>
<th>Credit volume</th>
<th>Semester (1 / 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENG1061</td>
<td>Mathematics 1</td>
<td>Compulsory</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>ENG1062</td>
<td>Fluid Mechanics and Thermodynamics 1</td>
<td>Compulsory</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>ENG1063</td>
<td>Materials and Statics</td>
<td>Compulsory</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>ENG1064</td>
<td>Design and Component Production</td>
<td>Compulsory</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>ENG1065</td>
<td>Mathematics 2</td>
<td>Compulsory</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>ENG1066</td>
<td>Solid Mechanics 1</td>
<td>Compulsory</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>ENG1067</td>
<td>Experimental and Transferable Skills</td>
<td>Compulsory</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>ENG1068</td>
<td>Electronic Instrumentation 1</td>
<td>Compulsory</td>
<td>15</td>
<td>2</td>
</tr>
</tbody>
</table>

How many optional modules must a student choose in order to achieve the necessary amount of credits to achieve this level? N/A

FHEQ Level 5: Potential awards – Dip HE

<table>
<thead>
<tr>
<th>Module code</th>
<th>Module title</th>
<th>Core /compulsory /optional</th>
<th>Credit volume</th>
<th>Semester (1 / 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENG2087</td>
<td>Design Project</td>
<td>Compulsory</td>
<td>30</td>
<td>1 and 2</td>
</tr>
<tr>
<td>ENG2088</td>
<td>Solid Mechanics 2</td>
<td>Compulsory</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>ENG2089</td>
<td>Fluid Mechanics and Thermodynamics 2</td>
<td>Compulsory</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>ENG2095</td>
<td>Mechanics of Vehicles and Machines</td>
<td>Compulsory</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>ENG2090</td>
<td>Electronic Instrumentation 2</td>
<td>Compulsory</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>ENG2093</td>
<td>Numerical and Experimental Methods</td>
<td>Compulsory</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>ENG2094</td>
<td>Control</td>
<td>Compulsory</td>
<td>15</td>
<td>2</td>
</tr>
</tbody>
</table>

How many optional modules must a student choose in order to achieve N/A
the necessary amount of credits to achieve this level?

<table>
<thead>
<tr>
<th>Level P – optional Professional Training Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module code</td>
</tr>
<tr>
<td>-------------</td>
</tr>
<tr>
<td>ENGP012</td>
</tr>
</tbody>
</table>

How many optional modules must a student choose in order to achieve the necessary amount of credits to achieve this level? N/A

<table>
<thead>
<tr>
<th>FHEQ Level 6: Potential awards – BEng (Hons) / BEng (Ord)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module code</td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>ENG3162</td>
</tr>
<tr>
<td>ENG3163</td>
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<tr>
<td>ENG3164</td>
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<tr>
<td>ENG3165</td>
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<td>ENG3166</td>
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<tr>
<td>ENG3169</td>
</tr>
<tr>
<td>ENG3170</td>
</tr>
<tr>
<td>ENG3171</td>
</tr>
<tr>
<td>ENG3172</td>
</tr>
</tbody>
</table>

How many optional modules must a student choose in order to achieve the necessary amount of credits to achieve this level? BEng: Semester 1: choose 2 of the 3 listed optional modules
Semester 2: choose 1 of the 3 listed optional modules
*MEng: Semester 1: no options
Semester 2: choose 2 of the 3 listed optional modules

<table>
<thead>
<tr>
<th>FHEQ Level 7: Potential awards – MEng / BEng (Hons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module code</td>
</tr>
<tr>
<td>-------------</td>
</tr>
<tr>
<td>ENGM001</td>
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<tr>
<td>ENGM247</td>
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<td>ENGM180</td>
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<tr>
<td>ENGM250</td>
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<td>ENGM183</td>
</tr>
<tr>
<td>ENGM100</td>
</tr>
<tr>
<td>ENGM174</td>
</tr>
<tr>
<td>ENGM244 / ENGM107</td>
</tr>
<tr>
<td>EEEM049</td>
</tr>
</tbody>
</table>
How many optional modules must a student choose in order to achieve the necessary amount of credits to achieve this level? Choose 3 of the 7 listed optional modules, maintaining a credit balance of 60:60 between semesters. Note: ENGM100 and ENGM174 cannot be taken with EEEM049 due to intensive 1 week semester –time delivery of these 2 modules.

18. Opportunities for placements / work-related learning / collaborative activity – please indicate if any of the following apply to your programme

<table>
<thead>
<tr>
<th>Opportunity</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Associate Tutor(s) / Guest Speakers / Visiting Academics</td>
<td>Yes</td>
</tr>
<tr>
<td>Professional Training Year (PTY)</td>
<td>Yes</td>
</tr>
<tr>
<td>Placement(s) (study or work that are not part of the PTY or Erasmus Scheme)</td>
<td>N/A</td>
</tr>
<tr>
<td>Clinical Placement(s) (that are not part of the PTY Scheme)</td>
<td>N/A</td>
</tr>
<tr>
<td>ERASMUS Study (that is not taken during Level P)</td>
<td>N/A</td>
</tr>
<tr>
<td>Study exchange(s) (that are not part of the ERASMUS Scheme)</td>
<td>Yes</td>
</tr>
<tr>
<td>Dual degree</td>
<td>N/A</td>
</tr>
</tbody>
</table>

19. Quality assurance

The Regulations and Codes of Practice for taught programmes can be found at: [http://www.surrey.ac.uk/quality_enhancement/index.htm](http://www.surrey.ac.uk/quality_enhancement/index.htm)