

## JBM Guidelines for MSc and Doctoral Programmes (Updated to reflect AHEP4 requirements)

### Introduction

1. This document provides guidelines for MSc and Doctoral programmes designed to provide further learning to meet the academic requirement for registration as a Chartered Engineer.
2. They are based on the QAA Subject Benchmark Statement (Engineering)<sup>1</sup>, which will be referred to as QAA (engineering) and have been updated to reflect the requirements of the 4<sup>th</sup> edition of the Engineering Council's documentation for "The Accreditation of Higher Education Programmes (AHEP)"<sup>2</sup>.

### Background

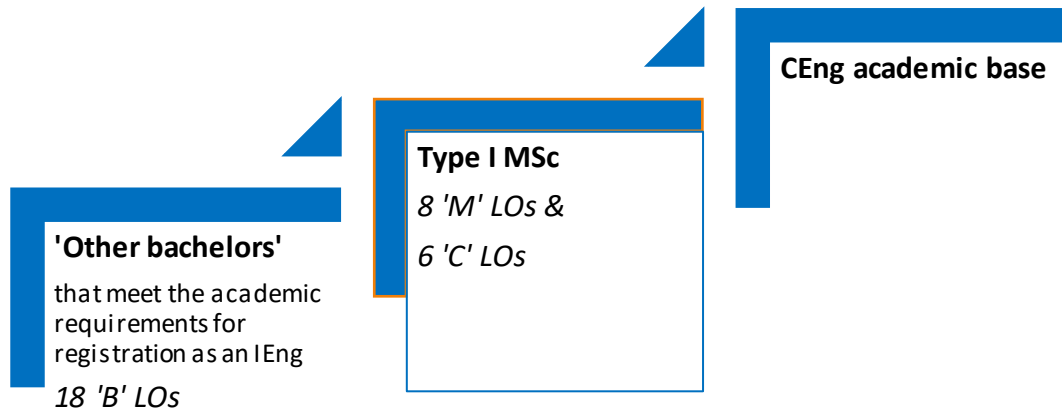
3. In relation to the academic requirement for registration as a Chartered Engineer, Engineering Council's AHEP standard defines two types of accredited bachelor's degree:
  - a. Bachelors (Hons) accredited for the purposes of partially meeting the academic requirement for registration as a Chartered Engineer.
  - b. Bachelors (with or without honours) accredited for the purpose of fully meeting the academic requirement for registration as an Incorporated Engineer
4. For the purpose of simplicity, the rest of this document will use the term '**BEng (Hons) programmes**' to refer to the former and '**other bachelor's programmes**' to refer to the latter. This does not mean that all BEng (Hons) degrees are accredited as partially meeting the academic requirement for registration as a Chartered Engineer, nor that such accreditation is only limited to BEng (Hons) degrees. JBM assesses programmes against its and Engineering Council's accreditation requirements and judges each on its merits.
5. The fact that two levels of bachelor degree are recognised by Engineering Council means that JBM in turn needs to recognise two types of MSc programme that can be combined with them:

---

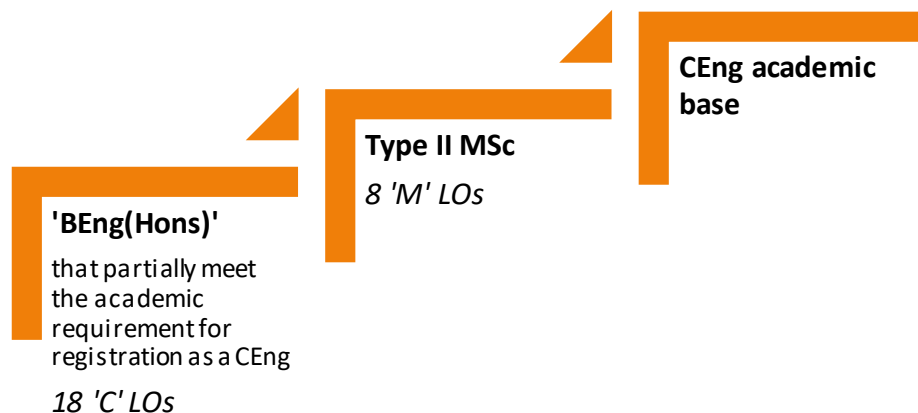
<sup>1</sup> QAA (engineering): UK Quality Code for Higher Education. Part A: Setting and monitoring academic Standards, Subject Benchmark Statement, Engineering, February 2015. See [www.qaa.ac.uk/en/Publications/Documents/SBS-engineering-15.pdf](http://www.qaa.ac.uk/en/Publications/Documents/SBS-engineering-15.pdf).

<sup>2</sup> Accreditation of HE Programmes (AHEP): Defining Characteristics of Accredited and Approved Programmes (2020). See <https://www.engc.org.uk/ahep.aspx>.

- a. **Type I** - A comparison of Engineering Council's AHEP4 Learning Outcomes (LOs) at each level shows that graduates from **'other bachelor's programmes'** can achieve the educational base for CEng registration with 6 'C' level LOs (i.e. specified for 'BEng (Hons) programmes') and 8 'M' level LOs specified for accredited master's programmes. In effect the 'C' level LOs bridge the gap from 'other bachelor programmes' level to the 'BEng(Hons) programme' level and the 'M' level LOs complete the step.



- b. **Type II** - Engineering Council's AHEP4 document defines 8 'M' level LOs for MSc programmes which graduates of **'BEng(Hons) programmes'** can use to achieve the educational base for CEng registration.



6. Note that this means that some combinations of bachelor's and master's degrees will not meet the CEng academic base requirements:

Does combination meet CEng academic base?	Type I MSc	Type II MSc
'BEng(Hons)'	Yes	Yes
'Other bachelors'	Yes	No

7. A full list of Learning Outcomes for both types of accredited postgraduate degree is presented in Table 1 below.
8. Please note that JBM's Type I and Type II MSc/Doctorate framework works for combinations of accredited degrees recognised by Engineering Council, but not for combinations involving unaccredited degrees. Graduates with a degree in civil (or structural or highways or transport)

engineering which is not accredited or graduates with cognate degrees who complete an MSc or Doctoral programme in engineering will need to submit their package of qualifications (Bachelors and Masters) for assessment by their chosen professional institution. 'Other bachelor' degree graduates who complete a Type II MSc can have their package of qualifications assessed in the same way.

9. In addition to the formal mapping of AHEP4 LOs, it is important to note other reference points to confirm whether a programme supports the required standards or not.
  - a. QAA (engineering) distinguishes between CEng and an IEng expectations. Both IEngs and CEngs use creativity and innovation and are involved in activities such as design, production, construction, operation, and disposal. Both are likely to be involved in commercial and technical management. CEngs are more likely to be involved in the development and application of new technologies, concepts, techniques, and services, while IEngs will be concerned with the application and management of current technology. Master's and Doctoral programmes should also provide an opportunity to integrate the technical and non-technical aspects of engineering and to develop a commitment to professional and social responsibility and ethical codes of conduct.
  - b. It is also helpful to note the distinction between the teaching and learning within an accredited MEng programme – the undergraduate qualification that can be used by itself to confirm the academic base for CEng - and a BEng Hons programme. The MEng programme includes a deepening of technical understanding, additional emphasis on team/group working, an increase in use of industrially relevant applications of engineering analysis and an enhanced capability for independent learning and work. Thus Masters/Doctoral level graduates are expected to demonstrate greater capacities for independent action, accepting responsibilities, formulating ideas proactively, dealing with open ended and unfamiliar problems, planning and developing strategies, implementing, and executing agreed plans, leading and managing teams, evaluating achievement against specification and plan, and decision making.

**Table 1: The table below lists the Learning Outcomes (LOs) required as Further Learning for registration as a Chartered Engineer (CEng).**

- **'Type I' MScs** to be used in combination with a Bachelors with (Hons), normally a BEng (Hons), accredited for the purposes of partially meeting the academic requirement for registration as a Chartered Engineer or Bachelors (with or without honours) accredited for the purpose of fully meeting the academic requirement for registration as an Incorporated Engineer
- **'Type II' MScs** to be used in combination with a Bachelors (Hons) accredited for the purposes of partially meeting the academic requirement for registration as a Chartered Engineer.

No.	Learning Outcome	Type I MScs With all bachelor's degrees	Type II MScs With BEng(Hons) degrees only
-	<b>Science and mathematics</b>		
M1	Apply a comprehensive knowledge of mathematics, statistics, natural science and engineering principles to the solution of complex problems. Much of the knowledge will be at the forefront of the particular subject of study and informed by a critical awareness of new developments and the wider context of engineering.	✓	✓
-	<b>Engineering Analysis</b>		
M2	Formulate and analyse complex problems to reach substantiated conclusions. This will involve evaluating available data using first principles of mathematics, statistics, natural science and engineering principles, and using engineering judgment to work with information that may be uncertain or incomplete, discussing the limitations of the techniques employed	✓	✓
M3	Select and apply appropriate computational and analytical techniques to model complex problems, discussing the limitations of the techniques employed.	✓	✓
M4	Select and critically evaluate technical literature and other sources of information to solve complex problems	✓	✓
-	<b>Design and innovation</b>		
M5	Design solutions for complex problems that evidence some originality and meet a combination of societal, user, business and customer needs as appropriate. This will involve consideration of applicable health and safety, diversity, inclusion, cultural, societal, environmental and commercial matters, codes of practice and industry standards.	✓	✓

No.	Learning Outcome	Type I MScs	Type II MScs
		With all bachelor's degrees	With BEng(Hons) degrees only
C6	Apply an integrated or systems approach to the solution of complex problems	✓	-
-	<b>The engineer and society</b>		
M7	Evaluate the environmental and societal impact of solutions to complex problems (to include the entire life cycle of a product or process) and minimise adverse impacts.	✓	✓
C11	Adopt an inclusive approach to engineering practice and recognise the responsibilities, benefits and importance of supporting equality, diversity and inclusion	✓	-
-	<b>Engineering practice</b>		
C12	Use practical laboratory and workshop skills to investigate complex problems	✓	-
C13	Select and apply appropriate materials, equipment, engineering technologies and processes, recognising their limitations	✓	-
C14	Discuss the role of quality management systems and continuous improvement in the context of complex problems	✓	-
C15	Apply knowledge of engineering management principles, commercial context, project and change management, and relevant legal matters including intellectual property rights.	✓	-
M16	Function effectively as an individual, and as a member or leader of a team. Evaluate effectiveness of own and team performance	✓	✓
M17	Communicate effectively on complex engineering matters with technical and non-technical audiences, evaluating the effectiveness of the methods used.	✓	✓