



The Institution of Engineering Designers

Learning Outcomes - Chartered Engineer (AHEP4)

EDITION CONTROL: LEARNING OUTCOMES - CHARTERED ENGINEER (AHEP4)

Edition	Revision Date	Notes
Edition 1	February 2022	

Learning Outcomes - Chartered Engineer (AHEP4)

Area of Learning	Bachelors (Honours) degrees and equivalent qualifications and apprenticeships approved or accredited as fully meeting the academic requirement for IEng registration and partially meeting the academic requirement for CEng registration	Masters degrees other than the Integrated Masters and Doctoral programmes and equivalent qualifications and apprenticeships approved or accredited as meeting the requirement for further learning for CEng registration	Integrated Masters degrees and equivalent qualifications and apprenticeships approved or accredited as fully meeting the academic requirement for CEng registration
On successful completion of an approved or accredited programme, an individual will be able to:			
Science and mathematics The study of engineering requires a substantial grounding in engineering principles, science and mathematics commensurate with the level of study.			
Science, mathematics and engineering principles	C1. Apply knowledge of mathematics, statistics, natural science and engineering principles to the solution of complex problems. Some of the knowledge will be at the forefront of the particular subject of study.	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.	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.
Engineering analysis Engineering analysis involves the application of engineering concepts and tools to analyse, model and solve problems. At higher levels of study engineers will work with information that may be uncertain or incomplete.			

Problem analysis	C2. Analyse complex problems to reach substantiated conclusions using first principles of mathematics, statistics, natural science and engineering principles.	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.	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.
Analytical tools and techniques	C3. Select and apply appropriate computational and analytical techniques to model complex problems, recognising 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.	M3. Select and apply appropriate computational and analytical techniques to model complex problems, discussing the limitations of the techniques employed.
Technical literature	C4. Select and evaluate technical literature and other sources of information to address complex problems.	M4. Select and critically evaluate technical literature and other sources of information to solve complex problems.	M4. Select and critically evaluate technical literature and other sources of information to solve complex problems.
Design and innovation Design is the creation and development of an economically viable product, process or system to meet a defined need. It involves significant technical and intellectual challenges commensurate with the level of study.			

Design	C5. Design solutions for complex problems that 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.	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.	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.
Integrated/systems approach	C6. Apply an integrated or systems approach to the solution of complex problems.	Learning outcome achieved at previous level of study.	M6. Apply an integrated or systems approach to the solution of complex problems.
<p>The engineer and society Engineering activity can have a significant societal impact and engineers must operate in a responsible and ethical manner, recognise the importance of diversity, and help ensure that the benefits of innovation and progress are shared equitably and do not compromise the natural environment or deplete natural resources to the detriment of future generations.</p>			
Sustainability	C7. Evaluate the environmental and societal impact of solutions to complex problems and minimise adverse impacts.	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.	M7. Evaluate the environmental and societal impact of solutions to complex problems (to include the entire lifecycle of a product or process) and minimise adverse impacts.
Ethics	C8. Identify and analyse ethical concerns and make reasoned ethical choices informed by professional codes of conduct.	Learning outcome achieved at previous level of study.	M8. Identify and analyse ethical concerns and make reasoned ethical choices informed by professional codes of conduct.
Risk	C9. Use a risk management process to identify, evaluate and mitigate risks (the effects of uncertainty) associated with a particular project or activity.	Learning outcome achieved at previous level of study	M9. Use a risk management process to identify, evaluate and mitigate risks (the effects of uncertainty) associated with a particular project or activity.
Security	C10. Adopt a holistic and proportionate approach to the mitigation of security risks.	Learning outcome achieved at previous level of study.	M10. Adopt a holistic and proportionate approach to the mitigation of security risks.

Equality, diversity and inclusion	C11. Adopt an inclusive approach to engineering practice and recognise the responsibilities, benefits and importance of supporting equality, diversity and inclusion.	Learning outcome achieved at previous level of study.	M11. Adopt an inclusive approach to engineering practice and recognise the responsibilities, benefits and importance of supporting equality, diversity and inclusion.
Engineering practice The practical application of engineering concepts and tools, engineering and project management, teamwork and communication skills. Engineers also require a sound grasp of the commercial context of their work, specifically the ways an organisation creates, delivers and captures value in economic, social, cultural or other contexts.			
Practical and workshop skills	C12. Use practical laboratory and workshop skills to investigate complex problems.	Learning outcome achieved at previous level of study.	M12. Use practical laboratory and workshop skills to investigate complex problems.
Materials, equipment, technologies and processes	C13. Select and apply appropriate materials, equipment, engineering technologies and processes, recognising their limitations.	Learning outcome achieved at previous level of study.	M13. Select and apply appropriate materials, equipment, engineering technologies and processes, recognising their limitations.
Quality management	C14. Discuss the role of quality management systems and continuous improvement in the context of complex problems.	Learning outcome achieved at previous level of study.	M14. Discuss the role of quality management systems and continuous improvement in the context of complex problems.
Engineering and project management	C15. Apply knowledge of engineering management principles, commercial context, project and change management, and relevant legal matters including intellectual property rights.	Learning outcome achieved at previous level of study.	M15. Apply knowledge of engineering management principles, commercial context, project and change management, and relevant legal matters including intellectual property rights.
Teamwork	C16. Function effectively as an individual, and as a member or leader of a team.	M16. Function effectively as an individual, and as a member or leader of a team. Evaluate effectiveness of own and team performance.	M16. Function effectively as an individual, and as a member or leader of a team. Evaluate effectiveness of own and team performance.

Communication	C17. Communicate effectively on complex engineering matters with technical and non-technical audiences.	M17. Communicate effectively on complex engineering matters with technical and non-technical audiences, evaluating the effectiveness of the methods used.	M17. Communicate effectively on complex engineering matters with technical and non-technical audiences, evaluating the effectiveness of the methods used.
Lifelong learning	C18. Plan and record self-learning and development as the foundation for lifelong learning/CPD.	Learning outcome achieved at previous level of study	M18. Plan and record self-learning and development as the foundation for lifelong learning/CPD.



The Institution of Engineering Designers

Learning Outcomes - Incorporated Engineer (AHEP4)



EDITION CONTROL: LEARNING OUTCOMES - INCORPORATED ENGINEER (AHEP4)

Edition	Revision Date	Notes
Edition 1	February 2022	

Learning Outcomes - Incorporated Engineer (AHEP4)

Area of Learning	Foundation degrees, Higher National Diplomas and equivalent qualifications and apprenticeships approved or accredited as fully meeting the academic requirement for EngTech registration and partially meeting the academic requirement for IEng registration	Bachelors Top-up degrees and equivalent qualifications and apprenticeships approved or accredited as meeting the requirement for further learning for IEng registration	Bachelors degrees and Bachelors (Honours) and equivalent qualifications and apprenticeships approved or accredited as fully meeting the academic requirement for IEng registration
	On successful completion of an approved or accredited programme, an individual will be able to:		
Science and mathematics The study of engineering requires a substantial grounding in engineering principles, science and mathematics commensurate with the level of study.			
Science, mathematics and engineering principles	F1. Apply knowledge of mathematics, statistics, natural science and engineering principles to broadly-defined problems.	B1. Apply knowledge of mathematics, statistics, natural science and engineering principles to broadly-defined problems. Some of the knowledge will be informed by current developments in the subject of study.	B1. Apply knowledge of mathematics, statistics, natural science and engineering principles to broadly-defined problems. Some of the knowledge will be informed by current developments in the subject of study.
Engineering analysis Engineering analysis involves the application of engineering concepts and tools to analyse, model and solve problems. At higher levels of study engineers will work with information that may be uncertain or incomplete.			
Problem analysis	F2. Analyse broadly-defined problems reaching substantiated conclusions.	B2. Analyse broadly-defined problems reaching substantiated conclusions using first principles of mathematics, statistics, natural science and engineering principles.	B2. Analyse broadly-defined problems reaching substantiated conclusions using first principles of mathematics, statistics, natural science and engineering principles.

Analytical tools and techniques	F3. Use appropriate computational and analytical techniques to model broadly-defined problems.	B3. Select and apply appropriate computational and analytical techniques to model broadly defined problems, recognising the limitations of the techniques employed.	B3. Select and apply appropriate computational and analytical techniques to model broadly defined problems, recognising the limitations of the techniques employed.
Technical literature	F4. Select and use technical literature and other sources of information to address broadly defined problems.	B4. Select and evaluate technical literature and other sources of information to address broadly defined problems.	B4. Select and evaluate technical literature and other sources of information to address broadly defined problems.
Design and innovation			
Design is the creation and development of an economically viable product, process or system to meet a defined need. It involves significant technical and intellectual challenges commensurate with the level of study			
Design	F5. Design solutions for broadly defined problems that meet a combination of user, business and customer needs as appropriate. This will involve consideration of applicable health and safety, diversity, inclusion, cultural, societal and environmental matters, codes of practice and industry standards.	B5. Design solutions for broadly defined problems that 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.	B5. Design solutions for broadly defined problems that 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.
Integrated/systems approach	F6. Apply a systematic approach to the solution of broadly-defined problems.	B6. Apply an integrated or systems approach to the solution of broadly defined problems.	B6. Apply an integrated or systems approach to the solution of broadly defined problems.
The engineer and society			
Engineering activity can have a significant societal impact and engineers must operate in a responsible and ethical manner, recognise the importance of diversity, and help ensure that the benefits of innovation and progress are shared equitably and do not compromise the natural environment or deplete natural resources to the detriment of future generations.			
Sustainability	F7. Evaluate the environmental and societal impact of solutions to broadly-defined problems.	Learning outcome achieved at previous level of study.	B7. Evaluate the environmental and societal impact of solutions to broadly-defined problems.

Ethics	F8. Identify ethical concerns and make reasoned ethical choices informed by professional codes of conduct.	B8. Identify and analyse ethical concerns and make reasoned ethical choices informed by professional codes of conduct.	B8. Identify and analyse ethical concerns and make reasoned ethical choices informed by professional codes of conduct.
Risk	F9. Identify, evaluate and mitigate risks (the effects of uncertainty) associated with a particular project or activity.	B9. Use a risk management process to identify, evaluate and mitigate risks (the effects of uncertainty) associated with a particular project or activity	B9. Use a risk management process to identify, evaluate and mitigate risks (the effects of uncertainty) associated with a particular project or activity
Security	F10. Adopt a holistic and proportionate approach to the mitigation of security risks.	Learning outcome achieved at previous level of study.	B10. Adopt a holistic and proportionate approach to the mitigation of security risks.
Equality, diversity and inclusion	F11. Recognise the responsibilities, benefits and importance of supporting equality, diversity and inclusion.	Learning outcome achieved at previous level of study.	B11. Recognise the responsibilities, benefits and importance of supporting equality, diversity and inclusion.
Engineering practice The practical application of engineering concepts and tools, engineering and project management, teamwork and communication skills. Engineers also require a sound grasp of the commercial context of their work, specifically the ways an organisation creates, delivers and captures value in economic, social, cultural or other contexts.			
Practical and workshop skills	F12. Use practical laboratory and workshop skills to investigate broadly defined problems.	Learning outcome achieved at previous level of study.	B12. Use practical laboratory and workshop skills to investigate broadly defined problems.
Materials, equipment, technologies and processes	F13. Select and apply appropriate materials, equipment, engineering technologies and processes.	Learning outcome achieved at previous level of study.	B13. Select and apply appropriate materials, equipment, engineering technologies and processes.
Quality management	F14. Recognise the need for quality management systems and continuous improvement in the context of broadly defined problems.	Learning outcome achieved at previous level of study.	B14. Recognise the need for quality management systems and continuous improvement in the context of broadly defined problems.

Engineering and project management	F15. Apply knowledge of engineering management principles, commercial context and project management.	B15. Apply knowledge of engineering management principles, commercial context, project management and relevant legal matters.	B15. Apply knowledge of engineering management principles, commercial context, project management and relevant legal matters.
Teamwork	F16. Function effectively as an individual, and as a member or leader of a team.	Learning outcome achieved at previous level of study	B16. Function effectively as an individual, and as a member or leader of a team.
Communication	F17. Communicate effectively with technical and non-technical audiences.	Learning outcome achieved at previous level of study	B17. Communicate effectively with technical and non-technical audiences.
Lifelong learning	F18. Plan and record self-learning and development as the foundation for lifelong learning/CPD.	Learning outcome achieved at previous level of study	B18. Plan and record self-learning and development as the foundation for lifelong learning/CPD.