The Original Tuning-AHELO Competence Framework for Engineering and the Tuning Test Item Bank Competence Framework

	The Original Tuning-AHELO Competence Framework for Engineering **Learning Outcomes Statements for General and Mechanical Engineering (first cycle)**	**The Tuning Test Item Bank Competence Framework**
	Engineering Generic Skills	
EGS1	● The ability to function effectively as an individual and as a member of a team.	● Included in【EGS】 .
EGS2	● The ability to use diverse methods to communicate effectively with the engineering community and with society at large.	● 【EGS】 The ability to use diverse methods to communicate effectively with the engineering community and with society at large. ※ In addition to asking specific questions that focus on communication effectiveness, scoring criteria for general questions will include “expressiveness.”
EGS3	● The ability to recognise the need for and engage in independent life-long learning.	● Will not be assessed in this project.
EGS4	● The ability to demonstrate awareness of the wider multidisciplinary context of engineering.	● Included in【ED】 .
	Basic and Engineering Sciences	

BES1	● The ability to demonstrate knowledge and understanding of the scientific and mathematical principles underlying their branch of engineering. 【Mechanical Engineering】 ● The ability to demonstrate knowledge and understanding of the basics of ♦ mathematics including differential and integral calculus, linear algebra, and numerical methods.	● Will be assessed based upon Multiple Choice Questions, MCQ.
BES2	● The ability to demonstrate a systematic understanding of the key aspects and concepts of their branch of engineering.	● 【 **BES** 】 The ability to demonstrate a systematic understanding of the key aspects and concepts of their branch of engineering.
BES3	● The ability to demonstrate comprehensive knowledge of their branch of engineering including emerging issues. 【Mechanical Engineering】 ● The ability to demonstrate knowledge and understanding of the basics of ♦ high-level programming, ♦ solid and fluid mechanics, ♦ material science and strength of materials, ♦ thermal science: thermodynamics and heat transfer,	● Will be assessed based upon Multiple Choice Questions, MCQ.

	♦ operation of common machines: pumps, ventilators, turbines, and engines.	
	Engineering Analysis	
EA1	● The ability to apply their knowledge and understanding to identify, formulate and solve engineering problems using established methods.	● 【EA1】The ability to apply their knowledge and understanding to identify, formulate and solve engineering problems using established methods.
EA2	● The ability to apply knowledge and understanding to analyse engineering products, processes and methods.	● 【EA2】The ability to apply knowledge and understanding to analyse engineering products, processes and methods.
EA3	● The ability to select and apply relevant analytic and modelling methods.	● Included in【EA1】【EA2】.
EA4	● The ability to conduct literature searches, use databases and other sources of information.	● Included in【EA1】【EA2】.
EA5	● The ability to design and conduct appropriate experiments, interpret the data and draw conclusions.	● Included in【EA1】【EA2】.
EA6	【Mechanical Engineering】 ● The ability to analyse ♦ mass and energy balances, and efficiency of systems, ♦ hydraulic and pneumatic systems,	● Included in【EA1】【EA2】.

	♦ machine elements.	
	Engineering Design	
ED1	● The ability to apply their knowledge and understanding to develop designs to meet defined and specified requirements.	● 【ED】The ability to apply their knowledge and understanding to develop designs to meet defined and specified requirements.
ED2	● The ability to demonstrate an understanding of design methodologies, and be able to use them.	● Included in【ED】.
ED3	【Mechanical Engineering】 ● The ability to carry out the design of elements of machines and mechanical systems using computer-aided design tools.	● Included in【ED】.
	Engineering Practice	
EP1	● The ability to select and use appropriate equipment, tools and methods.	● Newly defined by integrating EP1-3 ● 【EP-Integration】Ability to select, integrate, and utilize applicable theories and methods and their constraints to solve engineering problems.
EP2	● The ability to combine theory and practice to solve engineering problems.	
EP3	● The ability to demonstrate understanding of applicable techniques and methods, and their limitations.	

EP4	● The ability to demonstrate understanding of the non-technical implications of engineering practice.	● Included in【EP-Management】.
EP5	● The ability to demonstrate workshop and laboratory skills.	● Included in 【EP-Integration】.
EP6	● The ability to demonstrate understanding of the health, safety and legal issues and responsibilities of engineering practice, the impact of engineering solutions within a societal and environmental context, and commitment to professional ethics, responsibilities and norms of engineering practice.	● 【EP-Ethics】The ability to demonstrate understanding of the health, safety and legal issues and responsibilities of engineering practice, the impact of engineering solutions in a societal and environmental context, and commit to professional ethics, responsibilities and norms of engineering practice.
EP7	● The ability to demonstrate knowledge of project management and business practices, such as risk and change management, and awareness of their limitations.	● 【EP-Management】The ability to demonstrate knowledge of project management and business practices, such as risk and change management, and be aware of their limitations.
EP8	【Mechanical Engineering】 ● The ability to select and use control and production systems.	● Included in【EP-Integration】

Source：OECD (2011), "A Tuning-AHELO Conceptual Framework of Expected Desired/Learning Outcomes in Engineering", *OECD Education Working Papers*, No. 60, OECD Publishing, Paris, https://doi.org/10.1787/5kghtchn8mbn-en.