

Graduate Attributes and Indicators List

KB - Knowledge base for engineering: *Demonstrated competence in university level mathematics, natural sciences, engineering fundamentals, and specialized engineering knowledge appropriate to the program.*

- ❖ KB.1 - Recalls and defines information and concepts in mathematics
- ❖ KB.2 – Comprehends information and applies concepts in mathematics
- ❖ KB.3 - Recalls and defines information, first principles and concepts in the natural sciences
- ❖ KB.4 - Comprehends information and applies concepts in the natural sciences
- ❖ KB.5 - Recalls and defines information, first principles and concepts in fundamental engineering science
- ❖ KB.6 - Comprehends information and applies concepts in fundamental engineering science
- ❖ KB.7 - Recalls and defines information, first principles and concepts in specialized engineering science
- ❖ KB.8 - Comprehends information and applies concepts in specialized engineering science

PA - Problem analysis: *An ability to use appropriate knowledge and skills to identify, formulate, analyze, and solve complex engineering problems in order to reach substantiated conclusions.*

- ❖ PA.1 - Identifies and formulates complex engineering problems
- ❖ PA.2 - Develops models from first principles to analyze complex engineering problems
- ❖ PA.3 - Analyzes and solves complex engineering problems
- ❖ PA.4 - Critically evaluates the validity and accuracy of solutions

IN – Investigation: *An ability to conduct investigations of complex problems by methods that include appropriate experiments, analysis and interpretation of data and synthesis of information in order to reach valid conclusions.*

- ❖ IN.1 - Conducts planned activities (literature review, experiments, measurements, laboratories, etc.) and analyzes data
- ❖ IN.2 - Interprets results and reaches valid conclusions regarding complex engineering problems
- ❖ IN.3 - Formulates hypotheses and designs suitable investigative approaches and/or research methodologies
- ❖ IN.4 - Understands and/or demonstrates appropriate safety protocols

DE – Design: *The ability to perform engineering design. Engineering design is a process of making informed decisions to creatively devise products, systems, components, or processes to meet specified goals based on engineering analysis and judgement. The process is often characterized as complex, open-ended, iterative, and multidisciplinary. Solutions incorporate natural sciences, mathematics, and engineering science, using systematic and current best practices to satisfy defined objectives within identified requirements, criteria and constraints. Constraints to be considered may include (but are not limited to): health and safety, sustainability, environmental, ethical, security, economic, aesthetics and human factors, feasibility and compliance with regulatory aspects, along with universal design issues such as societal, cultural and diversification facets.*

- ❖ DE.1 - Understands the problem (open-ended complex engineering problem) and defines objectives and constraints
- ❖ DE.2 - Develops a design process considering health and safety risks, applicable standards, economic, environmental, cultural and societal considerations.
- ❖ DE.3 - Researches and develops possible solutions to a complex engineering problem and recommends a final design
- ❖ DE.4 - Implements and evaluates a final design

ET - Use of engineering tools: *An ability to create, select, adapt, and extend appropriate techniques, resources, and modern engineering tools to a range of engineering activities, from simple to complex, with an understanding of the associated limitations.*

- ❖ ET.1 - Selects and uses tools
- ❖ ET.2 - Evaluates tools and identifies their limitations
- ❖ ET.3 - Adapts, integrates and/or creates tools

IT - Individual and team work: *An ability to work effectively as a member and leader in teams, preferably in a multi-disciplinary setting.*

- ❖ IT.1 - Participates actively in a uni- and/or multi-disciplinary team

- ❖ IT.2 - Shares workload
- ❖ IT.3 - Displays good interpersonal skills
- ❖ IT.4 - Develops leadership skills

CS – Communication skills: *An ability to communicate complex engineering concepts within the profession and with society at large. Such abilities include reading, writing, speaking and listening, and the ability to comprehend and write effective reports and design documentation, and to give and effectively respond to clear instructions.*

- ❖ CS.1 - Understands, interprets and/or assesses oral, written, graphical or visual communications
- ❖ CS.2 - Produces written engineering reports and design documentation
- ❖ CS.3 - Demonstrates competency in the oral communication of complex engineering concepts
- ❖ CS.4 - Demonstrates an ability to give and/or effectively respond to clear instructions

PR – Professionalism: *An understanding of the roles and responsibilities of the professional engineer in society, especially the primary role of protection of the public and the public interest.*

- ❖ PR.1 - Understands the role of engineering profession in society
- ❖ PR.2 - Understands the responsibility of professional engineer in protection of the public and its interest
- ❖ PR.3 - Knows pertinent codes, laws and regulations related to the engineering profession

IE - Impact of engineering on society and the environment: *An ability to analyse social and environmental aspects of engineering activities. Such abilities include an understanding of the interactions that engineering has with the economic, social, health, safety, legal, and cultural aspects of society; the uncertainties in the prediction of such interactions; and the concepts of sustainable design and development and environmental stewardship.*

- ❖ IE.1 - Understands the social, environmental, economic, health, safety, legal and/or cultural aspects of engineering activities
- ❖ IE.2 – Understands and/or is able to analyze the uncertainties in the prediction of interactions between the different aspects of engineering activities
- ❖ IE.3 - Understands and/or conducts social and/or environmental impact analyses
- ❖ IE.4 - Understands and/or applies the concepts of environmental stewardship, sustainable design and sustainable development

EE - Ethics and equity: *An ability to apply professional ethics, accountability, and equity.*

- ❖ EE.1 - Appreciates and articulates issues and dilemmas related to equity
- ❖ EE.2 - Demonstrates knowledge of ethical standards (i.e. Code of Ethics)
- ❖ EE.3 – Understands and/or resolves ethical issues
- ❖ EE.4 - Demonstrates individual accountability

EP - Economics and project management: *An ability to appropriately incorporate economics and business practices including project, risk and change management into the practice of engineering, and to understand their limitations.*

- ❖ EP.1 - Understands economic concepts in an engineering context
- ❖ EP.2 - Understands the project management life cycle and its limitations
- ❖ EP.3 - Applies business tools and economics principles in managing engineering projects (or the engineering practice)

LL - Life-long learning: *An ability to identify and to address their own educational needs in a changing world, sufficiently to maintain their competence and contribute to the advancement of knowledge.*

- ❖ LL.1 - Sets goals
- ❖ LL.2 - Applies appropriate knowledge and skills to learning activities
- ❖ LL.3 - Engages in self-direction and self-evaluation
- ❖ LL.4 - Locates required information
- ❖ LL.5 - Adapts learning strategies to new conditions