Washington Accord Graduate Attributes (WA1 to WA12)

PO1 Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization **(WK1, WK2, WK3, WK4)** to the solution of complex Civil engineering problems.

PO2 Problem analysis: Able to identify, formulate, research literature and analyze complex Civil engineering problems and reach substantiated conclusions using the principles of mathematics, the natural sciences and the engineering sciences **(WK1, WK2, WK3, WK4)**.

PO3 Design/development of solutions: Able to design solutions for complex Civil engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, cultural, societal and environmental concerns **(WK5)**.

PO4 Investigation: Able to conduct investigations of complex Civil Engineering problems using research-based knowledge **(WK8)** considering experimental design, data analysis and interpretation **of data** and information synthesis to provide valid conclusions.

PO5 Modern tool usage: Able to create, select and apply appropriate techniques, resources and modern engineering and IT tools, including prediction and modeling, to complex Civil engineering problems with an understanding of their limitations **(WK6)**.

PO6 The engineer and society: Able to apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice **(WK7)**.

PO7 Environment and sustainability: Able to understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of and need for sustainable development **(WK7)**.

PO8 Ethics: Able to apply ethical principles and commit to the professional ethics, responsibilities and the norms of the engineering practice **(WK7)**.

PO9 Individual work and teamwork: Able to function effectively as an individual, and as a member or leader of diverse teams and in multi-disciplinary settings.

PO10 Communication: Able to communicate effectively about complex engineering activities with the engineering community and with society at large. Be able to comprehend and write effective reports, design documentation, make effective presentations and give and receive clear instructions.

PO11 Project management and finance: Able to demonstrate knowledge and understanding of engineering and management principles and apply these to one's work as a team member or a leader to manage projects in multidisciplinary environments.

PO12 Life-long learning: Able to recognize the need for, and have the preparation and ability to engage in independent, life-long learning in the broadest context of technological change.

Washington Accord Knowledge Profiles (WK1 to WK8)

WK1: A systematic, theory-based understanding of the **natural sciences** applicable to the discipline.

WK2: Conceptually-based **mathematics**, numerical analysis, statistics and formal aspects of computer and information science to support analysis and modeling applicable to the discipline.

WK3: A systematic, theory-based formulation of **engineering fundamentals** required in the engineering discipline.

WK4: Engineering **specialist knowledge** that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.

WK5: Knowledge that supports **engineering design** in a practice area.

WK6: Knowledge of **engineering practice** (technology) in the practice areas in the engineering discipline.

WK7: Comprehension of the role of engineering in society and identified issues in engineering practice in the discipline: ethics and the professional responsibility of an engineer to public safety; the impacts of engineering activity: economic, social, cultural, environmental and sustainability.

WK8: Engagement with selected knowledge in the **research literature** of the discipline.

Range of Problem Solving (Complex Engineering Problems have characteristic WP1 and some or all of WP2 to WP7):

WP1 Depth of Knowledge Required: Cannot be resolved without in-depth engineering knowledge at the level of one or more of WK3, WK4, WK5, WK6 or WK8 which allows a fundamentals-based, first principles analytical approach.

WP2 Range of conflicting requirements: Involve wide-ranging or conflicting technical, engineering and other issues.

WP3 Depth of analysis required: Have no obvious solution and require abstract thinking, originality in analysis to formulate suitable models.

WP4 Familiarity of issues: Involve infrequently encountered issues.

WP5 Extent of applicable codes: Are outside problems encompassed by standards and codes of practice for professional engineering.

WP6 Extent of stakeholder involvement and conflicting requirements: Involve diverse groups of stakeholders with widely varying needs.

WP7 Interdependence: Are high level problems including many component parts or sub-problems.

Range of Engineering Activities (Complex activities means activities or projects that have some or all of the following characteristics):

EA1 Range of resources: Involve the use of diverse resources (and for this purpose resources includes people, money, equipment, materials, information and technologies)

EA2 Level of interactions: Require resolution of significant problems arising from interactions between wide
ranging or conflicting technical, engineering or other issues

EA3 Innovation: Involve creative use of engineering principles and research-based knowledge in novel ways

EA4 Consequences to society and the environment: Have significant consequences in a range of contexts, characterized by difficulty of prediction and mitigation

EA5 Familiarity: Can extend beyond previous experiences by applying principles-based approaches