**Comparison of POs, EAC Program Outcomes and Engineers Australia Stage 1 Competencies**

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| **Theme** | **New Program Outcomes** | **WA/EAC Program Outcomes** | **Engineers Australia Revised Stage 1 Competencies** | **Australian Computer Society** |
| Engineering knowledge | Apply knowledge of mathematics, natural science, engineering fundamentals and specialization in Software Engineering to the solution of complex engineering problems; | Apply knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to the solution of complex engineering problems;  Apply knowledge of mathematics, natural science, engineering fundamentals and an engineering specialisation as specified in WK1 to WK4 respectively to the solution of complex engineering problems; | In-depth understanding of specialist bodies of knowledge within the engineering discipline;  Application of established engineering methods to complex engineering problem solving; | All graduates will have some understanding of each of the ICT knowledge areas identified in CBoK 3.2  ICT Fundamentals - Computational thinking: situation analysis and modelling using a range of methods and patterns to frame it so a computer system could operate effectively within it. - Design thinking: methods and tools that are used for handling abstraction could vary a great deal with the branch of ICT, from circuit diagrams to data modelling tools to business process modelling - Information processing in humans and machines, artificial intelligence - Systems thinking: components and interactions between them, structure and function, emergent properties and functions, systems layers - History of computing and ICT, drivers of technology evolution and trends for the future |
| Problem analysis | Identify, formulate, survey research literature and analyze complex Software engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences; | Identify, formulate, research literature and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences;  Identify, formulate, conduct research literature and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences (WK1 to WK4); | Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline;  Conceptual understanding of the, mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline; | The program will contain subjects at genuinely advanced level addressing complex computing topics that clearly provide depth related to the ICT objectives of the program.  …- use assessments that demonstrate a depth of knowledge at least at analyse level (Level 4) or higher in Bloom's Taxonomy - address a complex computing problem.  A complex computing problem will normally have some or all of the following criteria: - involves wide-ranging or conflicting technical, computing, and other issues; - has no obvious solution, and requires conceptual thinking and innovative analysis to formulate suitable abstract models; - a solution requires the use of in-depth computing or domain knowledge and an analytical approach that is based on well-founded principles; - involves infrequently encountered issues; - is outside problems encompassed by standards and standard practice for professional computing; - involves diverse groups of stakeholders with widely varying needs; - has significant consequences in a range of contexts; - is a high-level problem possibly including many component parts or sub-problems; - identification of a requirement or the cause of a problem is ill defined or unknown. (Seoul Accord, Section D) |
| Design/Development of solutions | Design solutions for complex Software engineering problems and design systems, components or processes that meet specified needs; | Design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations;  EAC3 Design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations (WK5); | Applicationof systematic engineering synthesis and designprocesses; | See Problem Analysis |
| Investigation | Conduct investigations of complex Software engineering problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions; | Conduct investigations of complex problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions;  EAC4 Conduct investigation of complex engineering problems using research-based knowledge (WK8) and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions; | Discernmentof knowledge development and research directions within the engineering discipline; | See Problem Analysis |
| Modern tool usage | Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex Software engineering problems, with an understanding of the limitations; | Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering problems, with an understanding of the limitations;  Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering problems, with an understanding of the limitations (WK6); | Fluent application of engineering techniques, tools and resources;  Creative, innovative and pro-active demeanor; | “A well-rounded ICT graduate will additionally have a range of less specific professional attributes including: … - using and designing modern ICT tools effectively” |
| Engineer and society | Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice and solutions to complex Software engineering problems; | Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice and solutions to complex engineering problems;  Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice and solutions to complex engineering problems (WK7); | Understanding of the scope, principles, norms, accountabilities and bounds of contemporary engineering practice in the specific discipline; | Impacts of ICT - Impacts of ICT on society (cyber warfare; surveillance, privacy and civil liberties, cybercrime and hacking, digital divide, technology reliance, intellectual property and legal issues) - Impacts of ICT on organisations, workplaces, jobs and skills |
| Environment and sustainability | Understand and evaluate the sustainability and impact of professional engineering work in the solution of complex Software engineering problems in environmental contexts; | Understand and evaluate the sustainability and impact of professional engineering work in the solution of complex engineering problems in societal and environmental contexts;  Understand and evaluate the sustainability and impact of professional engineering work in the solutions of complex engineering problems in societal and environmental contexts. (WK7); | Knowledge of contextual factors impacting the engineering discipline; | - |
| Ethics | Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice; | Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice;  Apply ethical principles and commit to professional ethics and conduct to uphold integrity and norms of engineering practice (WK7); | Ethical conduct and professional accountability; | All graduates will have developed the professional knowledge and skills identified in CBoK 3.1.  Professional ICT Ethics - Fundamental ethics notions (stakeholders, responsibility, harm, benefit, rights, virtues, duty, respect and consequences) and ethics theories - Methods of ethical reasoning, analysis and reflection, ethics canvas - Professional ethics issues: general professional issues such as conflict of interest, confidentiality - ICT specific ethics issues: adverse stakeholder impacts of ICT, surveillance and privacy, data matching, autonomous computing, digital divide, etc. - Integrity systems: the ACS Code of Professional Conduct, ethics committees and protections whistle blowing |
| Communication | Communicate effectively on complex Software engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions; | Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions;  Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions; | Effective oral and written communication in professional and lay domains;  Professional use and management of information; | All graduates will have developed the professional knowledge and skills identified in CBoK 3.1.  Professional Communication - Communication with different audiences (technical, managerial, users and non-digitally orientated audiences) in different forums (meetings, presentations, networking) - Forms and styles of documentation - technical reports and specifications, progress reports |
| Individual and team work | Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings; | Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings;  Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings; | Effective team membership and team leadership; | All graduates will have developed the professional knowledge and skills identified in CBoK 3.1.  Working Individually and in ICT development teams - Team organisation, development and management, especially of multi-disciplinary, diverse ICT teams; collaboration, group dynamics, leadership styles, conflict resolution, groupware and virtual teams - Individual time management, workflow and information management - Working effectively within an organisational context |
| Lifelong learning | Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change; | Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change;  Recognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change; | Orderly management of self and professional conduct; | All graduates will have at least intermediate level of knowledge and skills (ie. Bloom level 3) of 'Professional Ethics'. It is expected that the ACS Code of Ethics and Professional Conduct will be used, for example to demonstrate ethical awareness, capacity for life-long learning, etc.  The Professional ICT Practitioner - Continuing professional development, career upskilling, networking |
| Project management and finance | Demonstrate knowledge and understanding of engineering management principles and economic decision-making and apply these to manage projects; | Demonstrate knowledge and understanding of engineering management principles and economic decision-making and apply these to one’s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments;  Demonstrate knowledge and understanding of engineering management principles and economic decision-making and inculcate entrepreneurial mindset and apply these to one’s own work, as a member and leader in a team, to manage projects in multidisciplinary environments; | Applicationof systematic approaches to the conduct and management of engineering projects; | All graduates will have some understanding of each of the ICT knowledge areas identified in CBoK 3.2.  All graduates will have at least intermediate level of knowledge and skills (ie. Bloom level 3) of 'ICT Project Management' |