

SUBJECT OUTLINE: EN111 ENGINEERING PRACTICE AND SUSTAINABILITY

Course(s)	Common to all Bachelor of Engineering Courses
Subject Name	Engineering Practice and Sustainability
Subject Code	EN111
Duration	13 Lecture Weeks, 1 Exam Week, 1 Mid-Semester Week
Contact Hours	6 hours per week (2 Lectures, 2 Tutorial, 2 Project)
Credit Points	18
Delivery Mode	On Campus
Prerequisites	Nil
Corequisites	Nil
Coordinator	TBA

Synopsis

This subject provides students with an overarching introduction to the broad elements of professional engineering practice and their core competencies. The role of the engineers in society is explored along with the social, political and economic issues that may influence the role. The subject adopts a problem-based learning approach where student teams review a hypothetical engineering case study involving multiple, ethical and environmental related issues to critically analyze possible outcomes. Findings are presented via progressive and final reports culminating in a team work presentation to allow students to demonstrate attainment of good communication skills.

Subject Themes/Topics

Topic	Themes	Topic Details
1	Introduction to professional conducts and ethical engineering practices	a) Role of Engineering in development context b) Engineering ethics and Society
2	Team Building in Engineering Teams	a) Effective Communication b) Assertive Listening c) Critical Thinking d) Organizational Communication
3	Theories of Development	a) Sociological Theory b) Psychological Theory c) Other relevant theories
4	Social Change & Technology in economic and political context of society	a) Social Change b) Technology Change
5	Sustainable engineering practice in social, economic and political contexts.	a) Principle of Sustainability b) Environmental Sustainability c) Engineering Economics & Development
6	The role of media communication in an Engineers' world	a) Role of Media Communication b) Engineers in the real world c) Subject summary

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Subject Learning Outcomes (SLOs)

On completion of this subject students will be able to:

1. Demonstrate various concepts of professional and ethical conducts and practices in this contemporary engineering and development context.
2. Demonstrate team building, relationship and stakeholder engagement behaviors in engineering and development problem solving situations.
3. Research the range of environmental, technical and social elements involved in engineering challenges.
4. Apply skills in accessing, evaluating and summarizing information to communicate ideas and present arguments individual and within teams.
5. Apply a variety of Engineering Practices and strategies to meet engineering needs in complex social, political and economic environments.
6. Investigate, analyses and use a range of communication skills (speaking, writing, drawing and listening); and select and apply appropriate channels of communication in the sustainability process individually and within teams.

Assessment Tasks and Weightings – 100% Continuous

There is no final examination in this Subject. To pass this subject students must obtain 50% overall and a minimum of 40% in the Major Project Report.

Assessment Type	Mark (%)
Assessment 1: A Short Paper (concept understanding)	30
Assessment 2: A Short Test	15
Assessment 3: Major Project Report	40
Assessment 4: Problem-Based Project (Practical Application)	25

Students must also refer to the Subject Assessment Details

Assessment 1 – A Short Essay Paper: A concept based short essay paper outlining the students' understanding of general concepts, definitions and explanations relevant to the themes within Topics 1 & 2 covered in the lectures. The paper relates to professional conducts and ethical practices, their role in society and team building. The essay contributes 20% towards the final grade for the subject.

Assessment 2 – A Short Test: A concept based closed book assessment, testing students' abilities and comprehensions of the various concepts covered in the Topics. The test contributes 15% towards the final grade for the subject.

Assessment 3 – Major Project Report: A professional engineering structured report with individual and team components that outlines and communicates the project design/initiation processes, objectives, rationale and outcomes. The Major Project Report contributes 40% towards the final grade for the subject.

Assessment 4 – Problem-Based Project: A group professional report on resolving contemporary engineering associated issues prevalent in PNG. All team members will contribute and grades will be as function of team and individual performance. The presentation contributes 25% towards the final grade for the subject.

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Mapping

Subject Learning Outcomes (SLO) are mapped to each of the PNG National Qualifications Framework (NQF), Course Learning Outcomes (CLO), Unitech Graduate Attributes (GA), Assessment Tasks (AT) and Engineers Australia (EA) Stage 1 Competencies.

SLO	SLO TO NQF7	SLO to CLO	SLO to GA	SLO to AT	SLO to EAS1C
1	Knowledge & Skills	7	3 & 5	1 & 2	1.5, 1.6, 3.1
2	Knowledge, Skills & Applications	4	2 & 3	1 & 2	1.5, 1.6, 3.1, 3.2, 3.6
3	Applications & Autonomy	5	2, 3 4 5 & 6	3 & 4	1.5, 1.6, 3.1
4	Knowledge, Skills & Application	7	3 & 5	4	3.2, 3.4, 3.6
5	Applications & Autonomy	4 & 5	1, 2, 3, 4 5 & 6	4	1.6, 3.1, 3.4
6	Knowledge, skills & Application	5, 6 & 7	1, 2, 3, 4, 5 & 6	3	1.6, 3.1, 3.2, 3.3, 3.4, 3.5, 3.6

Engineers Australia Stage 1 Competencies

1. Knowledge and Skills Base	2.Engineering Application Ability	3. Professional and Personal Attributes
1.1 Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline.	2.1 Application of established engineering methods to complex engineering problem solving.	3.1 Ethical conduct and professional accountability.
1.2 Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline.	2.2 Fluent application of engineering techniques, tools and resources.	3.2 Effective oral and written communicator in professional and lay domains.
1.3 In-depth understanding of specialist bodies of knowledge within the engineering discipline.	2.3 Application of systematic engineering synthesis and design processes.	3.3 Creative, innovative and pro-active demeanour.
1.4 Discernment of knowledge development and research directions within the engineering discipline.	2.4 Application of systematic approaches to the conduct and management of engineering projects.	3.4 Professional use and management of information.
1.5 Knowledge of engineering design practice and contextual factors impacting the engineering discipline.		3.5 Orderly management of self and professional conduct.
1.6 Understanding of the scope,		

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principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline		3.6 Effective team membership and team leadership.
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Unitech Graduate Attributes

Attribute	Academic Dimension	Personal Dimension	Transferable Dimension
1. Lifelong Learner	Sustained Intellectual Curiosity and Use of Feedback Reflected in Work	Sets Aspiration Goals for Personal Improvement and Career Growth	Takes responsibility for one's learning and development.
2. Critical Thinker	Use of Inference Rules in Analysing and Finding Solutions for Complex Problems	Non-Emotional, Logic and Critical Thinking Abilities in all Situations.	Ability to find solutions to problems by using logical and imaginative thinking.
3. Effective Communicator	Abilities in Articulate Discussions	Skills in Delivering high Quality written essays and oral presentations.	Ability to communicate and negotiate with others and to listen to them.
4. Cultural Modernist	Familiarity with international standards, world cultures and human rights.	Tolerance of the religions and cultures of others.	Ability to work in a multicultural setting and comprehension and tolerance of religious and cultural differences.
5. Moral Uprightness	Understand and act upon the ethical responsibilities of their actions.	Character of acting in a morally upright way in all situations.	Professional behaviour at all times.
6. Technologically Savvy	Familiarity and use of technologies appropriately.	Keeping up to date with innovations.	Character of accepting new technology and quickly adapting to it.

Engineering Graduate Statement

This subject is common to all Bachelor of Engineering courses. Each engineering discipline will map subject learning outcomes to its own CLOs and the graduate statement and capabilities that stem from those CLOs. Refer to each engineering discipline for the relevant graduate statement.

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Engineering Course Learning Outcome

Course Learning Outcome	Descriptor
1) Underpinning Math and Sciences	Mastery of the principles and methods of the sciences and mathematics that underpin engineering.
2) Design	Developing creative, sustainable solutions to complex problems.
3) Engineering Discipline Specialisation	In depth proficiency in applying the tools, methods, concepts, technology and knowledge of an engineering discipline.
4) Communication and Teamwork	Proficient communication via written, oral and digital means across multiple audiences and within teams.
5) Researching and Evaluating Information	Ability to research, evaluate and synthesise information from varied sources.
6) Project Management	Manage project conception and operation involving complex technical systems and processes.
7) Professional Conduct	Conducting oneself in a professional, ethical manner consistent with sustainable economic development and society's expectations

Student Workload

The total workload for the subject for the 'average' student is a nominal 150 hours, based on a 13 week semester with 13 weeks of teaching as per the PNG National Qualification Framework.

Subject Text

No specific Text

References

1. William E. Kelly, Ph.D., P.E.; Barbara Luke, Ph.D., P.E., D.GE; and Richard N. Wring, Ph.D., (2017). Engineering for Sustainable Communities, ASCE
2. American Society of Civil Engineers, (2004). Sustainable Engineering Practice: An Introduction.
3. David T. Allen & David R. Shinnard (2011). Sustainable Engineering: Concepts, Design and Case Studies 1st Edition
4. Braden R. Allenby, (2011). The Theory and Practice of Sustainable Engineering 1st Edition

Readings and Resources:

Lecture notes and PowerPoints will be uploaded to the Google classroom.

Relevant Unitech Policies

It is important that all students familiarize themselves with the University of Technology Assessment Guidelines including those on plagiarism at www.unitech.ac.pg.