

Subject Description Form

Subject Code	ME3S01/ ME32101
Subject Title	Engineering Design for the Community
Credit Value	3
Level	3
Pre-requisite / Co-requisite/ Exclusion	Fundamental knowledge in Design and Engineering Science
Objectives	<p>The objectives of this subject are to:</p> <ol style="list-style-type: none"> 1. Introduce to students the concept and practice of service learning. 2. Raise students' awareness of social issues in Hong Kong and educate them on the challenges and needs of underprivileged communities in Hong Kong. 3. Develop a systemic platform to facilitate engineering/design students to apply their knowledge/skills to serve the community. 4. Reinforce the students' problem solving skill through real-life design projects. 5. Enhance students' generic competencies of innovative problems solving, communication and teamwork. 6. Nurture students' sense of social awareness, responsibility and engagement.
Intended Learning Outcomes	<p>Upon the completion of the subject, the students will be able to:</p> <ol style="list-style-type: none"> 1. Concept and Practice of Service Learning <ol style="list-style-type: none"> a) Link their service learning activities and experiences with academic content of the subject. b) Demonstrate empathy for people in need and a strong sense of civic responsibility. c) Evaluate people's needs by considering the complex issues in the service setting. d) Understand the role and responsibility both as a professional in their chosen discipline and as a responsible citizen. e) Function effectively in a multi-disciplinary team. 2. Discipline-specific Concepts, Issues and Skills <ol style="list-style-type: none"> f) Identify and formulate a design problem by developing design specifications to achieve the planned goals.

	<p>g) Apply knowledge of design, mathematics and engineering science to analyze and predict the life-cycle performance of a design.</p> <p>h) Assess the impacts of various factors including, materials, human, environment, safety and reliability of a design.</p>
<p>Subject Synopsis/ Indicative Syllabus</p>	<p>The topics in the course syllabus cover three major areas:</p> <ol style="list-style-type: none"> 1. Concept and Practice of Service Learning <ol style="list-style-type: none"> (i) Understand the social responsibility (ii) Proper attitude and behaviours in service delivery (iii) Reflection as a tool for learning (iv) Ethical issues in service learning 2. Discipline-Specific Concepts, Issues and Skills <p>Fundamental knowledge of engineering design for problem solving including:</p> <ol style="list-style-type: none"> (i) Problem identification and analysis (ii) Develop a design project with the goal to solve the problem (iii) Develop design specifications (iv) Design for ergonomics (v) Application of materials (vi) Use of common engineering components (vii) Design for reliability, safety and environmental-friendly (viii) Proper use of engineering/computational tools to conduct the design project 3. Project-Specific Concepts, Issues and Skills <p>Knowledge about and understanding of an identified target group of the community including:</p> <ol style="list-style-type: none"> (i) Their human psychology and behavior <ul style="list-style-type: none"> - Human psychology and behavior focuses on the human factors that affect the elderly daily life operation. It involves their feeling in dealing with common tasks, their sensory and motion, their reaction to different materials. (ii) Social problems related to and social services provided for them (iii) Primary health and social care available (iv) Market situation for the possible preferable product
<p>Teaching/Learning Methodology</p>	<p>The following teaching and learning methodology will be used for the first and second offerings of the subject and then reviewed before it is continued to offer:</p> <ol style="list-style-type: none"> 1. E-learning of service learning (10 hours)

<ul style="list-style-type: none"> • alternative design • Report writing skill • Helping prototype making • Providing service • Oral presentation 									
4. Performance in Rendering Service (individual)	20	√	√	√				√	
Total	100 %								

The students are expected to apply their knowledge and skills in performing an engineering design project to provide service to an identified target group, therefore their performance in both the service learning project and the engineering design project will be assessed.

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes are shown below:

- In the preliminary report (group report), students will present their understanding of the community need and responsibility in performing the design task, as well as the appropriateness of the direction, goals and specifications of the design project.
- Making use of the reflective journal (individual writing), students are able to further elaborate the objectives of the design task in relation to provide service to an identified target group of the community and to demonstrate empathy for people in need and a strong sense of civic responsibility.
- In addition to those outcomes fulfilled by the preliminary report, students are expected to apply knowledge of design, mathematics and engineering science to analyze and predict the life-cycle performance of their design in the final report (group report). They are also required to consider the impacts of various factors including, materials, human, environment, safety and reliability of a design. In the oral presentation (group presentation), students' ability to explain precisely and concisely on their contribution will be assessed. Due to the time constraint, the technical details including problem formulation and analysis may not be emphasized.
- The students' attitude and performance in the rendering of service, their degree of engagement with the service recipients, their collaboration with other students, and interactions with the service recipients and/or collaborating NGOs are obviously indicators of their ability to communicate effectively with clients and stakeholders, their sense of responsibility, professional ethics and their empathy for people in need.
- Because of the nature of the subject, written examination seems not necessary.

Student Study Effort Expected	Class contact:	
	▪ Lectures and seminars	13 Hrs.
	▪ e-learning of service learning	10 Hrs.
	▪ Workshops	8 Hrs.
	▪ Discussions and consultations	8 Hrs.
	Other student study effort:	
	▪ Visits to the identified target group at different stages of the project	40 Hrs.
	▪ Literature review and marketing survey	9 Hrs.
	▪ Prepare preliminary report, final report, reflective journal and oral presentation, and Participate in prototype fabrication.	30 Hrs.
	▪ Self studying	10 Hrs.
Total student study effort	128 Hrs.	
Reading List and References	<ol style="list-style-type: none"> 1. Mandell, B.R. and Schram, B., An introduction to human services: policy and practice, Pearson, latest edition. 2. Schriver, J.M., Human behavior and the social environment: shifting paradigms in essential knowledge for social work practice, Allyn and Bacon, latest edition. 3. Wayne, J.H., The social services: an introduction, F.E. Peacock Publishers, latest edition. 4. Ulrich, K.T., Product design and development, McGraw-Hill, latest edition. 5. Budynas, R.G. and Nisbett, J.K., Shigley's mechanical engineering design, McGraw-Hill, latest edition. 6. Boothroyd, G., Dewhurst, P. and Knight, W.A., Product design for manufacture and assembly, Boca Raton, CRC Press, latest edition. 7. Szalma, J.L. (2009). Individual differences in human-technology interaction: Incorporating variation in human characteristics into human factors and ergonomics research and design. <i>Theoretical Issues in Ergonomics Science</i>, 10(5), 381-397. doi: 10.1080/14639220902893613 8. Wickens, C.D., & Kramer, A. (1985). Engineering Psychology. <i>Annual Review of Psychology</i>, 36(1), 307-348. doi: 10.1146/annurev.ps.36.020185.001515 	