

## Subject Description Form

Subject Code	<b>BSE2S01S</b>
Subject Title	<b>Science for Healthy and Sustainable Living Environments</b>
Credit Value	3
Level	2
Pre-requisite Co-requisite Exclusion	Nil Nil Nil
Objectives	<p>The objectives of this subject are:</p> <ol style="list-style-type: none"> <li>1. To introduce the concepts and practices of service learning;</li> <li>2. To raise students' awareness about living environments of the underprivileged in Hong Kong;</li> <li>3. To educate students about sustainable and healthy living environments, and enhance their skills in communicating and teaching these concepts to underprivileged children and teenagers in secondary schools;</li> <li>4. To improve students' generic competencies of innovative problem solving, communication and teamwork; and</li> <li>5. To nurture students' sense of social awareness, responsibility and engagement.</li> </ol>
Intended Learning Outcomes	<p>Upon completion of the subject, students will be able to:</p> <ol style="list-style-type: none"> <li>a. Link their service learning activities and experiences with the academic content of the subject;</li> <li>b. Articulate and empathize with challenges related to unsustainable and/or unhealthy living environments faced by underprivileged people in Hong Kong;</li> <li>c. Apply basic scientific thinking principles and concepts to teach and demonstrate issues relating to sustainable and healthy living environments through interactive and learner-centered learning activities for primary and secondary school students;</li> <li>d. Articulate and empathize with the challenges facing primary and secondary schoolchildren from underprivileged backgrounds in Hong Kong;</li> <li>e. Work effectively in teams to solve problems encountered in planning and delivering the service;</li> <li>f. Communicate effectively with service recipients and/or other stakeholders; and</li> <li>g. Reflect on their roles and responsibilities as a professional in the chosen discipline and as a responsible citizen.</li> </ol>
Subject Synopsis/ Indicative Syllabus	<p>The subject syllabus covers three major topic areas:</p> <p>Concepts and Practices of Service Learning:</p> <ul style="list-style-type: none"> <li>• Principles, concepts and myths of service learning</li> <li>• Benefits of service learning to students, the university and the community</li> <li>• Ethical issues in service learning</li> <li>• Basic concepts and theories of social problems, justice and development</li> <li>• Social responsibilities of global citizens as intellectuals and professionals</li> <li>• Proper attitudes and behaviours in service delivery</li> <li>• Development of a service project proposal/plan</li> <li>• Effective teamwork and problem solving skills in service learning projects</li> <li>• Reflection as a tool for learning</li> </ul> <p>Discipline-Specific Concepts, Issues and Skills</p> <ul style="list-style-type: none"> <li>• Principles of sustainability; concepts of sustainable built environment and green buildings;</li> <li>• Scientific method and inquiry; formulation, hypothesis, prediction and experiment;</li> </ul>

	<ul style="list-style-type: none"> <li>• Applications of basic scientific methods and scientific thinking to everyday experiences and global concerns in relation to built environments: e.g. quantification of sustainability, consumption, efficiency and conservation of energy, water and other resources, reduction of wastes and disposals</li> <li>• Environmental, financial, cultural and socioeconomic challenges faced by underprivileged people relating to sustainability and living environment, particularly relating to the capability to achieve and maintain sustainable practices or a healthy living environment.</li> </ul> <p>Project-Specific Concepts, Issues and Skills</p> <ul style="list-style-type: none"> <li>• Scientific concepts and practices in teaching and demonstrating science and sustainability concepts, including teaching methods, classroom management and communication</li> <li>• Moral and ethical concerns related to working with children and young people in a school setting</li> </ul>
Teaching/Learning Methodology	<ol style="list-style-type: none"> <li>1. <b>e-Learning Module (10 hours)</b> The e-learning module, which is developed and delivered by the Office of Service Learning at PolyU, consists of readings, exercises and assessments that are designed to introduce students to the basic concepts and practices of service learning. Students are required to successfully complete the module <u>within the first four weeks</u> of the semester in which they are taking the subject.</li> <li>2. <b>Discipline-Specific Lectures, Seminars, Tutorials and/or Workshops (10 hours)</b> These lectures, seminars, tutorials and/or workshops are designed and conducted by the academic staff. They are designed to: (a) educate students in how to apply methods of scientific thinking and inquiry in the areas of buildings, sustainability and environmental issues; (b) refresh students about various engineering science concepts related to built environment and theories that they will encounter in the service project; and (c) equip students with skills and knowledge needed to create the necessary materials for the service project.</li> <li>3. <b>Project-Specific Lectures, Seminars, Tutorials and/or Workshops (4 hours)</b> These lectures, seminars, tutorials and/or workshops are designed and conducted by the academic staff, invited speakers (e.g. from the Office of Service Learning) and representatives of participating schools. They are designed to: (a) develop students' understanding of the challenges relating to sustainability and living environment faced by underprivileged members of society; (b) the challenges faced by primary and secondary school students, especially those from resource-poor backgrounds; and (c) train students in ethical knowledge and teaching/classroom management skills for planning and delivering the service project.  Prior to their participation in the service learning project, students are required to attend <u>all</u> lectures, seminars and relevant workshops and successfully complete <u>all</u> assignments/learning tasks required in (2) and (3).</li> <li>4. <b>Service Learning Projects</b> The service learning projects, organized in conjunction with the Office of Service Learning, will be implemented in (summer) semester 3 [3 credits]. Students will work in groups (e.g.: 3 students) with participating primary and secondary school students.  The focus of the projects is on cultivating an ethic of environmental sustainability through teaching related science and engineering concepts and theories.  Students will work in groups in the project. They will first be taken on visits to poor families to learn about their living situation especially with respect to energy efficiency and sustainability in everyday life. They may have to conduct interviews and surveys to get a sense of issues such as energy usage, water usage, etc. They will then use this experience to design learning activities for primary or secondary school students. The activities are required to integrate issues of sustainability and be interactive and learner-centered.  The schools that students will work with mostly serve children from underprivileged backgrounds. Students may propose any project theme related to sustainable built environment for the described environment. Some examples are:</li> </ol>

1. Collecting data to highlight issues of sustainability and related issues at home, e.g. benchmarking utility consumption in home (water, fuel gas and electricity), home waste quantification, etc
2. Identifying challenges to healthy and sustainable living, e.g. trend of air pollution, measurement indoor temperature and energy impacts.
3. Developing ideas and proposals to improve sustainability and living environment

Examples of tasks that students can undertake are organizing environmental awareness workshops, competitions, exhibitions and other activities for primary and secondary students, etc.

The service projects will take place mainly at the participating primary and secondary schools. Some project activities may be held during weekends and school summer holidays. A maximum of 60 students and 3 academic staffs will be reserved for each service recipients (staff-student ratio is 1:10), the staffs will go with the students to supervise and assess students' performance. Students are expected to spend around 25 hours preparing relevant project materials and 40 hours for direct interactions with service recipients.

#### 5. Review Sessions, Reflective Journals and Report (15 hours)

For students to learn through reflection, review and reflective sessions are held to supervise and guide students during and after the service learning project. Experts and facilitators from outside the subject-offering department (e.g. Office of Service Learning, local schools) may be invited to contribute to some of these sessions as appropriate. Moreover, group discussions are conducted to encourage students to review, refine and continuously improve service delivery. Service delivery performance will be evaluated.

Students are required to write two reflective journals throughout their project to: (a) document their works; (b) reflect upon their service learning experiences; (c) identify their learning gains and weaknesses; and (d) propose changes for future sessions.

Students are also required to write a final summative report and to give a group presentation after service delivery. Through the report and presentation, students should demonstrate their ability to: (a) link their service learning experiences with the academic focus/discipline-specific content of the subject; (b) reflect on their service learning experiences to recognize their learning gains as well as areas for future improvements; and (c) reflect on their roles and social responsibilities.

Assessment Methods in Alignment with Intended Learning Outcomes

Students' performance in this subject will be assessed using a letter-grading system in accordance with the University's convention from grade F to A+. The relative weighting of the different assessment components are as follows:

Specific assessment methods/ tasks	% weighting	Intended subject learning outcomes to be assessed						
		a	b	c	d	e	f	g
e-Learning Module	Pass-fail for completion, 5% of total grade	✓						✓
Plans/proposals for service	25%	✓	✓	✓		✓		
Performance in rendering service	40%	✓	✓	✓	✓	✓	✓	
Reflective journal/report/final presentation	30%	✓	✓		✓			✓
Total	100%							

Students must obtain a pass in all of the components in order to pass the subject.

*Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:*

	<p>The e-learning module and project-specific events include <u>assignments and learning tasks</u> that are designed to assess students' ability to link service learning with the academic content of the subject (ILO a) and their understanding of their roles and responsibilities in society (ILO g).</p> <p>In the service project preparatory stage, students are required to write project <u>proposals or plans</u> to substantiate their understanding of relevant engineering science concepts in relation to sustainable built environment and their ability to apply their knowledge in living environment for poor families (ILO a, c). These proposals or plans may include activity designs, case study and visit, sample deliverables, lesson plans, worksheets, suggested answers, etc. It is required that students work in groups from this stage on to demonstrate their ability to work collaboratively with others (ILO e). As sustainable building involves making choices that take resource use and energy efficiency into account, students should plan ways that are environmentally responsible (ILO b).</p> <p>During project execution, students will be exposed to issues and challenges facing the school students with whom they are going to work (ILO d). In addition to applying basic scientific thinking principles to demonstrate issues of sustainability in a service setting (ILO c), students need to be able to communicate effectively with the school students (ILO f). Students will be assessed based on their: <u>attitudes</u> and <u>performance</u> in the rendering of service; and degrees of <u>engagement</u> with respect to <u>participation</u>, <u>interaction</u> and <u>cognition</u>.</p> <p>All journals, reports, presentations and discussions will be used to assess students' abilities to link service learning with the academic content of the subject (ILO a), to reflect upon the challenges related to sustainability and living environment faced by the underprivileged community (ILO b), reflect upon the challenges facing the schoolchildren from underprivileged backgrounds (ILO d) and to reflect on their roles and responsibilities in society (ILO g).</p>	
Student Study Effort Expected	<b>e-Learning Module</b>	10 Hrs.
	<b>Class contact:</b>	
	<ul style="list-style-type: none"> <li>Discipline-Specific Lectures, Seminars, Tutorials and/or Workshops</li> </ul>	10 Hrs.
	<ul style="list-style-type: none"> <li>Project-Specific Lectures, Seminars, Tutorials and/or Workshops</li> </ul>	4 Hrs.
	<ul style="list-style-type: none"> <li>Reflection and review tutorials and sessions</li> </ul>	15 Hrs.
	<b>Other student study effort:</b>	
	<ul style="list-style-type: none"> <li>Readings, self-study, and planning and preparation for the service project</li> </ul>	25 Hrs.
	<ul style="list-style-type: none"> <li>Direct rendering of service</li> </ul>	40 Hrs.
	<ul style="list-style-type: none"> <li>Reflection and review</li> </ul>	25 Hrs.
	<b>Total student study effort</b>	129 Hrs.
Reading List and References	<ol style="list-style-type: none"> <li>Cress, C.M., Collier, P.J. &amp; Reitenauer, V.L. (2005). Learning Through Serving: A Student Guidebook for Service-Learning Across the Disciplines. Stylus Publishing.</li> <li>Halliday, S. (2008). Sustainable construction. Butterworth-Heinemann.</li> <li>Edwards, B. (2005). Rough Guide to Sustainability. RIBA Enterprises.</li> <li>Geoffrey, B.A., Claes, G.G. (2011). Green Nonotechnology: Solutions for the Sustainability and Energy in the Built Environment. CRC Press.</li> <li>Adams, M., Blumenfeld, W., Castañeda, C.R., Hackman, H.W., Peters, M.L., Zúñiga, X. (Ed.) (2010). Readings for Diversity and Social Justice. Routledge.</li> <li>Johnson, A. (2005). Privilege, Power, and Difference. McGraw-Hill.</li> <li><a href="http://greenliving.nationalgeographic.com/">http://greenliving.nationalgeographic.com/</a></li> <li><a href="http://www.unesco.org/education/tlsf/mods/theme_gs/mod0a.html">http://www.unesco.org/education/tlsf/mods/theme_gs/mod0a.html</a></li> </ol>	