

The Hong Kong Polytechnic University

Subject Description Form

Please read the notes at the end of the table carefully before completing the form.

Subject Code	AP40010
Subject Title	Lighting Control Technology
Credit Value	3
Level	4
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	To introduce the basic concepts of electricity, lighting electronics and circuits as well as the technology and applications in lighting control.
Intended Learning Outcomes <i>(Note 1)</i>	Upon completion of the subject, students will be able to: (a) have a basic understanding of electricity; (b) state the basic operation principles of common lighting electronic devices; (c) design and analyze digital circuits and systems; (d) describe the principles of different lighting control components; (e) understand the fundamentals of lighting control circuits, signals and protocols; and (f) demonstrate the applications of lighting control.
Subject Synopsis/ Indicative Syllabus <i>(Note 2)</i>	<p>Basic electricity: fundamental units; electrical components (resistors, capacitors and inductors); electrical distribution (direct current, alternating current, circuits and transformers); electrical control elements (switches, fuses, and circuit breakers);</p> <p>Fundamentals of lighting electronics: diodes (pn junction diode, zener diode, light emitting diode and photo diode); transistors (bipolar junction transistor (BJT), metal-oxide-semiconductor field-effect transistor (MOSFET), junction field effect transistor (JFET), insulated gate bipolar transistor (IGBT) and thyristor); amplifiers (Class A, B, C and D); analog to digital conversion; integrated circuits; microprocessor.</p> <p>Design of digital circuits and systems: MOS processing; design rules and layout design; logic functions and logic gates; memory circuits (ROM, EPROM, EEPROM, DRAM and SRAM); CMOS processing; CMOS circuits; BiCMOS circuits; digital system structures; system design techniques.</p> <p>Lighting control components: electromagnetic components (transformers for lighting, ballasts, ignitors and starters); electronic components (inverters, transformer circuits and ballast circuits).</p> <p>Dimmers and control systems: dimmer laws; dimmer circuits; standard</p>

	<p>protocols for lighting control; networks and buses; cordless control; architectural and entertainment lighting control; energy management and building control; emergency and security lighting.</p> <p>Applications of lighting control: commercial, industrial and architectural applications; practical lighting design.</p>																																						
<p>Teaching/Learning Methodology</p> <p>(Note 3)</p>	<p>Lecture: The course materials will be explained. Concrete examples will be given to illustrate difficult concepts. Students are encouraged to ask questions and participate more in lectures. Assignment sets will be given to assess the learning progress of students.</p> <p>Tutorial: Students will work on problem sets in the tutorials, which provide them opportunities to apply the knowledge gained in lectures.</p>																																						
<p>Assessment Methods in Alignment with Intended Learning Outcomes</p> <p>(Note 4)</p>	<table border="1"> <thead> <tr> <th rowspan="2">Specific assessment methods/tasks</th> <th rowspan="2">% weighting</th> <th colspan="6">Intended subject learning outcomes to be assessed (Please tick as appropriate)</th> </tr> <tr> <th>a</th> <th>b</th> <th>c</th> <th>d</th> <th>e</th> <th>f</th> </tr> </thead> <tbody> <tr> <td>(1) Continuous assessment</td> <td>40</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> </tr> <tr> <td>(2) Examination</td> <td>60</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> </tr> <tr> <td>Total</td> <td>100</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> </tr> </tbody> </table> <p>Continuous assessment includes assignments and tests which aim at checking the progress of students throughout the course, assisting them in self-monitoring their performances. The examination will be used to assess the knowledge acquired by the students, as well as to determine the extent in which they have achieved the intended learning outcomes.</p>	Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)						a	b	c	d	e	f	(1) Continuous assessment	40	✓	✓	✓	✓	✓	✓	(2) Examination	60	✓	✓	✓	✓	✓	✓	Total	100	✓	✓	✓	✓	✓	✓
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<p>Reading List and References</p>	<p>Robert S. Simpson, "Lighting control technology and applications", Focal Press, 2003.</p> <p>Damon Wood, "Lighting upgrades a guide for facility managers", 2nd edition,</p>																																						

	<p>The Fairmont Press, Inc and Marcel Dekker, Inc, 2004.</p> <p>Craig DiLouie, “Lighting controls handbook”, The Fairmont Press, Inc and CRC Press, 2008.</p> <p>Stanley Lyons, “Emergency Lighting for industrial, commercial and residential premises”, Butterworth-Heinemann Ltd, 1992.</p> <p>Michael Neidle, “Emergency and Security Lighting Handbook”, Heinemann Newnes, 1988.</p>
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Note 1: Intended Learning Outcomes

Intended learning outcomes should state what students should be able to do or attain upon completion of the subject. Subject outcomes are expected to contribute to the attainment of the overall programme outcomes.

Note 2: Subject Synopsis/ Indicative Syllabus

The syllabus should adequately address the intended learning outcomes. At the same time over-crowding of the syllabus should be avoided.

Note 3: Teaching/Learning Methodology

This section should include a brief description of the teaching and learning methods to be employed to facilitate learning, and a justification of how the methods are aligned with the intended learning outcomes of the subject.

Note 4: Assessment Method

This section should include the assessment method(s) to be used and its relative weighting, and indicate which of the subject intended learning outcomes that each method purports to assess. It should also provide a brief explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes.