Subject Description Form

Subject Code	EIE6811 – EIE6813
Subject Title	Guided Study in Electronic and Information Engineering I/II/III
Credit Value	3
Level	6
Pre-requisite/ Co-requisite/ Exclusion	Students are expected to have acquired knowledge in digital communications, power electronics, digital signal processing, microelectronics, biomedical engineering or bio-electronics equivalent to that taught in the final year of an Honours Degree in Electronic/Electrical/Information Engineering.
Objectives	This subject aims to equip students with the comprehensive knowledge in a selected research topic from the following areas in Electronic and Information Engineering: advanced communications systems, advanced power electronics, multimedia signal processing, biosensor technologies and microelectronics.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: 1. understand the state-of-the-art developments and trends in a selected research topic from the following areas: advanced communications systems, advanced power electronics, multimedia signal processing, biosensor technologies and microelectronics; 2. familiarize themselves with the technical knowhow and the tools for the analysis and design made in the selected research topic.
Subject Synopsis/ Indicative Syllabus	The contents of the guided study are based on any one or more research topics in the list of the area (1 to 5) selected by the student: 1. Advanced communications systems (i) Wireless Communications (ii) Wireless Networking (iii) Communication Theory (iv) Signal Processing for Communications (v) Optical Networks and Systems (vi) Next-Generation Networking (vii) Communication QoS, Reliability & Modeling (viii) Ad-hoc and Sensor Networking (ix) Communication Software and Services (x) Communication and Information Systems Security (xi) Cognitive Radio and Networks 2. Advanced power electronics (i) Power semiconductors, Power integrated circuits (PIC), passive components and packaging technologies (ii) Motor drives and motion control (iii) Analysis and design of electrical machines (iv) Hard-switching and soft-switching static power converters and UPS (v) Applications of power electronics in power system and generation/FACTS (vi) Power quality issues, harmonic problems and solutions (vii) EMI/EMC issues (viii) Traction and automotive systems (ix) Applications of power electronics in home appliance, industry and aerospace (x) Renewable energy technologies

	(xi) Distributed generation and smart-grid (xii) Modelling and simulation in power electronics (xiii) Power electronics related education/professional development (xiv) Bio-medical power electronics (xv) Telecommunications power supplies (xvi) Micro-electromechanical systems (MEMS) (xvii) Power electronic emerging technologies 3. Multimedia signal processing (i) Coding and compression of multimedia signals (ii) Multimedia for communication and collaboration (iii) Multimedia database and data retrieval (iv) Multimedia forensics (v) Client-cloud multimedia systems, applications, and experiences (vi) Virtual reality signal processing (vii) Scene analysis (viii) Multimedia networking (ix) Emerging topics in multimedia signal processing 4. Biosensor technologies (i) Bioelectronics (ii) Commercial biosensors, manufacturing and markets (iii) DNA chips, nucleic acid sensors and aptasensors (iv) Enzyme-based biosensors (v) Immunosensors (vi) Lab-on-a-chip (vii) Microfluidics and immobilisation technology (viii) Nanobiosensors, nanomaterials & nanoanalytical systems (ix) Natural & synthetic receptors (including MIPs) (x) Organism- and whole cell-based biosensors (xi) Printed biosensors and micro- and nanofabrication (xii) Proteomics, single-cell analysis and cancer-cell detection (xiii) Imaging and fluorescence (xiv) Signal transduction technology (xv) Signal conditioning and measurement certainty (xvi) Theranostics & implantable sensors 5. Microelectronics (i) Photovoltaic cells (ii) Optoelectronic devices (iii) Photonic devices (iv) Organic electronics

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<tr><td>Teaching/Learning Methodology</td><td>A student is required, under the supervision of the subject supervisor, to read specified monographs, journal publications and/or a book. The student and the subject supervisor must meet regularly to discuss the progress made by the student in the subject. Coursework in terms of literature survey reports and presentations should normally be included. At the end of the semester the student will be examined, normally both orally and in written form. All of the above contributes to both intended learning outcomes of the subject.

<u>Alignment of learning & teaching activities with the ILOs</u>

<table>
<tr><th rowspan="2">Teaching/Learning Methodology</th><th colspan="2">Intended subject learning outcomes</th></tr>
<tr><th>1</th><th>2</th></tr>
<tr><td>1. Literature survey</td><td>✓</td><td>✓</td></tr>
<tr><td>2. Write-ups and presentations</td><td>✓</td><td>✓</td></tr>
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<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>The Coursework part will include the coursework of the study assigned by the teaching staff. The Examination part will include the written and oral examination of the study assigned by the teaching staff.

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<tr><th rowspan="2">Specific assessment methods/tasks</th><th rowspan="2">% weighting</th><th colspan="2">Intended subject learning outcomes to be assessed</th></tr>
<tr><th>1</th><th>2</th></tr>
<tr><td>1. Coursework
(normally assignments and presentations)</td><td>45</td><td>✓</td><td>✓</td></tr>
<tr><td>2. Examination
(normally both written and oral, conducted by the responsible staff and a staff member who is knowledgeable in the topic)</td><td>55</td><td>✓</td><td>✓</td></tr>
<tr><td>Total</td><td>100</td><td colspan="2"></td></tr>
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<tr><td>Student Study Effort Expected</td><td>
<table>
<tr><td>Guided activities:</td><td></td></tr>
<tr><td>• Meeting with the supervisor / Presentations/ Viva examination</td><td>20 Hours</td></tr>
<tr><td>• Self-study / Preparation of reports and presentation materials</td><td>85 Hours</td></tr>
<tr><td>Total student study effort</td><td>105 Hours</td></tr>
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<tr><td>Reading List and References</td><td>Will be assigned by the teaching staff.</td></tr>
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