

To: 42470-3, 4, 5, SND-4, SND-5, SY-1, SY-2 and SY-3 Students of the BEng in EIE Programme, and 05404-EIF and SRF Students  
 From: Programme Leader, BEng in EIE & Chairman, Departmental Undergraduate Programme Committee (DUPC)  
 c.c.: Interim Head, EIE  
 BEng in EIE Programme Executive Group Members  
 Date: 24 Feb 2017

Dear Students,

### Minor Changes to the BEng in EIE (42470/42470-SY) Programme

The Department has recently implemented a few minor changes to the BEng in EIE programme curriculum as a result of refocusing the programme to the studies in Information and Communication Technologies (ICT) with an emphasis on “vertical integration”. These minor changes are highlighted below for your attention. You can refer to the attached document for more details about the rationales behind these minor changes to the BEng in EIE (42470/42470-SY) programme.

#### 1. Deleting Electives from and Adding Electives to the Curriculum

The technical electives listed in Table 1 below are removed from the curriculum of the BEng in EIE programme since they either do not align closely with the new programme emphasis or are less popular among students (i.e. low subject enrolment):

Table 1: Deletion of technical electives from the BEng in EIE programme:

Subject Code	Subject Title	Credit	Category of Subjects	
			Normal Year 1 Intake	Senior Year Intake
<del>EIE3110</del>	<del>Research Methodology</del>	<del>3</del>	<del>ELE</del>	<del>ELE</del>
<del>EIE3306</del>	<del>IC Technology and Processes</del>	<del>3</del>	<del>ELE</del>	<del>ELE</del>
<del>EIE3338</del>	<del>Applied Electromagnetics</del>	<del>3</del>	<del>ELE</del>	<del>ELE</del>
<del>EIE3378</del>	<del>Semiconductor Optoelectronic Devices</del>	<del>3</del>	<del>ELE</del>	<del>ELE</del>
<del>EIE4107</del>	<del>Wireless Communications</del>	<del>3</del>	<del>ELE</del>	<del>ELE</del>
<del>EIE4111</del>	<del>Advanced VLSI and Computer Aided Circuit Design</del>	<del>3</del>	<del>ELE</del>	<del>ELE</del>
<del>EIE4414</del>	<del>Computer Architecture and Systems</del>	<del>3</del>	<del>ELE</del>	<del>ELE</del>

Subject Code	Subject Title	Credit	Category of Subjects	
			Normal Year 1 Intake	Senior Year Intake
EIE4415	Multimedia Technology	3	ELE	ELE
EIE4448	Bioengineering Signals and Systems	3	ELE	ELE
EIE4450	Nanoscience and Technology for Electronic Engineering	3	ELE	ELE
EIE4451	Circuits for Telecommunications	3	ELE	ELE

The technical electives listed in Table 2 below are relevant to the BEng in EIE curriculum and thus have been added to the programme:

Table 2: Addition of technical electives to the BEng in EIE programme:

Subject Code	Subject Title	Credit	Category of Subjects	
			Normal Year 1 Intake	Senior Year Intake
EIE4112	Avionics Systems (Appendix I)	3	ELE	ELE
EIE4113	Wireless and Mobile Systems (Appendix II)	3	ELE	ELE
EIE4114	Digital Forensics for Crime Investigation (Appendix III)	3	ELE	ELE
EIE4115	Intrusion Detection and Prevention (Appendix IV)	3	ELE	ELE
EIE4116	Surveillance Studies and Technologies (Appendix V)	3	ELE	ELE

The above changes will be effective from 2017/18 and onwards.

## 2. Updating the List of Level 5 EIE Electives

The list of Level 5 subjects open for BEng in EIE final-year students' choosing has been updated as follows with reference to the update on the list of Level 5 subjects offered for the MSc in EIE programme:

Table 3: Updated list of Level 5 EIE electives for the BEng in EIE programme:

Subject Code	Subject Title	Credit
EIE509	Satellite Communications - Technology and Applications	3
EIE511	VLSI System Design	3
EIE522	Pattern Recognition: Theory & Applications	3
EIE529	Digital Image Processing	3
EIE531	Mobile Radio Communications	3
EIE546	Video Technology	3
EIE553	Security in Data Communication	3
EIE557	Computational Intelligence and its Applications	3
EIE558	Speech Processing and Recognition	3
EIE563	Digital Audio Processing	3
EIE574	High Frequency Circuit Design	3
EIE575	Vehicular Communications and Inter-Networking Technologies	3
EIE577	Optoelectronic Devices	3
EIE579	Advanced Telecommunication Systems	3
EIE581	Optical Wavelength Division Multiplexing Networks	3
EIE583	Advanced Power Semiconductor Devices and Design Criteria for Applications	3
EIE585	OFDM & MIMO Wireless Communications	3
EIE587	Channel Coding	3
EIE589	Wireless Data Network	3
EIE507	Network Design— Theory and Practice	3
EIE528	Digital Data Transmission	3
EIE536	High Speed Networks	3
EIE541	Digital Signal Processing	3
EIE545	Consumer Electronics	3
EIE552	Internet Technologies for Multimedia Applications	3
EIE555	Personal Networking Technology	3
EIE556	Advanced DSP for Multimedia Communications	3
EIE559	CDMA Spread Spectrum Communications and Its Applications	3
EIE565	Advanced Multimedia Technology	3
EIE576	Information Technology in Biomedicine	3
EIE578	CMOS Analog Integrated Circuits Design and Analysis	3

The above revisions will take place with immediate effect.

The attached file contains the following information for your reference:

1. Syllabi of EIE4112, EIE4113, EIE4114, EIE4115 and EIE4116
2. Rationales behind the minor changes to the BEng in EIE programme

For easy reference in the future, students are strongly advised to update your own Programme Booklet by enclosing this email and the attached documents to your own Booklet.

Should you have any question regarding the above, please feel free to talk to me.

Thank you for your attention.

Regards,  
Dr C.K. Leung  
Programme Leader  
BEng(Hons) in Electronic and Information Engineering

**The Hong Kong Polytechnic University**  
**Department of Electronic and Information Engineering**

**Minor Changes to the BEng (Hons) in Electronic and Information Engineering**  
**(BEng in EIE) (42470/42470-SY) Programme**

***Background***

Recently the Department has made a thorough discussion on the identity of the academic programmes it offers and came up with a plan to refocus its programmes to the studies in Information and Communication Technologies (ICT) with an emphasis on “vertical integration”. It follows from the current trend of many ICT enterprises, such as Google, Microsoft, Verizon, etc., who do not only focus on providing a specific kind of ICT services and products, but also engage themselves in different parts of the ICT vertical supply chain. While the business of these ICT enterprises can range from software applications, hardware systems to even microelectronic devices, it lets us believe that there is a need to provide a vertically integrated education to our students to prepare their future ICT career. It in fact also fully meets the profile and expertise of the Department.

To cope with this emphasis, the Department has recently made a review on all higher diploma, undergraduate degree and taught postgraduate programmes to ensure they follow closely our new emphasis of “vertical integration” in ICT. At the same time, we also try to identify rooms for streamlining and consolidation of subjects while ensuring that the programme aims, objectives and intended learning outcomes are unaffected and sufficient number of electives are provided for students’ selection.

In this connection, a number of minor changes have been implemented to the BEng in EIE programme curriculum which are detailed in the following sections.

## 1. Deleting Electives from and Adding Electives to the Curriculum

The technical electives listed in Table 1 have been removed from the curriculum of the BEng in EIE programme. They either do not align closely with the new programme emphasis or are less popular among students (i.e. low subject enrolment).

Table 1: Deletion of technical electives from the BEng in EIE programme:

Subject Code	Subject Title	Credit	Category of Subjects	
			Normal Year 1 Intake	Senior Year Intake
EIE3110	Research Methodology	3	ELE	ELE
EIE3306	IC Technology and Processes	3	ELE	ELE
EIE3338	Applied Electromagnetics	3	ELE	ELE
EIE3378	Semiconductor Optoelectronic Devices	3	ELE	ELE
EIE4107	Wireless Communications	3	ELE	ELE
EIE4111	Advanced VLSI and Computer Aided Circuit Design	3	ELE	ELE
EIE4414	Computer Architecture and Systems	3	ELE	ELE
EIE4415	Multimedia Technology	3	ELE	ELE
EIE4448	Bioengineering Signals and Systems	3	ELE	ELE
EIE4450	Nanoscience and Technology for Electronic Engineering	3	ELE	ELE
EIE4451	Circuits for Telecommunications	3	ELE	ELE

During the review, the Department has also identified certain subjects currently offered to the BSc (Hons) in Information Security (BSc in INS) (42480) and BEng (Hons) in Air Transport Engineering (48401)/BEng (Hons) in Aviation Engineering (48402) programmes which are relevant to the BEng in EIE discipline. These subjects have thus been added to the BEng in EIE curriculum as electives to broaden students' scope of learning. The subjects to be added to the BEng in EIE curriculum are listed in Table 2 as follows:

Table 2: Addition of technical electives to the BEng in EIE programme:

Subject Code	Subject Title	Credit	Category of Subjects	
			Normal Year 1 Intake	Senior Year Intake
EIE4112	Avionics Systems	3	ELE	ELE
EIE4113	Wireless and Mobile Systems	3	ELE	ELE
EIE4114	Digital Forensics for Crime Investigation	3	ELE	ELE
EIE4115	Intrusion Detection and Prevention	3	ELE	ELE
EIE4116	Surveillance Studies and Technologies	3	ELE	ELE

“EIE4112 Avionics Systems” (Appendix I) intends to provide students with knowledge of communications, electronics aspects of avionics, including aircraft instruments and integrated systems, and navigation systems; “EIE4113 Wireless and Mobile Systems” (Appendix II) aims to provide students with an understanding of various security concerns in wireless networks (e.g., WiFi and mobile cellular networks) and mobile systems and applications (e.g., Android and iOS); “EIE4114 Digital Forensics for Crime Investigation” (Appendix III) intends to provide students with basic concepts about digital forensic techniques for crime investigation, and train students to appreciate how different forensic techniques are used for information security; “EIE4115 Intrusion Detection and Prevention” (Appendix IV) aims to provide a solid foundation to students in network security and intrusion detection and prevention, enable students to master the knowledge about intrusion detection and prevention in the context of real-life applications, and prepare students for understanding, evaluating critically, and assimilating new knowledge and emerging technology in network security; “EIE4116 Surveillance Studies and Technologies” (Appendix V) is designed to provide students with a thorough understanding of recent surveillance technologies and their emerging trends, and enable them to learn the pros and cons of various surveillance technologies.

The revisions listed in Table 1 and Table 2 above will be effective from 2017/18 and onwards and applicable to all cohorts of intake to the BEng in EIE programme.

## 2. Updating the List of Level 5 EIE Electives

According to current curriculum design of the BEng in EIE (42470/42470-SY) programme, students may take at most one Level 5 EIE subject per semester as a final-year technical elective during their final year of study subject to the approval by the Programme Leader. The total number of Level 5 EIE subjects taken by a student shall not exceed 2. Below are the Level 5 EIE subjects currently listed in the BEng in EIE programme:

Table 3: Existing list of Level 5 EIE electives for the BEng in EIE programme:

Subject Code	Subject Title	Credit
EIE507	Network Design - Theory and Practice	3
EIE509	Satellite Communications - Technology and Applications	3
EIE511	VLSI System Design	3
EIE522	Pattern Recognition: Theory & Applications	3
EIE528	Digital Data Transmission	3
EIE529	Digital Image Processing	3
EIE531	Mobile Radio Communications	3
EIE536	High Speed Networks	3

Subject Code	Subject Title	Credit
EIE541	Digital Signal Processing	3
EIE545	Consumer Electronics	3
EIE546	Video Technology	3
EIE552	Internet Technologies for Multimedia Applications	3
EIE553	Security in Data Communication	3
EIE555	Personal Networking Technology	3
EIE556	Advanced DSP for Multimedia Communications	3
EIE557	Computational Intelligence and its Applications	3
EIE558	Speech Processing and Recognition	3
EIE559	CDMA Spread Spectrum Communications and Its Applications	3
EIE563	Digital Audio Processing	3
EIE565	Advanced Multimedia Technology	3
EIE576	Information Technology in Biomedicine	3
EIE577	Optoelectronic Devices	3
EIE578	CMOS Analog Integrated Circuits Design and Analysis	3
EIE579	Advanced Telecommunication Systems	3

The Level 5 EIE subjects are primarily offered for MSc in Electronic and Information Engineering (MSc in EIE) programme, and the BEng in EIE programme merely adopts these subjects to broaden the students' scope of learning. With reference to the update on the list of Level 5 subjects offered for the MSc in EIE programme, the list of Level 5 subjects open for BEng in EIE final-year students' choosing has been updated as follows:

Table 4: Updated list of Level 5 EIE electives for the BEng in EIE programme:

Subject Code	Subject Title	Credit
EIE509	Satellite Communications - Technology and Applications	3
EIE511	VLSI System Design	3
EIE522	Pattern Recognition: Theory & Applications	3
EIE529	Digital Image Processing	3
EIE531	Mobile Radio Communications	3
EIE546	Video Technology	3
EIE553	Security in Data Communication	3
EIE557	Computational Intelligence and its Applications	3
EIE558	Speech Processing and Recognition	3
EIE563	Digital Audio Processing	3
<b>EIE574</b>	<b>High Frequency Circuit Design</b>	<b>3</b>



Subject Code	Subject Title	Credit
EIE575	Vehicular Communications and Inter-Networking Technologies	3
EIE577	Optoelectronic Devices	3
EIE579	Advanced Telecommunication Systems	3
EIE581	Optical Wavelength Division Multiplexing Networks	3
EIE583	Advanced Power Semiconductor Devices and Design Criteria for Applications	3
EIE585	OFDM & MIMO Wireless Communications	3
EIE587	Channel Coding	3
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EIE528	Digital Data Transmission	3
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EIE556	Advanced DSP for Multimedia Communications	3
EIE559	CDMA Spread Spectrum Communications and Its Applications	3
EIE565	Advanced Multimedia Technology	3
EIE576	Information Technology in Biomedicine	3
EIE578	CMOS Analog Integrated Circuits Design and Analysis	3

The revisions will take place with immediate effect and applicable to all cohorts of intake to the BEng in EIE programme.

**Subject Description Form**

<b>Subject Code</b>	EIE4112
<b>Subject Title</b>	Avionics Systems
<b>Credit Value</b>	3
<b>Level</b>	4
<b>Pre-requisite</b>	ENG3005 Introduction to Aircraft Design & Aviation Systems or EIE3331/EIE3381/EIE331/EIE381 Communication Fundamentals or ME45002 Aircraft Systems
<b>Co-requisite/ Exclusion</b>	Nil
<b>Objectives</b>	To provide students with knowledge of communications, electronics aspects of avionics, including aircraft instruments and integrated systems, and navigation systems.
<b>Intended Learning Outcomes</b>	Upon completion of the subject, students will be able to: <ol style="list-style-type: none"> <li>1. possess essential knowledge and skills in the area of avionics systems;</li> <li>2. apply their knowledge, skills and hand-on experience to manufacture and maintain existing products; analyze and develop new modules and components in avionics systems for desired needs;</li> <li>3. extend their knowledge of avionics systems to different situations of engineering context and professional practice; and</li> </ol>
<b>Subject Synopsis/ Indicative Syllabus</b>	<p><b>Regulatory Agencies &amp; related documents:</b> ICAO Annex 10, FAA, RTCA; Concept of TSO; ARINC; DO-160.</p> <p><b>Airborne Communications Systems:</b> VHF &amp; HF transceivers, VDL modes; NAVCOM; EPIRB.</p> <p><b>Terrestrial Radio Navigation &amp; Landing Aids:</b> NDB; VOR; DVOR; DME; ILS &amp; GP; Radar altimeters &amp; AID.</p> <p><b>Satellite Navigation:</b> Introduction to GNSS and its impacts on Performance-based navigation – RNAV &amp; RNP.</p> <p><b>Surveillance Systems:</b> Primary &amp; Secondary Radars; ATCRBS replies; TCAS; ADS-B.</p> <p><b>Cockpit Integration:</b> Display technologies; Instrument Placement.</p> <p><b>On Board Data Buses:</b> ARINC 429; ARINC 629; ARINC 825 CAN Bus.</p> <p><b>Electronic Flight Control:</b> FBW flight control features. Control laws. Safety and integrity. Redundancy and failure survival. Digital implementation and problems. Flight control software functions.</p> <p><b>Case study:</b></p> <ul style="list-style-type: none"> <li>• Case study on an avionics system/avionics subsystem/avionics component</li> </ul>

<b>Teaching/Learning Methodology</b>	<ol style="list-style-type: none"> <li>The teaching and learning methods include lectures/tutorial sessions, homework assignments, test, case study report and examination.</li> <li>The continuous assessment and examination are aimed at providing students with integrated knowledge required for avionics systems.</li> <li>Technical/practical examples and problems are raised and discussed in class/tutorial sessions.</li> </ol>																																					
	<table border="1"> <thead> <tr> <th rowspan="2">Teaching/Learning Methodology</th> <th colspan="3">Intended subject learning outcomes</th> </tr> <tr> <th>1</th> <th>2</th> <th>3</th> </tr> </thead> <tbody> <tr> <td>1. Lecture</td> <td>√</td> <td>√</td> <td></td> </tr> <tr> <td>2. Tutorial</td> <td>√</td> <td>√</td> <td></td> </tr> <tr> <td>3. Homework assignment</td> <td>√</td> <td>√</td> <td></td> </tr> <tr> <td>4. Case study report</td> <td>√</td> <td>√</td> <td>√</td> </tr> </tbody> </table>					Teaching/Learning Methodology	Intended subject learning outcomes			1	2	3	1. Lecture	√	√		2. Tutorial	√	√		3. Homework assignment	√	√		4. Case study report	√	√	√										
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	<ul style="list-style-type: none"> <li>• Self Study</li> </ul>	44 Hours
	<ul style="list-style-type: none"> <li>• Case Study</li> </ul>	22 Hours
	<b>Total student study effort:</b>	<b>105 Hours</b>
<b>Reading List and References</b>	<ol style="list-style-type: none"> <li>1. Helfrick A, Principles of Avionics, 7th Edition, Avionics Communications, 2012.</li> <li>2. Tooley M, and Wyatt, Aircraft Electrical and Electronic Systems: Principles, Maintenance and Operation, Elsevier Ltd, 2009.</li> <li>3. Collinson R.P.G., Introduction to Avionics Systems, Third Edition, Springer, Feb 2011.</li> <li>4. Kayton Myron Walter R. Fried Avionics Navigation Systems, Second Edition, John Wiley and Son, Published online 2007.</li> </ol>	
<b>Last Updated</b>	March 2015	
<b>Prepared by</b>	Dr Martin Chow	

**Subject Description Form**

<b>Subject Code</b>	EIE4113
<b>Subject Title</b>	Wireless and Mobile Systems
<b>Credit Value</b>	3
<b>Level</b>	4
<b>Pre-requisite</b>	For 42480: Network Technologies and Security (EIE3120)  For 42470: Data and Computer Communications (EIE3333)
<b>Exclusion</b>	Mobile Networking (EIE4104)
<b>Objectives</b>	This subject aims to provide students with an understanding of various security concerns in wireless networks (e.g., WiFi and mobile cellular networks) and mobile systems and applications (e.g., Android and iOS).
<b>Intended Subject Learning Outcomes</b>	<p><b>Upon completion of the subject, students will be able to:</b></p> <p><u>Category A: Professional/academic knowledge and skills</u></p> <ol style="list-style-type: none"> <li>1. Understand the security threats, concerns, and vulnerabilities in wireless and mobile systems, and the corresponding security mechanisms and authentication procedures</li> <li>2. Understand the strategies for developing secure mobile applications, and the use of mobile security penetration tools for evaluating the robustness of mobile applications</li> <li>3. Apply the knowledge to develop practical applications that are robust against mobile platform attack tools</li> </ol> <p><u>Category B: Attributes for all-roundedness</u></p> <ol style="list-style-type: none"> <li>4. Understand the creative process when designing solutions to a problem</li> </ol>
<b>Subject Synopsis/ Indicative Syllabus</b>	<p><b>Syllabus:</b></p> <ol style="list-style-type: none"> <li>1. <u>Introduction to Mobile and Wireless Networks</u> Mobile cellular networks (3G/4G LTE), IEEE wireless networks (IEEE 802.11, IEEE 802.15), mobile networks (NEMO, MANET).</li> <li>2. <u>Vulnerability of Wireless Networks</u> Threats and risks to telecommunication systems, vulnerabilities from wired to wireless communications, fundamental security mechanisms.</li> <li>3. <u>WiFi Security</u> Attacks on wireless networks, security in the IEEE 802.11 standard, security in 802.11i, authentication in wireless networks, layer 3 security mechanisms.</li> <li>4. <u>Security in Mobile Telecommunication Networks</u> Vulnerability of signaling systems, GSM and GPRS security, 3G security, network interconnection.</li> <li>5. <u>Mobile Systems and Development Strategies</u> Top issues facing mobile devices, tips for secure mobile application development, mobile HTML security, SMS security, mobile geolocation.</li> <li>6. <u>Android and iOS Security</u> Android IPC mechanisms, security model, permission review, security tools. iOS security testing, application format, permissions and user</li> </ol>

	controls. Mobile security penetration testing tools.																																																	
<b>Teaching/Learning Methodology</b>	<p>Lectures: The subject matters will be delivered through lectures. Students will be engaged in the lectures through Q&amp;A, discussions and specially designed classroom activities.</p> <p>Tutorials: During tutorials, students will work on/discuss some chosen topics in small group. This will help strengthen the knowledge taught in lectures.</p> <p>Laboratory and assignments: During laboratory exercises, students will perform hands-on tasks to practice what they have learned. They will evaluate the vulnerability of systems and design solutions to problems. The assignments will help students to review the knowledge taught in class.</p> <p>While lectures and tutorials will help to achieve the professional outcomes, the open-ended questions in laboratory exercises and assignments will provide the chance to students to exercise their creativity in problem solving.</p>																																																	
<b>Assessment Methods in Alignment with Intended Subject Learning Outcomes</b>	<table border="1"> <thead> <tr> <th rowspan="2">Specific Assessment Methods/Tasks</th> <th rowspan="2">% Weighting</th> <th colspan="4">Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)</th> </tr> <tr> <th>1</th> <th>2</th> <th>3</th> <th>4</th> </tr> </thead> <tbody> <tr> <td>1. Continuous Assessment</td> <td>(50%)</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>• Homework and assignments</td> <td>10%</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> </tr> <tr> <td>• Tests</td> <td>10%</td> <td>✓</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>• Laboratory exercises</td> <td>30%</td> <td></td> <td></td> <td>✓</td> <td>✓</td> </tr> <tr> <td>2. Examination</td> <td>50%</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> </tr> </tbody> </table>				Specific Assessment Methods/Tasks	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)				1	2	3	4	1. Continuous Assessment	(50%)					• Homework and assignments	10%	✓	✓	✓	✓	• Tests	10%	✓	✓			• Laboratory exercises	30%			✓	✓	2. Examination	50%	✓	✓		✓	Total:	100%				
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<b>Student Study Effort Expected</b>	<b>Class contact (time-tabled):</b>																																																	
	• Lecture		24 Hours																																															
	• Tutorial/Laboratory/Practice Classes		15 Hours																																															
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	• Lecture: preview/review of notes; homework/assignment; preparation for test/quizzes/examination		36 Hours																																															
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<b>Reading List and References</b>	<p><b>Reference Books:</b></p> <ol style="list-style-type: none"> <li>1. H Chaouchi, M Laurent-Maknavicius, <i>Wireless and Mobile Network Security</i>, Wiley, 2009.</li> <li>2. P. Venkataram, B. Sathish Babu, <i>Wireless and Mobile Network Security</i>, Tata McGraw-Hill, 2010.</li> <li>3. H. Dwivedi, C. Clark, D. Thiel, <i>Mobile Application Security</i>, McGraw-Hill, 2010.</li> </ol>																																																	
<b>Last Updated</b>	November 2014																																																	
<b>Prepared by</b>	Dr Ivan Ho																																																	

**Subject Description Form**

<b>Subject Code</b>	EIE4114
<b>Subject Title</b>	Digital Forensics for Crime Investigation
<b>Credit Value</b>	3
<b>Level</b>	4
<b>Pre-requisite/ Co-requisite/ Exclusion</b>	Nil
<b>Objectives</b>	<ol style="list-style-type: none"> <li>1. To provide students with basic concepts about digital forensic techniques for crime investigation</li> <li>2. To appreciate how different forensic techniques are used for information security</li> </ol>
<b>Intended Subject Learning Outcomes</b>	<p><b>Upon completion of the subject, students will be able to:</b></p> <p><u>Category A: Professional/academic knowledge and skills</u></p> <ol style="list-style-type: none"> <li>1. Understand different approaches for digital forensics</li> <li>2. Use different techniques for forensic investigation</li> </ol> <p><u>Category B: Attributes for all-roundedness</u></p> <ol style="list-style-type: none"> <li>3. Present ideas and findings effectively</li> </ol>
<b>Subject Synopsis/ Indicative Syllabus</b>	<p><b>Syllabus:</b></p> <ol style="list-style-type: none"> <li>1. <u>Digital and Computational Forensics Context</u> Introduction to digital and computational forensics; Historical aspects in digital and computational forensics; Introduction to techniques for multimedia manipulation; different classes of techniques for forensics: basic idea, framework and applications.</li> <li>2. <u>Forensics based on Intrinsic Data</u> Models of digital data capturing device; idea of the use of intrinsic data in digital forensic investigation; introduction to forensics techniques using intrinsic data; applications in source device identification, device linking and integrity verification.</li> <li>3. <u>Forensics based on Extrinsic Data</u> Introduction to techniques for multimedia content protection and authentication; different classes of watermarking techniques; performance measure; attacks modelling; copyright protection applications (e.g., ownership identification and transaction tracking).</li> <li>4. <u>Digital Evidence</u> Models of digital evidence; event analytics: surveillance, monitoring, forensic and security; data evaluation from various domains (e.g., mobile phone, SMS messages and social media) for user behaviour and forensic analysis.</li> <li>5. <u>Robustness of Forensic Techniques</u> Robustness and security of forensic techniques; adversary model; case studies of reliabilities of forensic techniques.</li> </ol> <p><b>Laboratory Experiments:</b></p> <p>Practical Works:</p> <ol style="list-style-type: none"> <li>1. Evaluation of forensic techniques based on intrinsic data.</li> <li>2. Evaluation of forensic techniques based on extrinsic data.</li> </ol>

		3. Forensic analysis of digital evidence.			
<b>Teaching/Learning Methodology</b>	<b>Teaching and Learning Method</b>	<b>Intended Subject Learning Outcome</b>	<b>Remarks</b>		
	Lectures	1, 2	Fundamental principles and key concepts of the subject are delivered to students.		
	Tutorials	1, 2	Supplementary to lectures; Students will be able to clarify concepts and to have a deeper understanding of the lecture material; Problems and application examples are given and discussed.		
	Laboratory sessions	2, 3	Students will evaluate different kinds of forensic techniques.		
	Mini-project	1, 2, 3	Students are required to study a problem in forensic application. Students will need to submit a written report and make a presentation.		
<b>Assessment Methods in Alignment with Intended Subject Learning Outcomes</b>	<b>Specific Assessment Methods/Tasks</b>	<b>% Weighting</b>	<b>Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)</b>		
			<b>1</b>	<b>2</b>	<b>3</b>
	1. Continuous Assessment (total 50%)				
	• Tests	20%	√	√	
	• Short quizzes	10%	√	√	
	• Laboratory sessions	5%		√	√
	• Mini-project	15%		√	√
	2. Examination	50%	√	√	
	Total	100%			
	The continuous assessment consists of tests, short quizzes, laboratory exercises and a mini-project.				
<b>Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:</b>					
<b>Specific Assessment Methods/Tasks</b>	<b>Remark</b>				
Short quizzes	These can measure students' understanding of the theories and concepts as well as their comprehension of subject materials.				
Tests and examination	end-of chapter type problems used to evaluate students' ability in applying concepts and skills learnt in the classroom;				



		students need to think critically in order to come with a solution for a problem.
	Laboratory sessions, mini-project	oral examination will be conducted to evaluate student's technical knowledge and communication skills.
<b>Student Study Effort Expected</b>	<b>Class contact (time-tabled):</b>	
	• Lecture	24 Hours
	• Tutorial/Laboratory/Practice Classes	15 Hours
	<b>Other student study effort:</b>	
	• Lecture: preview/review of notes; homework/assignment; preparation for test/quizzes/examination	36 Hours
	• Tutorial/Laboratory/Practice Classes: preview of materials, revision and/or reports writing	30 Hours
	<b>Total student study effort:</b>	
<b>Reading List and References</b>	<p><b>Textbooks:</b></p> <ol style="list-style-type: none"> <li>Li Chang-Tsun, <i>“Emerging Digital Forensics Applications for Crime Protection, Prevention and Security”</i>, IGI Global 2013, doi:10.4018/978-1-4666-4006-1, 2013.</li> <li>Li Chang-Tsun and Anthony T.S. Ho, <i>“Crime Prevention Technologies and Applications for Advancing Criminal Investigation”</i>, IGI Global 2012, doi:10.4018/978-1-4666-1758-2, 2012.</li> </ol> <p><b>Reference Books:</b></p> <ol style="list-style-type: none"> <li>Larry Daniel and Lars Daniel, <i>“Digital Forensics for Legal Professionals”</i>, Syngress, 2011.</li> <li>Azah Kamilah Muda, Yun-Huoy Choo, Ajith Abraham and Sargur N. Srihari (editors), <i>“Computational Intelligence in Digital Forensics: Forensic Investigation and Applications”</i>, Springer, 2014.</li> <li>Husrev Taha Sencar and Nasir Memon (editors), <i>“Digital Image Forensics”</i>, Springer, 2013.</li> <li>John R. Vacca, <i>“Managing Information Security”</i>, Waltham, Mass., Syngress, 2014.</li> <li>Frank Y. Shih, <i>“Multimedia Security Watermarking, Steganography and Forensics”</i>, CRC Press, 2013.</li> </ol>	
<b>Last Updated</b>	November 2014	
<b>Prepared by</b>	Dr Bonnie Law	

**Subject Description Form**

<b>Subject Code</b>	EIE4115
<b>Subject Title</b>	Intrusion Detection and Prevention
<b>Credit Value</b>	3
<b>Level</b>	4
<b>Pre-requisite</b>	For 42480: Network Technologies and Security (EIE3120)  For 42470: Network Management and Security (EIE4106)
<b>Co-requisite/ Exclusion</b>	Nil
<b>Objectives</b>	<ol style="list-style-type: none"> <li>1. To provide a solid foundation to the students in network security and intrusion detection and prevention</li> <li>2. To enable the students to master the knowledge about intrusion detection and prevention in the context of real-life applications</li> <li>3. To prepare the students for understanding, evaluating critically, and assimilating new knowledge and emerging technology in network security</li> </ol>
<b>Intended Subject Learning Outcomes</b>	<p><b>Upon completion of the subject, students will be able to:</b></p> <p><u>Category A: Professional/academic knowledge and skills</u></p> <ol style="list-style-type: none"> <li>1. Understand the physical location, the operational characteristics and the various functions performed by the intrusion detection/prevention system</li> <li>2. Describe how components in different layers inter-operate in the intrusion detection/prevention system</li> <li>3. Understand the current and effective procedures to deal with network security threats</li> <li>4. Learn new techniques and to align new security technologies to existing network infrastructure</li> </ol> <p><u>Category B: Attributes for all-roundedness</u></p> <ol style="list-style-type: none"> <li>5. Present ideas and findings effectively</li> <li>6. Learn independently</li> </ol>
<b>Subject Synopsis/ Indicative Syllabus</b>	<p><b>Syllabus:</b></p> <ol style="list-style-type: none"> <li>1. <u>Vulnerabilities and Security Threats to Computer Networks</u> Sources of vulnerabilities, types of attacks, attacks against various security objectives, countermeasures of attacks.</li> <li>2. <u>Intrusion Detection and Prevention Technologies</u> Host-based intrusion detection system (IDS) / intrusion prevention system (IPS), network-based IDS/IPS. Data collection for IDS/IPS. Intrusion detection techniques, misuse detection: pattern matching, rule-based and state-based; anomaly detection: statistical based, machine learning based, data mining based; hybrid detection.</li> <li>3. <u>IDS and IPS Architecture</u> Tiered architectures, single-tiered, multi-tiered, peer-to-peer. Sensor: sensor functions, sensor deployment and security. Agents: agent functions, agent deployment and security. Manager component: manager functions, manager deployment and security. Information flow in IDS and IPS, defending IDS/IPS.</li> </ol>

	<p>4. <u>Alert Management and Correlation</u> Data fusion. Alert correlation, pre-process, correlation techniques, post-process, alert correlation architectures. Cooperative intrusion detection, cooperative discovery of intrusion chain, abstraction-based intrusion detection, interest-based communication and cooperation, agent-based cooperation.</p> <p>5. <u>Deployment of IDS/IPS</u> Case study on CISCO IDS and Snort.</p> <p><b>Possible Laboratory Experiments:</b></p> <ol style="list-style-type: none"> <li>1. Network monitoring</li> <li>2. Protocol and traffic analysis Intrusion detection using Snort</li> </ol>																																																														
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<b>Student Study Effort Expected</b>	<b>Class contact (time-tabled):</b>									
	1. Lecture	24 Hours								
	2. Tutorial/Laboratory/Practice Classes	15 Hours								
	<b>Other student study effort:</b>									
	3. Lecture: preview/review of notes; homework/assignment; preparation for test/quizzes/examination	36 Hours								
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<b>Last Updated</b>	December 2016									
<b>Prepared by</b>	Dr H. Hu									

**Subject Description Form**

<b>Subject Code</b>	EIE4116
<b>Subject Title</b>	Surveillance Studies and Technologies
<b>Credit Value</b>	3
<b>Level</b>	4
<b>Pre-requisite/ Co-requisite/ Exclusion</b>	Nil
<b>Objectives</b>	This course aims at providing students with thorough understanding of recent surveillance technologies and their emerging trends. They will also learn the pros and cons of various surveillance technologies.
<b>Intended Subject Learning Outcomes</b>	<p><b>Upon completion of the subject, students will be able to:</b></p> <p><u>Category A: Professional/academic knowledge and skills</u></p> <ol style="list-style-type: none"> <li>1. Introduce a brief history to provide context for the evolution of today's surveillance technologies</li> <li>2. Understand the different surveillance technologies</li> <li>3. Understand the system design principle of CCTV and other related video security and surveillance technologies</li> </ol> <p><u>Category B: Attributes for all-roundedness</u></p> <ol style="list-style-type: none"> <li>4. Understand professional, ethical, legal, security and social issues and responsibilities</li> </ol>
<b>Subject Synopsis/ Indicative Syllabus</b>	<p><b>Syllabus:</b></p> <ol style="list-style-type: none"> <li>1. <u>Overview of Surveillance Studies</u> Brief history, key developments leading to current surveillance technologies; public controversy and accountability.</li> <li>2. <u>Surveillance Technologies and Techniques</u> Visual surveillance; audio surveillance; aerial surveillance; radio-wave surveillance; GPS surveillance; sensors; computer, Internet and social media surveillance; data cards; biochemical surveillance; animal surveillance; Biometrics; pros and cons of surveillance technologies.</li> <li>3. <u>Case Study: Video and CCTV Surveillance</u> Video's critical role in the security plan; the evolution of video and CCTV surveillance systems, network videos; cameras – analog, digital and network, cameras technologies; analog and digital video; video compression technologies; video processing equipments; video recorders, servers and storage; video management; video motion detectors; video analytics.</li> <li>4. <u>Privacy and Legislation</u> Ubiquity of surveillance devices; balance between the needs of law enforcement of the privacy of law-abiding citizens.</li> </ol> <p><b>Laboratory Experiments:</b></p> <ol style="list-style-type: none"> <li>1. Analysis of video compression in surveillance systems</li> <li>2. Critical scene detection in surveillance systems</li> <li>3. Video signal analysis.</li> </ol>

<b>Teaching/Learning Methodology</b>	<b>Teaching and Learning Method</b>	<b>Intended Subject Learning Outcome</b>	<b>Remarks</b>			
	Lectures	1, 2, 3, 4	fundamental principles and key concepts of the subject are delivered to students			
	Tutorials	1, 2, 3, 4	supplementary to lectures and are conducted with smaller class size; students will be able to clarify concepts and to have a deeper understanding of the lecture material; problems and application examples are given and discussed			
	Laboratory sessions	3	students will make use of the software to develop surveillance applications.			
<b>Assessment Methods in Alignment with Intended Subject Learning Outcomes</b>	<b>Specific Assessment Methods/Tasks</b>	<b>% Weighting</b>	<b>Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)</b>			
			<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
	1. Continuous Assessment (total 40%)					
	• Short quizzes/ Assignments	10%	✓	✓	✓	✓
	• Tests	20%	✓	✓	✓	✓
	• Laboratory sessions	10%			✓	
	2. Examination	60%	✓	✓	✓	✓
	Total	100%				
The continuous assessment will consist of laboratory reports, a number of short quizzes, assignments, and tests.						

	<p><b>Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:</b></p> <table border="1" data-bbox="483 228 1406 972"> <thead> <tr> <th data-bbox="483 228 764 342">Specific Assessment Methods/Tasks</th> <th data-bbox="764 228 1406 342">Remark</th> </tr> </thead> <tbody> <tr> <td data-bbox="483 342 764 512">Short quizzes</td> <td data-bbox="764 342 1406 512">mainly objective tests (e.g., multiple-choice questions, true-false, and matching items) conducted to measure the students' ability to remember facts and figures as well as their comprehension of subject materials</td> </tr> <tr> <td data-bbox="483 512 764 712">Assignments, tests and examination</td> <td data-bbox="764 512 1406 712">end-of chapter type problems used to evaluate students' ability in applying concepts and skills learnt in the classroom; students need to think critically and creatively in order to come with an alternate solution for an existing problem</td> </tr> <tr> <td data-bbox="483 712 764 972">Laboratory sessions</td> <td data-bbox="764 712 1406 972">Each students is required to produce a written report; accuracy and the presentation of the report will be assessed; oral examination based on the laboratory exercises will be conducted for each student to evaluate his/her technical knowledge and communication skills</td> </tr> </tbody> </table>		Specific Assessment Methods/Tasks	Remark	Short quizzes	mainly objective tests (e.g., multiple-choice questions, true-false, and matching items) conducted to measure the students' ability to remember facts and figures as well as their comprehension of subject materials	Assignments, tests and examination	end-of chapter type problems used to evaluate students' ability in applying concepts and skills learnt in the classroom; students need to think critically and creatively in order to come with an alternate solution for an existing problem	Laboratory sessions	Each students is required to produce a written report; accuracy and the presentation of the report will be assessed; oral examination based on the laboratory exercises will be conducted for each student to evaluate his/her technical knowledge and communication skills				
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Assignments, tests and examination	end-of chapter type problems used to evaluate students' ability in applying concepts and skills learnt in the classroom; students need to think critically and creatively in order to come with an alternate solution for an existing problem													
Laboratory sessions	Each students is required to produce a written report; accuracy and the presentation of the report will be assessed; oral examination based on the laboratory exercises will be conducted for each student to evaluate his/her technical knowledge and communication skills													
<b>Student Study Effort Expected</b>	<p><b>Class contact (time-tabled):</b></p> <table border="1" data-bbox="469 1055 1428 1469"> <tbody> <tr> <td data-bbox="469 1055 1161 1111">• Lecture</td> <td data-bbox="1161 1055 1428 1111">24 Hours</td> </tr> <tr> <td data-bbox="469 1111 1161 1167">• Tutorial/Laboratory/Practice Classes</td> <td data-bbox="1161 1111 1428 1167">15 Hours</td> </tr> <tr> <td colspan="2" data-bbox="469 1167 1428 1223"><b>Other student study effort:</b></td> </tr> <tr> <td data-bbox="469 1223 1161 1335">• Lecture: preview/review of notes; homework/assignment; preparation for test/quizzes/examination</td> <td data-bbox="1161 1223 1428 1335">36 Hours</td> </tr> <tr> <td data-bbox="469 1335 1161 1413">• Tutorial/Laboratory/Practice Classes: preview of materials, revision and/or reports writing</td> <td data-bbox="1161 1335 1428 1413">30 Hours</td> </tr> <tr> <td data-bbox="469 1413 1161 1469"><b>Total student study effort:</b></td> <td data-bbox="1161 1413 1428 1469"><b>105 Hours</b></td> </tr> </tbody> </table>		• Lecture	24 Hours	• Tutorial/Laboratory/Practice Classes	15 Hours	<b>Other student study effort:</b>		• Lecture: preview/review of notes; homework/assignment; preparation for test/quizzes/examination	36 Hours	• Tutorial/Laboratory/Practice Classes: preview of materials, revision and/or reports writing	30 Hours	<b>Total student study effort:</b>	<b>105 Hours</b>
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<b>Reading List and References</b>	<p><b>Reference Books:</b></p> <ol style="list-style-type: none"> <li>1. J.K. Petersen, <i>Introduction to Surveillance Studies</i>, CRC Press, 2013.</li> <li>2. Vlado Damjanovski, <i>CCTV: Networking and Digital Technology</i>, Elsevier, 2005.</li> <li>3. Herman Kruegle, <i>CCTV Surveillance: Analog and Digital Video Practices and Technology</i>, Elsevier Butterworth-Heinemann, 2007.</li> <li>4. Fredrik Nilsson and Axis Communications, <i>Intelligent Network Video: Understanding Modern Video Surveillance Systems</i>, CRC Press, 2009.</li> <li>5. Daniel Neyland, <i>Privacy, Surveillance and Public Trust</i>, Palgrave Macmillan, 2006.</li> <li>6. Fredrika Bjorklund and Ola Svenonius, <i>Video Surveillance and Social Control in a Comparative Perspective</i>, Routledge, 2013.</li> </ol>													
<b>Last Updated</b>	November 2014													
<b>Prepared by</b>	Dr YL Chan													