

### Subject Description Form

<b>Subject Code</b>	EIE4106
<b>Subject Title</b>	Network Management and Security
<b>Credit Value</b>	3
<b>Level</b>	4
<b>Pre-requisite</b>	EIE3333 Data and Computer Communication
<b>Co-requisite/ Exclusion</b>	Nil
<b>Objectives</b>	This course aims at training students to master the basic principles, knowledge, and skills about network management and network security. They will learn how to apply these principles in various scenarios by using appropriate hardware and software tools to design solutions for network management and security problems, and to evaluating performance.
<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. Describe some common features about network security systems and network management systems</li> <li>2. Perform basic network security tasks with appropriate tools and techniques</li> <li>3. Describe some network security services and functions</li> <li>4. Analyze and evaluate some common security features of computer networks</li> <li>5. Design simple network management and security systems</li> </ol> <p><u>Category B: Attributes for all-roundedness</u></p> <ol style="list-style-type: none"> <li>6. Work in a team and collaborate effectively with others</li> <li>7. Understand the creative process when designing a solution to a problem</li> </ol>
<b>Subject Synopsis/ Indicative Syllabus</b>	<ol style="list-style-type: none"> <li>1. <u>Network Management</u> <ol style="list-style-type: none"> <li>1.1 Functional areas in network management</li> <li>1.2 Network management station, agent, management information base (MIB)</li> <li>1.3 The architecture of Simple Network Management Protocol (SNMP)</li> <li>1.4 Network Management processing procedures and additional capabilities</li> <li>1.5 Management Information Base (MIB) concepts and usages</li> </ol> </li> <li>2. <u>Network Security</u> <ol style="list-style-type: none"> <li>2.1. OSI Security services and security mechanisms</li> <li>2.2. Basic cryptography, authentication protocols, digital signature and public key infrastructure</li> <li>2.3. Firewall and virtual private network (VPN) and application layer security</li> <li>2.4. Concepts of web threat models and web application security</li> </ol> </li> </ol>
<b>Teaching/Learning Methodology</b>	<p><b>Lectures:</b></p> <p>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><b>Tutorials:</b></p> <p>During tutorials, students will work on/discuss some chosen topics in small group. This will help strengthen the knowledge taught in lectures.</p>

	<p><b>Laboratory:</b></p> <p>During laboratory exercises, students will perform hands-on tasks to practice what they have learned. They will evaluate performance of systems and design solutions to problems.</p>																																																																													
<p><b>Assessment Methods in Alignment with Intended Subject Learning Outcomes</b></p>	<table border="1" data-bbox="475 304 1398 898"> <thead> <tr> <th rowspan="2">Specific Assessment Methods/Tasks</th> <th rowspan="2">% Weighting</th> <th colspan="7">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> <th>5</th> <th>6</th> <th>7</th> </tr> </thead> <tbody> <tr> <td>1. Continuous Assessment (total: 50%)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>• Tutorial/in-class exercises</td> <td>10%</td> <td>✓</td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td>✓</td> </tr> <tr> <td>• Tests</td> <td>20%</td> <td>✓</td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td></td> </tr> <tr> <td>• Laboratory exercises</td> <td>20%</td> <td>✓</td> <td>✓</td> <td>✓</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> <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> <td></td> </tr> </tbody> </table> <p><b>Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:</b></p> <p>Tutorials: students will work on/discuss some chosen topics in small group. This will help strengthen the knowledge taught in lectures.</p> <p>Laboratory exercises: students will be assessed about their performance on hands-on tasks such as setting up a VPN, capturing and analyzing packets, perform tasks to design and implement network management and security features. During laboratory exercises, they must identify and solve the network security problems by applying knowledge learnt and using appropriate tools and techniques in the project demonstration.</p> <p>Tests: students will need to solve network management and security problems within a specific time and without access to other materials. This is a good way to assess students' mastery of knowledge and understanding.</p>								Specific Assessment Methods/Tasks	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)							1	2	3	4	5	6	7	1. Continuous Assessment (total: 50%)									• Tutorial/in-class exercises	10%	✓			✓			✓	• Tests	20%	✓		✓	✓				• Laboratory exercises	20%	✓	✓	✓	✓	✓	✓	✓	2. Examination	50%	✓		✓	✓			✓	Total	100%							
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Total	100%																																																																													
<p><b>Student Study Effort Expected</b></p>	<p><b>Class contact (time-tabled):</b></p>																																																																													
	<ul style="list-style-type: none"> <li>Lecture</li> </ul>							18 Hours																																																																						
	<ul style="list-style-type: none"> <li>Tutorial/Laboratory/Practice Classes</li> </ul>							21 Hours																																																																						
	<p><b>Other student study effort:</b></p>																																																																													
	<ul style="list-style-type: none"> <li>Lecture: preview/review of notes; homework/assignment; preparation for test/quizzes/examination</li> </ul>							36 Hours																																																																						
	<ul style="list-style-type: none"> <li>Tutorial/Laboratory/Practice Classes: preview of materials, revision and/or reports writing</li> </ul>							30 Hours																																																																						
	<p><b>Total student study effort:</b></p>							<b>105 Hours</b>																																																																						
<p><b>Reading List and References</b></p>	<p><b>Reference Books:</b></p> <p><b>A set of comprehensive lecture notes will be provided to students for the study of this subject. Students may refer to the following suggested reading</b></p>																																																																													

	<p><b>lists for more in-depth and extensive discussion of topics covered and end-of chapter problem sets (when applicable):</b></p> <ol style="list-style-type: none"> <li>1. Stewart, J., &amp; Kinsey, D., <i>Network security, firewalls, and VPNs (Third ed., Jones &amp; Bartlett Learning information systems security &amp; assurance series)</i>. Burlington, MA: Jones and Bartlett Learning, ISBN: 9781284183696, c2021.</li> <li>2. Fiedelholz, <i>The Cyber Security Network Guide (Vol. 274, Studies in Systems, Decision and Control)</i>. Cham: Springer International Publishing AG, (online access from PolyU Library), ISBN: 3030615901, ISBN: 9783030615901, c2020.</li> <li>3. Stallings, W., <i>Cryptography and network security: Principles and Practice (Seventh ed.)</i>. Hoboken, New Jersey: Pearson, c2017. ISBN: 0134444280.</li> <li>4. Ian Neil, <i>CompTIA security+ certification guide: master IT security essentials and exam topics for CompTIA security+ SY0-501 certification</i>, Birmingham: Packt Publishing 2018, (eBook, online access)</li> <li>5. Robin M. Abernathy, Troy McMillan, <i>Certified information systems security professional Cert guide</i>, Indianapolis, Indiana: Pearson Education 2016 Second edition.</li> <li>6. Subramanian, Mani, <i>Network management: principles and practice</i>, Pearson, 2<sup>nd</sup> ed., 2011 (PolyU Library Acc. No.: TK5105.5 .S92 2011).</li> </ol> <p><b>General References and standards:</b></p> <ol style="list-style-type: none"> <li>1. Ding, Jianguo, <i>Advances in network management</i>, Books24x7, CRC Press : Auerbach Publications, 2010 (eBook, online access).</li> <li>2. Clemm, Alexander, <i>Network Management Fundamentals</i>, Indianapolis, Ind.: Cisco Press, 2007 (PolyU Library Call Number: TK5105.5 .C576 2007)</li> <li>3. James Henry Carmouche, <i>IPsec virtual private network fundamentals</i>, Indianapolis, Ind.: Cisco Press, 2007 (PolyU Library Call Number: TK5105.567 .C37 2007).</li> </ol> <p><b>Classics Paper</b></p> <p>Shannon, Claude Elwood, <i>Claude Elwood Shannon: collected papers</i>, Institute of Electrical and Electronics Engineers, c1993 (PolyU Library Call Number: TK5101 .S448 1993).</p>
<b>Last Updated</b>	July 2023
<b>Prepared by</b>	Dr Ye Qingqing