Subject Description Form

Subject Code	EIE342 (for 42077)
Subject Title	Computer Networks
Credit Value	3
Level	3
Pre-requisite	Telecommunication Technologies (EIE325)
Co-requisite	Nil
Exclusion	Data and Computer Communications (EIE442)
Objectives	1. To provide a solid foundation to the students about architectural concepts of data communications and computer networking 2. To enable the students to master the knowledge about data communications and computer networking in the context of real-life applications 3. To prepare the students for understanding, evaluating critically, and assimilating new knowledge and emerging technology about computer networks 4. To enable the students to understand
Intended Subject Learning Outcomes	**Upon completion of the subject, students will be able to:** Category A: Professional/academic knowledge and skills 1. Describe the services, functions, and inter-relationship of different components with an architectural model such as Open System Interconnection (OSI) seven layer model and TCP/IP model. 2. Describe how components and subsystems in the physical layer, data link layer, and network layer inter-operate and analyze their performance. 3. Evaluate critically the performance of some common computer networks. 4. Design solutions to solve engineering problems that require the applications of computer network technology. 5. Appreciate the principles and operations of various network applications. 6. Take up new knowledge by reading related magazines, journal papers, and trade brochures, and by analyzing new situations while taking into account various constraints. 7. Describe how rapid progress of computer and network technology can impact on the society in various aspects, such as culture and economics. Category B: Attributes for all-roundedness 8. Present ideas and findings effectively. 9. Think critically. 10. Learn independently.
Contribution of the Subject to the Attainment of the Programme Outcomes	**Programme Outcomes:** Category A: Professional/academic knowledge and skills • Programme Outcome 1, 2, 5: This subject contributes to the programme outcome through the teaching of the theories and concepts of computer networks and through providing with an opportunity to apply their knowledge. • Programme Outcome 3, 6: This subject contributes to the programme outcome by providing students with laboratory exercises to understanding of networking and internetworking concepts. • Programme Outcome 4: This subject contributes to the programme

<table>
<tr><td></td><td>outcome by providing the opportunity for students to solve practical engineering problems pertaining to the fields of computer networks.

Category B: Attributes for all-roundedness
• Programme Outcome 9: This subject contributes to the programme outcome by providing students with an opportunity to practice communicating effectively.
• Programme Outcome 10: This subject contributes to the programme outcome by providing students with an opportunity to think critically about the most suitable network analysis and debugging techniques for analyzing computer networks.</td></tr>
<tr><td>Subject Synopsis/ Indicative Syllabus</td><td>Syllabus:

1. Computer Networks, Services, and Layered Architectures
Evolution of networking and switching technology. Protocol and services. Layered network architectures: OSI 7-layer model, TCP/IP architecture, digital transmission local area networks.

2. Protocols in Data Link Layer
Automatic Repeat Request (ARQ) protocol and reliable data transfer service. Sliding-window flow control. Framing and point-to-point protocol, flow control and error controls.

3. Packet Switching Technology
Connectionless (datagram) packet switching and virtual-circuit switching. Routing in packet networks.

4. TCP/IP Protocols
IP packet format, addressing, subnetting, and IP routing. TCP protocol: connection management and congestion control. Dynamic Host Configuration, Network Address Translation.

5. Network Applications
Sockets, client-server model, Domain Name Systems (DNS), the File Transfer Protocol (FTP), Simple Mail Transfer Protocol (SMTP), Hypertext Transfer Protocol (HTTP).

6. Case Studies (conducted in tutorial sessions)
Recent development in data communications and computer networking; Selected topics: Voice over IP, Virtual Private Network, Internet 2, high speed router design, network security, etc.

Laboratory Experiments:

1. Cisco router configuration and programming
2. Static routing and dynamic routing
3. Protocol analysis
4. Network Address Translation
5. Routing simulation study
6. Terminal server over the Ethernet</td></tr>
<tr><td>Teaching/ Learning Methodology</td><td>
<table>
<tr><th>Teaching and Learning Method</th><th>Intended Subject Learning Outcome</th><th>Remarks</th></tr>
<tr><td>Lectures</td><td>1, 2, 3, 4, 5, 9</td><td>Fundamental principles and key concepts of the subject are delivered to students.</td></tr>
<tr><td>Tutorials</td><td>1, 2, 3, 4, 5, 6, 7, 9, 10</td><td>Supplementary to lectures and are conducted with smaller class size;</td></tr>
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		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	8, 9, 10	Students will set up a mini-internet and conduct practical exercises to reinforce concepts and techniques learned.

Alignment of Assessment and Intended Subject Learning Outcomes

Specific Assessment Methods/ Task	**% Weighting**	**Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)**									
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1. Continuous Assessment	40%										
• Short quizzes		✓	✓	✓		✓					
• Assignments					✓		✓	✓	✓	✓	✓
• Tests					✓		✓	✓	✓	✓	✓
• Laboratory sessions									✓		✓
2. Examination	60%				✓		✓	✓	✓	✓	✓
Total	100%										

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

Specific Assessment Methods/Tasks	**Remark**
Short quizzes	Mainly objective tests conducted to measure the students' understanding of the theories and concepts 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; Assignments of reading report type to assess students' ability in acquiring new knowledge related to computer networks; Students need to think critically and creatively in order to come with an alternate solution for an existing problem.
Laboratory sessions	Each group of 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 group member to evaluate his technical knowledge and communication skills.

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<tr><td rowspan="6">Student Study Effort Expected</td><td colspan="2">Class contact (time-tabled):</td></tr>
<tr><td>• Lecture</td><td>24 Hours</td></tr>
<tr><td>• Tutorial/Laboratory/Practice Classes</td><td>18 hours</td></tr>
<tr><td colspan="2">Other student study effort:</td></tr>
<tr><td>• Lecture: preview/review of notes; homework/assignment; preparation for test/quizzes/examination</td><td>36 Hours</td></tr>
<tr><td>• Tutorial/Laboratory/Practice Classes: preview of materials, revision and/or reports writing</td><td>27 Hours</td></tr>
<tr><td colspan="2">Total student study effort:</td><td>105 Hours</td></tr>
<tr><td>Reading List and References</td><td colspan="2">Textbook:

1. Alberto Leon-Garcia and Indra Widjaja, Communication Networks: Fundamentals Concepts and Key Architectures, McGraw-Hill, 2004.

Reference Books:

1. Douglas Comer, Computer Networks and Internets: with Internet Applications, 4th ed., Pearson/Prentice-Hall, 2004.
2. William Stallings, Data and Computer Communications, 7th ed., Pearson/Prentice-Hall, 2004.
3. Andrew S. Tanenbaum, Computer Networks, 4th ed., Prentice-Hall, 2003.
4. Mimitri P. Bertsekas, Data Networks, 2nd ed., Prentice-Hall, 1992 (This reference is selected as a classic).</td></tr>
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