

## Syllabus – DATA COMMUNICATION

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|--|--|------------------------------|---|
| <b>Kode Mata Kuliah</b> ( <i>Course Code</i> ):<br><b>TIF207</b>     | <b>Nama Mata Kuliah</b> ( <i>Course Name</i> ):<br><b>Data Communication</b>   |                              |   |
| <b>Program Studi</b> ( <i>Study Program</i> ):<br><b>Informatics</b> | <b>Fakultas</b> ( <i>Faculty</i> ):<br><b>Engineering and Computer Science</b> |                              |   |
| <b>Mata Kuliah Pra-Syarat</b> ( <i>Course Pre-requisite</i> ):<br>–  | <b>Kredit</b> ( <i>Credit</i> ): <b>3</b>                                      |                              |   |
|  | <b>Kuliah</b><br>( <i>Lecture</i> ):<br><b>3</b>                               | <b>Tutorial:</b><br><b>0</b> | <b>Praktikum</b><br>( <i>Practicum</i> ):<br><b>0</b> |
| <b>Revisi</b> ( <i>Revision Status</i> ):<br><b>2.0</b>              | <b>Semester:</b> Ganjil/Odd<br><b>Tahun Akademik:</b> 2015/2016                |                              |   |
| <b>Lecturer's Name:</b><br>Irwan Prasetya Gunawan                    |  |                              |   |

### COURSE DESCRIPTION

This course presents a comprehensive overview of data communications. It is based on the bottom-up approach to data communications. The course emphasizes data communications concepts as outlined by the 7 layer Open System Interconnection (OSI). This course introduces the architecture, structure, functions, components, and models of data communication network including computer network, Internet, and mobile. The principles and structure of IP addressing and the fundamentals of Ethernet concepts, media, and operations are introduced to provide a foundation for the curriculum.

### COURSE OBJECTIVES

Upon completion of this course, the student should be able to:

- Understand the fundamentals of data communications.
- Evaluate and apply formulae to practical communication problems concerning bandwidth, noise and symbols.
- Understand the different media available to support data communications.
- Understand the role of the various protocols in facilitating the transfer of data across a communication network.
- Appreciate the role of the ISO seven layer model which attempts to standardise communication.

### METHODS OF INSTRUCTIONS

The course is delivered as a class-based course. Classroom instruction consists of lectures and practical problem solving, supplemented by visual aids designed to assist the student to successfully meet the courses learning objectives.

It is imperative that students take an active interest in the course. To succeed in this course, students must read, think, and write in a critical and analytical manner and this takes time and practice. Such practice can only be achieved by working theoretical and practical exercises. When troubles arise, and they will, the student must ask questions which may be directed to the instructor or other students in a variety of ways.

Students are also encouraged to work together on problem sets as part of their exercises. However, individual must ultimately demonstrate the understanding of the material by writing up his/her own solutions without the help of other students or their written work.

On average students need to spend, at least, 6 hours of study and preparation per week for this course.

### ATTENDANCE REQUIREMENT

Comply with academic rules. Punctuality and regular attendance in classes is of prime importance for successful completion of this course. Students will be expected to arrive for class on time and to remain in class until the end of the class session.

Absence from lectures shall not exceed 22%. Students who exceed the 22% limit without a medical or emergency excuse acceptable to and approved by the Dean of the Faculty shall not be allowed to take the final examination and shall receive a mark of zero for the course.

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### ASSESSMENT

Coursework evaluation will be weighted as follows:

- Mid Semester Test: 30%
- Final Semester Test: 40%
- Others (class participation, Assignments/quiz/pretest): 20%

### MATERIAL REFERENCES AND REQUIRED SUPPLIES

Prescribed Textbooks:

- [1] Behrouz Forouzan, Data Communications and Networking, Fourth Edition, McGraw Hill International, 2007

Additional sources:

- [2] Andrew S. Tanenbaum, Computer Networks, Third Edition, Prentice Hall International, 1996.
- [3] William Stallings, Data and Computer Communications, Fifth Edition, Prentice Hall International, 1997.
- [4] Douglas E. Comer, Internetworking with TCP/IP Volume I: Principles, Protocols, and Architecture, Third Edition, Prentice Hall International, 1995 [Comer, 1995].
- [5] Douglas E. Comer and David L. Stevens, Internetworking with TCP/IP Volume II: Design, Implementation, and Internals, Second Edition, Prentice Hall International, 1996 [Comer and Stevens, 1996].

### COURSE OUTLINE

Note: all materials are delivered by means of in-class lectures and class room discussions.

| Session | Topics & Sub-Topics  | Methods                | References  | Assignment   |
|---------|--|------------------------|---|--|
| 1       | Introduction to Data Communications:<br>(a) Introduction to Data Communications<br>(b) Historical review of Computer Networking<br>(c) Computer Networking Hardware<br>(d) Computer Networking Software<br>(e) Network Architecture  | Lecture,<br>Discussion | [1] ch.1,<br>[2] ch.1,<br>[2] ch.1.2,<br>[2] ch.1.3   | Probs: 1, 1.1, 1.2,<br>1.3, 1.4, 1.5                     |
| 2       | Fundamental of Communication:<br>(a) Reference Model<br>(b) Standardisation<br>(c) Network Topologies<br>(d) Data Communication Basics<br>(e) Packet-based Data Communication<br>(f) Circuit-switched vs Packet-switched<br>(g) Message switching datagram, virtual circuit<br>(h) Connection vs Connectionless oriented | Lecture,<br>Discussion | [2] ch.2.1<br>[2] ch.1.4, [1] ch. 2<br>[2] ch.6, [1] ch.1<br>[1] ch.1<br>[2] ch.2.1<br>[2] ch.5.1.1<br>[1] ch.8.1<br>[2] ch.5.1.1, 5.1.3,<br>5.1.4<br>[2] ch.5.1.3, 5.1.4 | Probs: 2.1, 2.2,<br>2.3, 2.4, 2.5, 2.6,<br>2.7, 2.8, 2.9 |
| 3       | Wired/wireless communication network:<br>(a) Wired-based Communications<br>(b) Wireless Communication<br>(c) Examples of Communication Networks  | Lecture,<br>Discussion | [1] ch.7.1<br>[1] ch.7.2  | Probs: 3.1, 3.2,<br>3.3                                  |
| 4       | Data link layer basics:<br>(a) Data Link Layer Basics<br>(b) Encoding, Framing<br>(c) Error Detection, error correction, reliable transmission<br>(d) Sliding Windows  | Lecture,<br>Discussion | [2] ch.3<br>[1] ch.4.1, 4.2, [2]<br>ch.3.1.2<br>[2] ch.3.2, [1]<br>ch.10, 10.2<br>[2] ch.3.4  | Probs: 4.1, 4.2,<br>4.3, 4.4                             |
| 5       | Channel allocation:<br>(a) Channel Allocation<br>(b) Multiple Access Protocols<br>(c) Ethernet   | Lecture,<br>Discussion | [2] ch.4.2, [1]<br>ch.12.1<br>[2] ch.4.3  | Probs: 5.1, 5.2,<br>5.3                                  |

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| 6                          | Network layer:<br>(a) Network Layer<br>(b) Network Layer Addressing<br>(c) IPv4 and IPv6<br>(d) Routing Algorithm  | Lecture,<br>Discussion       | [1] ch.19, 20, 21, 22<br>[2] ch.5.6.2, [1] ch.19.1, 19.2, 21.1<br>[2] ch.5.6.1, 5.6.2 [1] ch.19.1, ch.20.2<br>[2] ch.5.1.1, [1] ch.22.3, 22.4                 | Probs: 6.1, 6.2, 6.3, 6.4                             |
| 7                          | Spanning Tree and intra/interdomain routing protocols:<br>(a) Spanning Tree<br>(b) Intra/inter-domain routing protocols<br>(c) CIDR  | Discussion, Quiz             | [2] ch.5.2.7<br>[1] ch.22.3<br>[2] ch.5.6.2   | Probs: 7.1, 7.2, 7.3                                  |
| <b>MID SEMESTER TEST</b>   |  |                              |   |   |
| 8                          | Internet Protocol and Quality of Services:<br>(a) Internet Protocol (IP)<br>(b) Quality of Services<br>(c) Congestion Control  | Lecture,<br>Discussion       | [2] ch.5.4 [1] ch.24.5, 24.6, 24.9  | Probs: 8.1, 8.2, 8.3                                  |
| 9                          | End to end protocol, data presentation:<br>(a) End to end protocol<br>(b) Data presentation<br>(c) Compression   | Lecture,<br>Discussion       | [1] ch.1, 29.1<br>[2] ch.7.4.2 [1] ch.29.2  | Probs: 9.1, 9.2, 9.3                                  |
| 10                         | Transport services and protocol:<br>(a) Transport services<br>(b) Transport protocol   | Discussion                   | [2] ch.6 , [1] ch.23  | Probs: 10.1, 10.2                                     |
| 11                         | UDP, TCP and Performance Issues:<br>(a) UDP<br>(b) TCP<br>(c) Performance issues   | Discussion                   | [2] ch. 6.4, [1] ch.23.2<br>[2] ch.6.5, [1] ch.23.2, 23.4<br>[2] ch.6.6   | Probs: 11.1, 11.2, 11.3                               |
| 12                         | Application Services (DNS, e-mail, www):<br>(a) DNS<br>(b) Email<br>(c) WWW<br>(d) Multimedia<br>(e) Streaming   | Lecture,<br>Discussion       | [2] ch.7.1, [1] ch.25<br>[2] ch.7.2, [1] ch.26.2<br>[2] ch.7.3 [1] ch.27.1, 27.2<br>[2] ch.7.4, [1] ch.29.1<br>[2] ch.7.4.3, [1] ch.29.3, 29.4                | Probs: 12.1, 12.2, 12.3, 12.4, 12.5                   |
| 13                         | Wireless and Wimax:<br>(a) Wireless networking<br>(b) Security<br>(c) Wireless broadband<br>(d) WIMAX  | Lecture,<br>Discussion, Quiz | [2] Ch.4.4<br>[2] ch.8.6.4<br>[2] ch.4.5  | Probs: 13.1, 13.2, 13.3, 13.4                         |
| 14                         | Network and Internet Security:<br>(a) Network Security Basic<br>(b) Cryptography<br>(c) Symmetric Key Algorithm<br>(d) Public Key Infrastructure<br>(e) Internet Security<br>(f) IPSec<br>(g) PGP<br>(h) Firewalls | Discussion, Quiz             | [2] ch.8, [1] ch.31<br>[2] ch.8.1, [1] ch.30<br>[2] ch.8.2, [1] ch.30.2<br>[2] ch.8.3, [1] ch.31.7<br>[1] ch. 32<br>[1] ch.32.1<br>[1] ch.32.3<br>[1] ch.32.4 | Probs: 14.1, 14.2, 14.3, 14.4, 14.5, 14.6, 14.7, 14.8 |
| <b>FINAL SEMESTER TEST</b> |  |                              |   |   |

Prepared by:  
Name: Irwan Prasetya Gunawan  
Position: Lecturer  
Date: April 14, 2016

Certified by:  
Name: Hoga Saragih  
Position: Head of Department  
Date