



Course **090245137**

Communication Protocols

King Mongkut's University of Technology North Bangkok
The Sirindhorn International Thai-German Graduate School of Engineering
Electrical and Computer Engineering Program

Section 1: General Information

1. Course code and course title

090245137 Communication Protocols

2. Total credits

3 credits (2-2-5) (3-0-6) (3-0-9) (2-3-7)

3. Curriculum and course category:

Curriculum: *Master of Engineering in Electrical and Computer Engineering*

Course category: Required Courses

Core Course Specific Core Course

Industrial Internship Master Thesis

Elective Courses

General Elective Specific Elective Other Elective

4. Course coordinator/ Instructors

Course Coordinator: _____

Instructor(s): Assoc. Prof. Dr. Soamsiri Chantaraskul

5. Semester/ year of study

Semester 1 (Aug. to Dec.) Semester 2 (Jan. to May) Academic Year: **2021**

6. Pre-requisite (if any)

No Yes, please provide:

7. Co-requisites (if any)

No Yes, please provide:

8. Venue of study

Lecture Day/Time: Tuesdays at 09.00-12.00

On-site: Lecture Room No.:.....511.....Floor:....5....

TGGS, KMUTNB Faculty of Engineering, CU RWTH

On-line*: Teaching Media: Microsoft Teams Google Meet

Zoom Webex

Other (specify)

Remark: * During COVID-19, the teaching can be on-site and/or on-line according to TGGS Policy.



9. Information for quality assurance in education

This course shows evidence of:

- Integration of research or creative activities with instruction; use of research-based learning management; knowledge management practices for learning improvement
- Integration of academic services and course implementation

10. Date of latest revision:

July 2021

Section 2: Course Description and Implementation

1. Course Description (As written in the Official Approved Curriculum)

Fundamental concept of telecommunications and computer networks; layers composing the networking framework; network topology and standards; Internet and connecting networks; basic concepts and design aspect of communication protocols; Local Area Network (LAN); model and operations of the TCP/IP protocol suit error handling methods; routing algorithms and IP; working principle of TCP and UDP; TCP congestion control; application layer protocols; Software Defined Networking (SDN).

2. Number of hours per semester

Lecture	Practice	Self-study
45 hours/ semester (3 hours/week*)	30 hours (2 hours/week*)	75 hours/ semester (5 hours/week*)

Remark: * Based on 15 weeks of lecture

Course Category: Lecture Practice Laboratory
 Course Evaluation: A-F S/U P

3. Number of hours per week for academic guidance to individual students

1. Giving academic advice (minimally number hour per week) during the office hour
 1 2 3 4 5

The student can arrange the time via telephone or email for the meeting date/time.

2. Adopting information technology-based academic advising
 Email: soamsiri.c@tggs.kmutnb.ac.th
 Phone: 02-5552929
 Communication Apps: Line ID:

(Please notify the lecturer when adding the line.)



Program: **ECE**
 Degree Level: **Master**

Faculty/College: **TGGS**

- Meeting Online: The platform will be informed to students upon the request.
- Other (specify)
- 3.

4. Course Learning Outcomes (CLOs): Students should be able to:

- CLO 1. Explain a fundamental concept of telecommunications, computer networks, layered networks, and techniques used in each layer.
- CLO 2. Design simple communication protocols based on the usage requirements.
- CLO 3. Identify the need for data communication standards and comprehend major protocols used in various types of computer networks.
- CLO 4. Analyze and investigate into the implementation aspects and performance enhancement mechanisms of communication protocols in particular the TCP/IP protocol suit.

5. The mapping between Expected Learning Outcomes (ELOs) from the curriculum and Course Learning Outcomes (CLOs)

Table 5.1 ELOs-CLOs Consistency *(for a subject-specific course/ a specific curriculum)*

ELOs/CLOs consistency	CLO 1	CLO 2	CLO 3	CLO 4
ELO1	✓		✓	
ELO2				
ELO3				✓
ELO4				
ELO5		✓		
ELO6				
ELO7				
ELO8				
ELO9				
ELO10				

Remark: All ELOs and ELOs for the course (highlighted row) are as written in the Official Approved Curriculum.

Table 5.2 Mapping desirable characteristics of KMUTNB graduates and CLOs *(for non-specific courses designed for various curriculums)*

Consistency between desirable characteristics of KMUTNB Graduates- CLOs	CLO 1	CLO 2	CLO 3	CLO 4
1. Professional credentials with critical thinking skills				✓



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Consistency between desirable characteristics of KMUTNB Graduates- CLOs	CLO 1	CLO 2	CLO 3	CLO 4
2. Integrity and social responsibility				
3. Innovative and technopreneur mindset				✓
4. Global Competence			✓	

Section 3: Student Improvement in relation to Course Learning Outcomes (CLOs)

Organizing learning to develop skills/ knowledge; evaluation of CLOs in accordance with the ones identified in Section 2.4

Course Learning Outcomes (CLOs)	Teaching Methods compliant with CLOs	Evaluation Methods compliant with CLOs
CLO 1	<ul style="list-style-type: none"> Lecture* Active learning** Individual assignment 	<ul style="list-style-type: none"> Assignment evaluation Quiz*** Exam****
CLO 2	<ul style="list-style-type: none"> Lecture* Case studies/ In-class examples Individual assignment 	<ul style="list-style-type: none"> Assignment evaluation Quiz*** Exam****
CLO 3	<ul style="list-style-type: none"> Lecture* in relation for the currently used standards and protocol mechanisms Active learning** Individual assignment 	<ul style="list-style-type: none"> Assignment evaluation Quiz*** Exam****
CLO 4	<ul style="list-style-type: none"> Lecture* Case studies In-class mechanism analysis Individual assignment 	<ul style="list-style-type: none"> Assignment evaluation Quiz*** Exam****

Remark: * Lecture on the concept of the topic is introduced with basic or fundamental definitions, visualization and correlations. For the complicated equation, the derivation from the basic laws can be shown to students. So, the students do not memorize the equations but understand the basic concept and basic equation. The lecturer will introduce the advanced and new concepts, technologies, and findings to students from publications such as journals and websites and from the research and industrial experiences.



*** Active learning by asking questions related to the topic in the lecture and encouraging the students to response to the questions. If the students cannot response with answers, then the lecturer will give some guidance until the students can response.*

**** Quiz in the closed-book format on the basic concepts and equations with simple problem solving to evaluate their learning. The solution will be given to students after grading, so they can identify their mistakes and weakness.*

***** Exam on the basic concepts and equations with simple problem solving in the closed-book format as a review, whereas the complicated/integrated problem solving will be worked in the open-book format.*

Section 4: Lesson Plan and Evaluation

1. Lesson Plan

Week	Topics/Details	CLOs	Hours	Learning and teaching activities; teaching media (if any)	Lecturer
1	Part 1: Introduction and fundamental concept of telecommunications and computer networks	CLO 1	3.0	<ul style="list-style-type: none"> Lecture presentation slides Q&A Examples and Case Studies Quiz No. 1 	Dr. Soamsiri
2, 3	Part 2: Protocols development and formal methods TCP/IP model operation and design aspects	CLO 2	6.0	<ul style="list-style-type: none"> Lecture presentation slides Q&A Examples and Case Studies Quiz No. 2 and 3 Assignment No. 1 	Dr. Soamsiri
4	Part 3: Physical layer – basic functionalities and standards	CLO 3	3.0	<ul style="list-style-type: none"> Lecture presentation slides Q&A Examples and Case Studies Quiz No. 4 	Dr. Soamsiri
5, 6	Part 4: Data link layer – framing synchronization , error handling methods, flow control, data link layer protocols (HDLC and PPP)	CLO 3 and CLO 4	6.0	<ul style="list-style-type: none"> Lecture presentation slides Q&A Examples and Case Studies Quiz No. 5 and 6 Assignment No. 2 	Dr. Soamsiri



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Week	Topics/Details	CLOs	Hours	Learning and teaching activities; teaching media (if any)	Lecturer
7	Part 5: LAN – IEEE802 standards, Medium Access Control (MAC), Ethernet protocol, WLAN	CLO 3 and CLO 4	3.0	<ul style="list-style-type: none"> • Lecture presentation slides • Q&A • Examples and Case Studies • Quiz No. 7 	Dr. Soamsiri
8	Midterm Exam including all topics from week 1-7		3.0	<ul style="list-style-type: none"> • Paper-based examination 	Dr. Soamsiri
9,10	Part 6: Network layer – routing algorithms, congestion control, and quality of service, concept of Software Defined Networking (SDN)	CLO 3 and CLO 4	6.0	<ul style="list-style-type: none"> • Lecture presentation slides • Q&A • Examples and Case Studies • Quiz No. 8 and 9 	Dr. Soamsiri
11	Part 7: Internet Protocol (IP) – IP operations, internet control protocol, IP routing protocol, IP versions	CLO 3 and CLO 4	3.0	<ul style="list-style-type: none"> • Lecture presentation slides • Q&A • Examples and Case Studies • Quiz No. 10 	Dr. Soamsiri
12,13	Part 8: Transport layer – TPDU, protocols, transport service primitives, UDP, TCP operations, TCP for reliable service guarantee approaches.	CLO 3 and CLO 4	6.0	<ul style="list-style-type: none"> • Lecture presentation slides • Q&A • Examples and Case Studies • Quiz No. 11 and 12 • Assignment No. 3 	Dr. Soamsiri
14, 15	Part 9: Network management protocol (SNMP), Naming system (DNS), Network applications and protocols – E-mail,	CLO 3 and CLO 4	6.0	<ul style="list-style-type: none"> • Lecture presentation slides • Q&A • Examples and Case Studies • Quiz No. 13 and 14 	Dr. Soamsiri



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Week	Topics/Details	CLOs	Hours	Learning and teaching activities; teaching media (if any)	Lecturer
	MIME, STMP, POP, WWW, HTTP, FTP, TFTP				
16	Final Exam including all topics from week 9-15		3.0	• Paper-based examination	Dr. Soamsiri
		Total	48.0		

2. Evaluation Plan (in accordance with OBE 2 mapping framework)

Course Learning Outcomes (CLOs)	Evaluation Methods	Week of Evaluation	Percentage of Evaluation
CLO 1, 2, 3, 4	3 Assignments / presentation	3, 6, 13	15%
CLO 1, 2, 3, 4	14 Quizzes	1-7, 9-16	10%
CLO 1, 2, 3, 4	2 Exams	8, 16	70%
	Attendance	1-16	5%

Section 5 Teaching/Learning Resources

Textbooks and materials

- Andrew S. Tanenbaum, "Computer Networks", Prentice Hall, 4th Ed
- William Stallings, "Data and Computer Communications"
- James F. Kurose and Keith W. Ross, "Computer Networking, a Top-down Approach Featuring the Internet", Addison-Wesley
- Peter Sweeney, "Error Control Coding – An Introduction", Prentice Hall
- Richard Stevens, "TCP/IP Illustrated, Volume 1", Addison-Wesley



Section 6 Course Evaluation and Improvement

1. Course evaluation by students

The students will have an opportunity to evaluate the effectiveness of the course in a form of paper survey and group interview at the end of each semester. The results of survey and interview including the grading will be reviewed by the curriculum meeting to evaluate the course's effectiveness.

2. Strategies for assessing learning management

The students will have an opportunity to evaluate the teaching of the course in a form of paper survey and group interview at the end of each semester. The results of survey and interview including the grading will be reviewed by the curriculum meeting to evaluate the teaching as well as returning to the lecturer for further improvement.

3. Improvement schemes of course implementation

The evaluation from the students including the grading will be submitted to the curriculum meeting for reviewing and brainstorming to improve teaching of each course. Comments and suggestions given by the curriculum meeting will be informed to the responsible lecturer of each course.

4. Verification of students' learning outcomes, referred to OBE 2 and 3

The grading of this course will be evaluated and reviewed by the Department meeting and the TGGS executive board meeting in order to verify its appropriateness before the final approval.

5. Course review and improvement plans

The results of the grading evaluation and student evaluation will be submitted to the curriculum meeting for reviewing and brainstorming to improve the effectiveness of the offered courses. Comments and suggestions will be informed to the responsible lecturer of each course.