



Program

Course Title Internet of Things

Mahidol University International College

Course Code EGCI 431

Division Science

TQF 3 Course Specifications

Section 1 General Information

1. Course code and course title

Thai	EGCI 431	อินเทอร์เน็ตของสรรพสิ่ง
English	EGCI 431	Internet of Things

2. Number of credits 4 Credits

3. Program and type of subject

3.1 Program	Bachelor of Engineering (<u>Computer Engineering</u>)
3.2 Type of Subject	Major Course (Required Major)

4. Course Coordinator and Course Lecturer

4.1 Course Coordinator	Dr. Mingmanas Sivaraksa
4.2 Course Lecturer	Dr. Konlakorn Wongpatikaseree

5. Trimester/ Year of Study

5.1 Trimester	Third trimester / for 4 th year Computer Engineering
5.2 Course Capacity	Approximately 25 students

6. Pre-requisite None

7. Co-requisites None

8. Venue of Study Mahidol University, Salaya campus

9. Date of Latest Revision

Date MonthYear



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Section 2 Goals and Objectives

1. Course Goals

To provide students with basic knowledge and skills in IoT system. The ability to design, develop and prototype the latest microcontrollers with IoT application. Students require to enable to build an IoT system from the ground up. The interdisciplinary nature of extensive variety insofar as what an IoT system will be shown for understanding the real-world IoT application. Students require to design and implement an IoT system of their choice to apply and solve simple engineering problems.

2. Objectives of Course Development/Revision

2.1 Course Objectives

- 1.Explain in a concise manner how the general internet as well as Internet of Things work.
- 2.Design and program IoT device
- 3.Design an IoT device to work with a Cloud Computing infrastructure

2.2 Course-level Learning Outcomes: CLOs

By the end of the course, students will be able to (CLOs)

1. CLO1 understand the definition and significance of the Internet of Things
2. CLO2 Design the architecture, operation, and business benefits of an IoT solution
3. CLO3 Prototype IoT Application.

Section 3 Course Management



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1. Course Description

(Thai) สถาปัตยกรรมอินเทอร์เน็ตเชื่อมต่อสรรพสิ่ง เทคโนโลยีการสื่อสารในอินเทอร์เน็ตเชื่อมต่อสรรพสิ่ง เทคโนโลยีที่ใช้อินเทอร์เน็ตเชื่อมต่อสรรพสิ่ง มาตรฐานอินเทอร์เน็ตเชื่อมต่อสรรพสิ่ง การนำความรู้ที่ได้นำมาสร้างระบบอินเทอร์เน็ตเชื่อมต่อสรรพสิ่งที่สามารถนำไปประยุกต์ในงานด้านต่างๆ

(English) IoT architectures, communication technologies for IoT, technologies behind IoT, IoT platform; how they are integrated to form IoT systems

2. Credit hours per trimester

Lecture (Hour(s))	Laboratory/field trip/internship (Hour(s))	Self-study (Hour(s))
48 hours (4 hours x 12 weeks)	-	96 hours (8 hours x 12 weeks)

3. Number of hours that the lecturer provides individual counseling and guidance.

1 hours/week



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1. Short summary on the knowledge or skills that the course intends to develop in students (CLOs)

By the end of the course, students will be able to

1. CLO1 Understand the definition and significance of the Internet of Things
2. CLO2 Design the architecture, operation, and business benefits of an IoT solution
3. CLO3 Prototype IoT Application.

2. Teaching methods for developing the knowledge or skills specified in item 1 and evaluation methods of the course learning outcomes

Course Code	Teaching methods	Evaluation Methods
CLO1	Lecture with participation	Written Examination, Individual Evaluation
CLO2	Individual assignment, Practical experiment , Individual research assignment with report	Individual Evaluation, Group evaluation, Written Examination
CLO3	Group research assignment with report, discuss on experimental result	Group evaluation, Oral presentation



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1. Teaching plan

Week	Topic	Number of Hours		Teaching Activities/ Media	Lecturer
		Lecture Hours	Lab/Field Trip/Internship Hours		
1	Introduction to Internet of Things (IoT)	4	0	Lecture with participation, Individual assignment, Small group discussion	Individual Evaluation, Quiz
2	IoT Architecture	4	0		
3	IoT Platform	4	0		
4	Networking Protocol	4	0		
5-6	IoT Technologies	8	0		
7	Midterm examination				Midterm Assessment
8	Industry IoT (IIoT)	4	0	Lecture with participation, Practical experiment, Small group project	Individual Project, Oral presentation
9-11	IoT Designing and Implementation	12	0		
12	IoT Cloud Computing	4	0		
13	Project Demonstration and Presentation	4	0	Group Project	Oral presentation
	Total	48	0		

2. Plan for Assessing Course Learning Outcomes



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2.1 Assessing and Evaluating Learning Achievement

a. Formative Assessment

The assessment tools such as quizzes and exam are used to evaluate student’s understanding by their ability to explain the basic knowledge of IoT application. For the design parts, students should be able to show the creativity to solve the real-world problem with the IoT device. The assessments are made through their assignment, individual project and exam. The final IoT project has to be shown by applying the prototype of IoT device to be able solving simple engineering problems. The assessments are made through their group project.

b. Summative Assessment

(1) Tools and Percentage Weight in Assessment and Evaluation

Learning Outcomes	Assessment Methods	Assessment Ratio (Percentage)	
CLO1 Understand the definition and significance of the Internet of Things	Quiz	5	20
	Midterm Exam	15	
CLO2 Design the architecture, operation, and business benefits of an IoT solution	Assignment	20	50
	project	20	
	Midterm Exam	10	
CLO3 Prototype IoT Application.	Group project	30	30
Total			100

(2) Grading System



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Grade	Achievement	Final Score (% range)	GPA
A	Excellent	90-100	4.0
B+	Very Good	85-89	3.5
B	Good	80-84	3.0
C+	Fairly Good	75-79	2.5
C	Fair	70-74	2.0
D+	Poor	65-69	1.5
D	Very Poor	60-64	1.0
F	Fail	Less than 60	0.0

(3) Re-examination

N/A - (Not applicable with MUIC)

3. Student Appeals

The student wishing to appeal according to grading result must submit a written and signed appeal form personally to the academic affair unit. It is prohibited to assign another person to appeal on one's behalf. The written appeal form is then sent to the program director and chair of department. The final decision is transferred for approval by the faculty committee. The result of appeal then is informed to the student.



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1. Textbooks and/or other documents/materials

- 1) Adrian McEwen, “Designing the Internet of Things”, Wiley Publishers, 2013, ISBN: 978-1-118-43062-0
- 2) Daniel Kellmerit, “The Silent Intelligence: The Internet of Things”. 2013, ISBN 0989973700

2. Recommended textbooks and/or other documents/materials

- 1) IOT (Internet of Things) Programming: A Simple and Fast Way of Learning IOT by David Etter

3. Other Resources (If any)



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1. Strategies for effective course evaluation by students

1.1 Evaluation of peers by students

1.2 Student evaluation

1.2.1 Course content

1.2.2 Course management

1.2.3 Suggestions

1.2.4 Overall opinions

2. Evaluation strategies in teaching methods

2.1 Student evaluation

2.2 Presentation

3. Improvement of teaching methods

Use evaluation from 1 and 2 for course improvement

4. Evaluation of students' learning outcome

Analysis of students' learning outcomes using scores from each CLOs for evaluation.

5. Review and improvement for better outcome

Review the course before trimester starts, before each teaching period and review course contents every 3 years.



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Alignment between Courses and General Education courses

Relations between the course and the program

Table 1 Relations between the course and the PLOs

Embedded Systems	PLOs					
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
EGCI 431		x				x

Table 2 Relations between CLOs and PLOs

EGCI 431	PLOs					
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1 Understand the definition and significance of the Internet of Things		x				
CLO2 Design and write program for embedded system.		x				x



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CLO2 Design the architecture, operation, and business benefits of an IoT solution		x					x
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Table 3 PLOs that the course is responsible for

<i>PLOs</i>	<i>SubPLOs</i>
PLO2: Integrate computer engineering knowledge with other related sciences and pursue new knowledge in computer engineering.	2.1 Use computer engineering knowledge to solve problems in other fields
PLO6: Create a related computer engineering development based on information technology in mathematics or applied statistics.	6.1 Choose information technology tools properly for computer engineering development