King Mongkut's University of Technology Thonburi
Department of Computer Engineering
Course Name: CPE101 Engineering Exploration **Semester:** 1/2565(2022)

Course Syllabus

Instructor Name 1: Asst. Prof. Jumpol Polvichai, Ph.D. Aj. Jumo (อ.จุมพล)
Office hours: by appointment online via Facebook **e-mail:** jumpol@gmail.com
Instructor Name 2: Asst. Prof. Surapont Toomnark Aj. Toom (อ.ศุภณ)
Office hours: by appointment online via Facebook **e-mail:** surapont@cpe.kmutt.ac.th
Instructor Name 3: Asst. Prof. Nuttanart Muansuwan, Ph.D. Aj. Kate (อ.เกตน์)
Office hours: by appointment online via Facebook **e-mail:** nuttanart@cpe.kmutt.ac.th

Normal Course meeting times:

Online Classes: None

Lecture: Watch videos in the Facebook Group (CPE101-2022) before lab classes.

Lab:	Thursday	13.30-17.20 room CPE 1114 (AE)	Aj.Toom [Fern]
	Friday	08.30-12.20 room CPE 1114 (C)	Aj.Kate [Goong]
	Friday	08.30-12.20 room CPE 1115 (D)	Aj.Jumo [Nok]
	Friday	13.30-17.20 room CPE 1114 (A)	Aj.Toom [Goong]
	Friday	13.30-17.20 room CPE 1115 (B)	Aj.Jumo [Nok]

Course Learning Environment (announcements and discussion): the Facebook Group (CPE101-2022) https://www.facebook.com/groups/420959493406634

Catalogue Listing: Various research topics related to each student's research area.

Course Prerequisites: None

Textbook: Exploring Engineering: An Introduction to Engineering and Design 2nd Edition, Kindle Edition by Philip Kosky, Robert T. Balmer, William D. Keat, George Wise

Course objectives:

The key objective of this course is to prepare Computer Engineering students to give a basic introduction to engineering methods. The course will introduce the practical concepts of engineering. Engineering principles, analysis, design, and experimentation. Project-based learning approach. Teamed design project involving laws of physics, mathematics, management, and communication. Also, the course will focus on learning skills, social skills, ethics, engineering senses, safety ,literature survey and write good project proposals and to do good presentation.

Course Description

Introduction to practical concepts of engineering. Engineering principles, analysis, design, and experimentation are introduced with project-based learning approach. In addition, projects as student teams are assigned at the end involving laws of physics, mathematics, management, and communication. Hands-on experience is essential in all activities.

Key Topics:

1. What do engineers do? Element of Engineering Design and Analysis.
2. Basic engineering Drawing. Computer Aided Design.
3. Basic Project Creation, Planning and Management
4. Explore to some engineering fields.
5. Learn how to do the basic programming.
6. Hands on basic design exercises.
7. Hands on functional decomposition and complex design exercises.
8. Design evaluation of alternatives and selection of a concept.
9. Design project defense and project report.

Expected Prior Knowledge and Skills In: English comprehension skills.

Course Outcomes

Recognize roles and responsibilities of various engineering fields. Recognize necessary problems of each engineering fields. Apply basic scientific knowledge to address the issue raised.

Learning Outcomes:

1. Recognize roles and responsibilities of various engineering fields.
2. Recognize necessary problems of each engineering fields.
3. Apply basic scientific knowledge to address the issue raised.

Ethical Conduct:

Ethics is a key characteristic we would like all our students to possess. Ethics means that you do the right thing because it is the right thing to do, not for fear of being caught "cheating". Cheating is prohibited. Students must do their own work when it comes to individual assignments, quizzes, and examinations. For projects, consultation with peers is encouraged; however, copying materials just to turn things in for points is considered unethical behavior on the part of the one copying and the one offering his/her work for copy. For group work, we would like the students to contribute their fair share of the work in making the lab or project a success. **Class attendance** is very important. Attendance is strongly exploited. Showing up late causes penalty and may result in a fail grade. A student with 15-minute late show up will be given zero point on attendance. Two late show ups will be counted as one absent. Three absents or more will result in a final grade of F. Cell-phones must be **turned off** before you come to class. They are disruptive and annoying. If yours goes off during class or you use it during class, you will be asked to leave the classroom and you will not be allowed back during that class period. If we hear a cell-phone ringing during a quiz, I will assume you are cheating.

Learning Note (Reflective Writing):

Every week, each student is required to review and think analytically about your understanding related to your topic learned in the week. How to do it in details will be provided at the start of the early semester.

Projects:

1. The Gambler Robot

   This is an integrated project that the same task was designed for all students. Groups of students have to work together using learned knowledge and to solve the task in time (before midterm exam). Grouping form a group of 6-7 students (basically we need 5 groups in each sections), in which 2 students responsible for 2D design, 2 students responsible for 3D design, and remaining students are responsible for control system design. Due date is set before the midterm exam.

2. The Final Project

   This is an open project for a small group of 3-4 students. Students are encouraged to choose any interesting topics by themselves. However, a TA will be assigned to help students to finish the project. To evaluate the project, the students have to present the progress, to write a final report, to make a poster, and to present the project at the end of semester.

Grading Policy:

Attendance/Participation/ Reflection	**5%**
Lab work/Assignment/Quiz/Activity	**10%**
The Learning Note (Reflective Writing)	**15%**
✓ Every week	5%
✓ Precise and Effective	10%
The First Project	**20%**
✓ Design	10%
✓ Execution	5%
The Final Project	**30%**
✓ Progress Presentation	10%
✓ Final Reports	10%
✓ Project Presentation	10%
Final Exam	**20%**

Note: *The instructor reserves the right to change the grading policy as deemed appropriate.*

Student with Disabilities:

Any student with a disability should contact the instructor as soon as possible to make any necessary arrangements in order to meet the course requirements.

Course Schedule:

The details in the following table may change to adapt to special circumstances.

August 2022

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

Septemper 2022

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

October 2022

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

November 2022

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

December 2022

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

CPE 101 Class Schedule for 2022

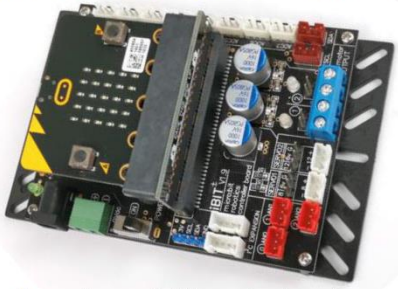
Week		Date	Time	Section	Location	Topic	Instructor	Deliverables	Projects
1	THU	August 18, 2022	13.30-17.20	AE	1114	What Engineers Do?	Prof. Jumpol Polvichai, PhD	Learning Note Blogging	The First Project Grouping Initiations
	FRI	August 19, 2022	8.30-12.20	C	1114				
	FRI	August 19, 2022	8.30-12.20	D	1115	Class Introduction			
	FRI	August 19, 2022	13.30-17.20	A	1114				
	FRI	August 19, 2022	13.30-17.20	B	1115				
2	THU	August 25, 2022	13.30-17.20	AE	1114	Research Skills / Working Foundation	Prof. Nuttanart Muansuwan, PhD	Learning Note Blogging	An Integrated Project
	FRI	August 26, 2022	8.30-12.20	C	1114				
	FRI	August 26, 2022	8.30-12.20	D	1115	Writing, Reading and Presenting / Set Goals, Follow Up and Make Decision			
	FRI	August 26, 2022	13.30-17.20	A	1114				
	FRI	August 26, 2022	13.30-17.20	B	1115				
3	THU	September 1, 2022	13.30-17.20	AE	1114	Engineering Drawing (2D Drawing)	Prof. Surapont Toomnark	Assignment / Learning Note Blogging	
	FRI	September 2, 2022	8.30-12.20	C	1114				
	FRI	September 2, 2022	8.30-12.20	D	1115	LibreCAD			
	FRI	September 2, 2022	13.30-17.20	A	1114				
	FRI	September 2, 2022	13.30-17.20	B	1115				
4	THU	September 8, 2022	13.30-17.20	AE	1114	Engineering Drawing (3D Modeling)	Prof. Surapont Toomnark	Assignment / Learning Note Blogging	
	FRI	September 9, 2022	8.30-12.20	C	1114				
	FRI	September 9, 2022	8.30-12.20	D	1115	TinkerCAD / 3D Printing			
	FRI	September 9, 2022	13.30-17.20	A	1114				
	FRI	September 9, 2022	13.30-17.20	B	1115				
5	THU	September 15, 2022	13.30-17.20	AE	1114	Hands-on Simulation	Prof. Prapong Prechapranwong, PhD	Assignment / Learning Note Blogging	
	FRI	September 16, 2022	8.30-12.20	C	1114				
	FRI	September 16, 2022	8.30-12.20	D	1115	TinkerCAD Circuits			
	FRI	September 16, 2022	13.30-17.20	A	1114				
	FRI	September 16, 2022	13.30-17.20	B	1115				
6	THU	September 22, 2022	13.30-17.20	AE	1114	Basic Embedded Systems	Prof. Surapont Toomnark	Learning Note Blogging	
	FRI	September 23, 2022	8.30-12.20	C	1114				
	FRI	September 23, 2022	8.30-12.20	D	1115	micro:bit			
	FRI	September 23, 2022	13.30-17.20	A	1114				
	FRI	September 23, 2022	13.30-17.20	B	1115				
7	THU	September 29, 2022	13.30-17.20	AE	1114	Application Design	Prof. Nuttanart Muansuwan, PhD	Learning Note Blogging	
	FRI	September 30, 2022	8.30-12.20	C	1114				
	FRI	September 30, 2022	8.30-12.20	D	1115	Introduction to Application Development			
	FRI	September 30, 2022	13.30-17.20	A	1114				
	FRI	September 30, 2022	13.30-17.20	B	1115				
8	THU	October 6, 2022	13.30-17.20	AE	1114	Game	Prof. Natasha Dejdumrong, PhD	An Integrated Project / Learning Note Blogging	
	FRI	October 7, 2022	8.30-12.20	C	1114				
	FRI	October 7, 2022	8.30-12.20	D	1115	Build a Simple Game			
	FRI	October 7, 2022	13.30-17.20	A	1114				
	FRI	October 7, 2022	13.30-17.20	B	1115				
9	THU	October 20, 2022	13.30-17.20	AE	1114	Computer Network / Programming	Prof. Peerapon Siripongwutikorn, PhD	Learning Note Blogging	The Second Project Grouping Initiations
	FRI	October 21, 2022	8.30-12.20	C	1114				
	FRI	October 21, 2022	8.30-12.20	D	1115	Simple Network Labs / Happy Coding			
	FRI	October 21, 2022	13.30-17.20	A	1114				
	FRI	October 21, 2022	13.30-17.20	B	1115				
10	THU	October 27, 2022	13.30-17.20	AE	1114	Midterm Exams	Prof. Jumpol Polvichai, PhD	Learning Note Blogging	The Class Project
	FRI	October 28, 2022	8.30-12.20	C	1114				
	FRI	October 28, 2022	8.30-12.20	D	1115	The Three Challenges			
	FRI	October 28, 2022	13.30-17.20	A	1114				
	FRI	October 28, 2022	13.30-17.20	B	1115				
11	THU	November 3, 2022	13.30-17.20	AE	1114	Intelligent Systems	Prof. Jumpol Polvichai, PhD	Learning Note Blogging	
	FRI	November 4, 2022	8.30-12.20	C	1114				
	FRI	November 4, 2022	8.30-12.20	D	1115	Introduction to AI and Machine Learning			
	FRI	November 4, 2022	13.30-17.20	A	1114				
	FRI	November 4, 2022	13.30-17.20	B	1115				
12	THU	November 10, 2022	13.30-17.20	AE	1114	Data Sciences	Prof. Jumpol Polvichai, PhD	Learning Note Blogging	
	FRI	November 11, 2022	8.30-12.20	C	1114				
	FRI	November 11, 2022	8.30-12.20	D	1115	Introduction to Data Analytics			
	FRI	November 11, 2022	13.30-17.20	A	1114				
	FRI	November 11, 2022	13.30-17.20	B	1115				
13	THU	November 17, 2022	13.30-17.20	AE	1114	Network Security	Rattasapa Meeprapai, Cyber Security Engineer of The Secretariat of The Cabinet	Learning Note Blogging	
	FRI	November 18, 2022	8.30-12.20	C	1114				
	FRI	November 18, 2022	8.30-12.20	D	1115	Fundamental of Cyber Security/Threat			
	FRI	November 18, 2022	13.30-17.20	A	1114				
	FRI	November 18, 2022	13.30-17.20	B	1115				
14	THU	November 24, 2022	13.30-17.20	AE	1114	Project Progress Presentations	All Professors and TAs	Learning Note Blogging	
	FRI	November 25, 2022	8.30-12.20	C	1114				
	FRI	November 25, 2022	8.30-12.20	D	1115				
	FRI	November 25, 2022	13.30-17.20	A	1114				
	FRI	November 25, 2022	13.30-17.20	B	1115				
15	FRI	December 2, 2022	13.30-17.20	ABCD & AE	TBA	Game Day	All TAs	Learning Note Blogging	
16	FRI	**December 16, 2022**	13.30-16.20	ABCD & AE	TBA	Final Exam	All Professors and TAs		
	MON	**December 19, 2022**	8.30-12.20	ABCD & AE	TBA	Final Project Presentations (Poster Presentations)	All Professors and TAs	Poster Presentations & Final Project Report	

Project An Gambler Robot
(หุ่นยนต์นักพนัน)

Requirements

1. Use a provided robot base with 2 wheels and 2 motors as the picture

2. Use provided micro:bit board as the control system



3. Design by yourselves for additional structures in 2 parts: as poly acrylic sheets (using laser cutter) using the 2D CAD software and as plastics (using 3D printer) using the 3D CAD software with 3D printers. (regular materials and 2 servo motors are provided)

4. Be able to pick up dices from the provided area and to roll dices on the gamble table. Only dices stays on the table counted as your score.

5. Be able to control movements manually
6. Provide with only 10 dices as shown here …
7. Count your score by adding all numbers that **come out from the dices that could stay on the gamble table**. After that, the dices will be removed from the gamble table when the score is counted and put them back scattered around the field. In 3 minutes, you could pick up and roll the dices as many time as you could, the total add up score is your final score.
8. Test your robot in a providing field which includes collecting area, gamble table, and dices (scattered around the field) may be look like as this picture above.

Grouping to form a group of 5-6-7 students, in which 1-2 students responsible for 2D design, 1-2 students responsible for 3D design, and remaining students are responsible for control system design.

Due date before the midterm exam