Special Topics in Chemical Engineering 2

Course Name	Course type (credit/hours)	Elective course(3/3)	Course code	D045
	Target students Division/major/grade	Chemical Engineering/Senior	Opening semester	2020 1ST SEMESTER
	Class time and classroom	Mon C(CDL106)Wed C(CDL106)	English Grade	A(100%English)
Reference to this course	Prerequisite courses	물리화학, 유기화학, 양자역학개론		
	Related basic courses			
	Recommended concurrent courses			
	Related advanced courses			

Instructor	Name (title/division)	Ju-Hyung Kim(Associate Professor, Energy Systems Research)				
	Office Room Number	서관 205-1	Office phone Number	2386	e-mail	
	Office hours		Homepage address			
Teaching Assistant	Name (title/division)					
	Office Room Number		Office phone Number		e-mail	

1. Introduction

Introduction of organic (or carbon-based) electronics, which is receiving much attracation in the chemical engineering field, is main purpose of this class.

The lectures will cover the range from fundamentals of organic semiconductors to various applications such as organic light-emitting diodes (OLEDs) and organic thin-film transistors (OTFTs), including working principles, structural designs, functionalities, and fabrication processes.

Recent research in this area will be also reviewed.

2. Course Objectives

1. 유기 반도체 기술의 전반적인 내용을 이해한다.

2. 유기 반도체의 핵심 요소 기술과 전자 소자의 응용 과정을 이해한다.

3. 실제 산업 분야에서 요구하는 유기 반도체 관련 기술과 최신 연구 동향에 대해 이해한다.

This class will provide fundamental knowledge of organic (or carbon-based) electronics, leading to electronic and optoelectronic device applications.
In addition, general technology and recent research in the industrial fields will be also discussed for better understanding.

3. Class types and activities

1. Lectures will be given with various supprting materials and references.

2. Mid-term and final examinations are scheduled.

3. Opportunities for experiencing pracital applications of organic devices will be provided.

4. Teaching Method

- [V] lecture
- [V] team project(presentation and case studies)
- [ ] designing and production
- [ ] others
- [ ] discussion and debate
- [ ] experiments(role-playing,etc)
- [ ] on-site learning(on-site training)

5. Support Systems in Use

- [V] AjouBb
- [ ] cyber lecture
- [ ] class behavior analyazing system
- [ ] automatic recording system
- [ ] online content
- [ ] others
- [ ] web-based assignment

6. Teaching Tools

- [ ] PBL(Problem Based Learning)
- [ ] UR(Undergraduate Research)
- [ ] others
- [V] CBL(Case Based Learning)
- [ ] FL(Flipped Learning)
- [ ] TBL(Team Based Learning)
- [ ] DSAL(Data Science Active Learning)

7. Knowledge and ability required for taking this course

물리 화학 (양자역학), 유기 화학
(Physical Chemistry (Quantum Mechanics), and Organic Chemistry)

8. Method of Evaluation

Evaluation Item	The Number of Times	Evaluation Proportion	Remarks
Attendance		5	
midterm exam	1	40	
final exam	1	40	
quiz			
presentation	1	15	주어진 주제에 대해 개별 발표 및 QnA
discussion			
homework			
etc			
study hours	2시간		

9. Textbook and supplementary material

Main/Sub	Title (Web-site)	Writer	Publisher	Publication year
Main	강의 노트 (Lecture Notes)			
Ref.	Atkins' Physical Chemistry, 10th Edition	Atkins and de Paula	OXFORD	
Ref.	Organic Electroluminescence	Kafafi	SPIE Press	
Ref.	Introduction to Solid State Physics	Kittel	WILEY	

10. Class system and Class shedule

1. 기본적인 전자와 반도체의 성질
   (Introduction to electrons and semiconductors)

2. 유기 반도체의 전자 구조 및 특성
   (Electronic structures and their related properties of organic semiconducting materials)

3. 유기 반도체의 응용 및 소자 구동 원리: 유기 발광 다이오드, 유기 박막 트랜지스터, 유기 태양 전지
   (Device applications of organic semiconductors: Organic light-emitting diodes, organic thin-film transistors, and organic photovoltaic)

4. 유기 반도체 공정 기술 및 최근의 연구 동향
   (Processing of organic semiconductors, and recent research issues)

< Class Schedule >

* language : K-korean, E-English

Weeks	Topics	language	Instructor	Teaching Method	Evaluation Method	Matter to be prepared
1	Introduction of Organic Electronics	E	Ju-Hyung Kim			
2	Quantum Theory Review	E	Ju-Hyung Kim			
3	Quantum Theory Review	E	Ju-Hyung Kim			
4	Solid Properties (Semiconductors)	E	Ju-Hyung Kim			
5	Solid Properties (Semiconductors)	E	Ju-Hyung Kim			
6	Electronic and Optoelectrical Properties of Organic Materials	E	Ju-Hyung Kim			
7	Electronic and Optoelectrical Properties of Organic Materials	E	Ju-Hyung Kim			
8	Mid-term Examination (중간고사)	E	Ju-Hyung Kim			
9	Fundamental of Organic Electronics	E	Ju-Hyung Kim			
10	Fundamental of Organic Electronics	E	Ju-Hyung Kim			
11	Organic Light-Emitting Diodes	E	Ju-Hyung Kim			
12	Organic Light-Emitting Diodes	E	Ju-Hyung Kim			
13	Organic Thin-Film Transistors	E	Ju-Hyung Kim			
14	Organic Photovoltaic	E	Ju-Hyung Kim			
15	Processing and Recent Research Issues	E	Ju-Hyung Kim			
16	Final Examination (기말고사)	E	Ju-Hyung Kim			

11. Other items of notification

본 수업은 영어로 진행되는 영어강의입니다.
(The lectures will be given in English.)