Special Topics in Chemical Engineering 2

Course Name	Course section (credit/hours)	Elective course(3/3)		course code	D024
	course item			course component	
	Target students Division/major/grade			opening semester	2021 1ST SEMESTER
	Class time and classroom	Mon C(CDL106)Wed C(CDL106)		English Grade	A(100%English)
Reference to this course	Credit compositon	Theory(3) + Design(0) + Practice(0)			
	Prerequisite courses	물리화학, 유기화학, 양자역학개론			
	Related basic courses				
	Recommanded concurrent courses				
	Related advanced course				
Instructor	Name (title/division)	Ju-Hyung Kim(Associate Professor, Energy Systems Research)			
	Office Room Number	서관 205-1	Extension Number	2386	e-mail	juhyungkim@ajou.ac.kr
	Office hour		Homepage address		
Teaching Assistant	Name (title/division)				
	Office Room Number		Office phone Number		e-mail	

1. Course 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 & course outcome

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

6. Teaching Tools

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

7. Evaluation method of course outcome

Evaluation Item	The Number of Times	Evaluation Proportion	Remarks
Attendance			수업 일수의 1/4 초과 결석의 경우 F
midterm exam	1	20	
final exam	1	40	
quiz			

7. Evaluation method of course outcome

Evaluation Item	The Number of Times	Evaluation Proportion	Remarks
presentation	1	20	주어진 주제에 대해 개별 발표 및 QnA
discussion			
homework	14	20	매주 개인 과제 (온라인 수업으로 출석은 과제점수에 포함됨)
etc			
study hours	2시간		

8. Textbook and Reference material

Main/Sub	Title	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	

9. 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)

< Schedule >

* language : K-korean, E-English

Weeks	Title of lecture	language	time distribution(minutes)			Teaching Method	evaluation method
			theory	design	experiment practice		
1	Introduction of Organic Electronics	E	3				
2	Quantum Theory Review	E	3				
3	Quantum Theory Review	E	3				
4	Solid Properties (Semiconductors)	E	3				
5	Solid Properties (Semiconductors)	E	3				
6	Electronic and Optoelectrical Properties of Organic Materials	E	3				
7	Electronic and Optoelectrical Properties of Organic Materials	E	3				
8	Midterm Examination (중간고사)	E	3				
9	Fundamental of Organic Electronics	E	3				
10	Fundamental of Organic Electronics	E	3				
11	Organic Light-Emitting Diodes	E	3				
12	Organic Light-Emitting Diodes	E	3				
13	Organic Thin-Film Transistors	E	3				
14	Organic Photovoltaic	E	3				
15	Processing and Recent Research Issues	E	3				
16	Final Examination (기말고사)	E	3				

10. Contribution index of the course for attaining ABEEK program outcomes

course outcome	contribution scale
No Data	

11. Analysis of improved matters for the previous semester

13. Reference items

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