

Syllabus [2025Year 2 Term]

Course Information

Course Title	Quantum Chemical Engineering	Credits	3
Course Code	549940-1	Required/Elective (For Undergraduate Courses)	Selective majors
Department or Major	Department of Chemical Engineering	Language	English
Methods of Teaching		Lecture Room	화9,10,11,12,13,14(3공516)
Time Allotment	Lecture(2) Experiments(0) Trainging & Practice(0) Performance(0) Designing & Planning(1)	Cyber Lectures	
Course Type	offline		
Cyber Lectures Preview			

Lecturer

Lecturer	Name	Yong-Kul Lee	Rank	Professor	Final Academic Degree	공학박사
	Department & college	Institute of Advances in Science and Technology		Office	College of Engineering – Building 3 511	
	Office Phone Number	—		e-mail	yolee@dankook.ac.kr	
	Field of Interest					

Course Summary

Course Description	Quantum mechanics enables scientists to calculate energy levels and other properties of a tom and molecules. In this course we will consider the electronic orbitals of the hydrogen atom in detail and shoe how these calculations can be extended to describe atoms with more than one electron.
Description Related Courses	
Course Goals	
Projected Results	

Percentage of the original language classes(%)	
Cyber Lectures P review	

Syllabus

Times	Lecture Topic	Lecture Goals	Lecture Methods	Assignments
1	Introduction			
2	Quantum Theory – Heisenberg Uncertainty Principle – Schrodinger Equation			
3	– Operators – Expectation Values and Superposition			
4	– Particle in a One-Dimensional Box			
5	– Particle in a Three-Dimensional Box			
6	– Classical Harmonic Oscillator			
7	– Quantum Mechanical Harmonic Oscillator			Report
8	Atomic Structure – Schrodinger Equation for Hydrogenlike Atoms			
9	– Eigenfunctions and Probability Densities for Hydrogenlike Atoms			
10	Molecular Electronic Structure – Born-Oppenheimer Approximation – The Hydrogen Molecule Ion			
11	– Calculation of the Energy of the Hydrogen Molecule Ion			Report
12	Symmetry – Symmetry Elements and Symmetry Operations			
13	– The Rotation Operation and the Symmetry Axis – The Reflection Operation and the Symmetry Plane			Report
14	Computational chemistry – Structure and energy optimization – Frequencies and TS calculations			

Times	Lecture Topic	Lecture Goals	Lecture Methods	Assignments
15	Final exam			

Methods of Grading

sequence	Description	Percentage	Details
1	Mid-tem Exam	30%	
2	Final-exam	30%	
3	Pop Quizzes	0%	
4	Assignments	10%	
5	Reports	0%	
6	Presentations & Discussions	10%	
7	Attendance	20%	
8		0%	
9	Others	0%	
All		100%	

Core of Value

핵심가치	전공역량	역량정의	역량구분	값(%)
혁신 (Discovery)	창의적문제해결 (Creative problem-solving)	주어진 상황과 문제를 창의적으로 해결할 수 있는 능력	부역량	0%
혁신 (Discovery)	도전 (Challenging)	전공 지식을 새로운 분야와 융합하고 아우를 수 있는 능력		0%
혁신 (Discovery)	지식융합 (Knowledge convergence)	새로운 분야를 개척하거나 도전적으로 임할 수 있는 능력	부역량	0%
헌신 (Dedication)	세계시민 (Universal value)	세계 공동체 구성원으로 전공자로서 국제적 이슈에 대응할 수 있는 능력		0%
헌신 (Dedication)	상호협력 (Cooperation)	공동의 목적 달성을 위해 타인과 상호협력을 할 수 있는 능력		0%
헌신 (Dedication)	공동체 (Sense of community)	공동체의 구성원으로서 필요한 태도와 윤리의식을 가질 수 있는 능력		0%
능동 (self-Determination)	자기주도 (Self-Managing)	주어진 상황과 문제를 주도적이고 능동적으로 해결할 수 있는 능력		0%

핵심가치	전공역량	역량정의	역량구분	값(%)
능동 (self-Determination)	지식활용 (Knowledge application)	주어진 상황과 문제에 대해 논리적으로 파악하고 분석할 수 있는 능력	주역량	0%
능동 (self-Determination)	논리적사고 (Logical thinking)	전공관련 지식을 필요에 따라 다양하게 적용하고 활용할 수 있는 능력		0%
능동 (self-Determination)	의사소통 (Articulation)	대화를 통해 다양한 의견을 조율하고 합의를 이끌어 낼 수 있는 능력		0%

Textbook(s) & References

Description	Title	Author	Publisher
Required Textbook	Physical Chemistry	Robert J, Silbey	John Wiley & Sons, Inc.
Recommended Textbook			
Recommended Textbook	Physical Chemistry	Peter Atkins/Julio de Paula,	교보문고

Memo