科目ナンバリング	U-LAS13 10006 LE60				
授業科目名<英訳>	Basic Physical Chemistry (quantum theory)-E2 Basic Physical Chemistry (quantum theory)-E2	担当者所属職名・氏名	エネルギー理工学研究所 講師 ARIVAZHAGAN RAJENDRAN		
群	自然科学科目群	分野(分類)	化学(基礎)	使用言語	英語
旧群	B群	単位数	2単位	週コマ数	1コマ	授業形態	講義（対面授業科目）
開講年度・開講期	2026・後期	曜時限	火2	配当学年	全回生	対象学生	理系向

[授業の概要・目的]

We will explore the fundamentals of quantum theory from a chemical perspective. The course begins with the basic properties of electromagnetic waves and the De Broglie concept of matter waves. After understanding wave-particle duality, we will examine the early atomic models, such as the Bohr atomic model, and discuss the quantization of energy. Next, we introduce the Schrodinger wave equation, the concept of the wave function, and atomic orbitals, and solve simple quantum mechanical problems to gain insight into the absorption and vibrational spectra of molecules. The hydrogen atom and the electron spin will be discussed in detail.

[到達目標]

This course aims to help students understand the fundamental concepts and principles that form the basis of quantum chemistry.

[授業計画と内容]

1. Properties of the electromagnetic waves
2. Bohr's atomic model
3. De Broglie wave of matter
4. Concept of quantum mechanical operators
5. Normalization, orthogonality, and orthonormality
6. Postulates of quantum mechanics
7. Time-independent and time-dependent Schrodinger wave equations
8. One-dimensional (1D) potential wells
9. 1D potential wells: Applications, and Particle in 2D and 3D boxes
10. 1D harmonic oscillation
11. Particle in a ring, Particle on a sphere, and Rigid rotator
12. Wave function and energy eigenvalue of hydrogen atom, and Zeeman effect
13. Spin of electron and spin-orbit interaction
14. Term symbols and revised Zeeman effect
15. Term examination
16. Feedback

[履修要件]

特になし

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[成績評価の方法・観点]

Results will be evaluated by the submission of homework written in English (30%), attendance and discipline (20%), and assignment which is considered as a term examination (50%).

[教科書]

Donald A. McQuarrie 『Quantum Chemistry, 2nd Edition』（University Science Books）ISBN:978-1-891389-50-4
Peter Atkins and Julio de Paula 『Atkins' Physical Chemistry, 10th Edition』（Oxford University Press）ISBN:978-0-19-969740-3

[参考書等]

（参考書）
授業中に紹介する

[授業外学修（予習・復習）等]

I recommend that the students should review the points to be learned.

[その他（オフィスアワー等）]

Office hours are set at 15:00-17:00 in every Friday.

[主要授業科目（学部・学科名）]

理学部