

# 國立中正大學課程大綱

## National Chung Cheng University Course Syllabus

2026.01.19 修訂

學年/學期 (Academic Year / Semester)	114-2		
課程名稱 (Course name)	General Chemistry (II)		
課碼 (Course code)	2601102_03	學分數 Credit(s)	3
授課教師 (Instructor)	Prof. Joyce Shuchun Yu (于淑君) Tel: 05-272-0411 ext. 66407, email: chejyy@ccu.edu.tw		
課程助教 (Teaching Assistant)	蔡聿貞 (ext. 61405, email: g12260025@alum.ccu.edu.tw) 張心妮 (ext. 61405, email: annie.chang66666@gmail.com)		
授課方式(teaching methods)	<input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Student Presentation <input type="checkbox"/> Seminar <input type="checkbox"/> Lab <input type="checkbox"/> other		
先修科目 (Prerequisite)	<p>Prerequisites for General Chemistry (II) include a working knowledge of:</p> <ul style="list-style-type: none"><li>Basic physics concepts: energy, forces, velocity, and momentum.</li><li>Vectors and their graphical representation.</li><li>Algebraic skills: factoring polynomials and using the quadratic equation.</li><li>Multi-step problem-solving.</li></ul>		
課程介紹與教學目標 (Course Description and Objectives)	<p><b>Course Description</b>—(3 credits):</p> <p>This course delves deeper into the fundamental principles and laws of chemistry, building upon your foundational knowledge. We will explore the fascinating world of chemical kinetics, equilibrium, and redox reactions, unraveling the mysteries of electrochemistry and thermodynamics. You'll also gain an understanding of nuclear chemistry, complex ions, and coordination compounds. Throughout this course, we will emphasize the use of English to communicate chemical concepts effectively, preparing you for advanced studies and professional careers in chemistry and related fields.</p> <p><b>Objectives:</b></p> <p>Students who successfully complete this course should be able to:</p> <ul style="list-style-type: none"><li><b>Communicate effectively in English:</b> Confidently use English to discuss, read, and write about chemical concepts, experimental findings, and research.</li><li><b>Master chemical kinetics and equilibrium:</b> Analyze reaction rates, determine equilibrium constants, and predict shifts in equilibrium using Le Châtelier's principle.</li><li><b>Understand thermodynamics:</b> Apply the three laws of thermodynamics to chemical systems, calculate enthalpy, entropy, and Gibbs free energy changes, and predict the spontaneity of reactions.</li><li><b>Explore electrochemistry:</b> Explain redox reactions, electrochemical cells, and electrolysis. Calculate cell potentials</li></ul>		

	<p>and relate them to Gibbs free energy. Describe the principles of corrosion and its prevention.</p> <ul style="list-style-type: none"> <li>• <b>Investigate nuclear chemistry:</b> Describe radioactive decay processes, understand nuclear fission and fusion, and discuss applications of nuclear chemistry.</li> <li>• <b>Grasp coordination chemistry:</b> Explain the properties of transition metals, the formation and structure of coordination compounds, isomerism, and the relationship between electronic structure and color in coordination complexes.</li> <li>• <b>Develop laboratory skills:</b> Apply chemical principles to conduct experiments, analyze data, and interpret results. (This could be expanded with specific techniques depending on your lab component)</li> <li>• <b>Think critically and solve problems:</b> Analyze chemical phenomena, apply concepts to solve problems, and evaluate evidence to draw conclusions.</li> </ul>
教科書及學習工具 (Textbooks and Tools)	<p><b>Required Textbook:</b> Steven S. Zumdahl and Donald J. DeCoste <i>Chemical Principles</i>, 8/e Asia Edition, CENGAGE Learning, 2017.</p> <p><b>Call Number:</b> ISBN-13: 9789814834216; ISBN-10: 9814834211</p> <p><b>GenAI Tools:</b> ChatGPT (4.0 recommended); Gemini Advanced; NaturalReader</p>
學習評量與成績配分 (Assessment and Grade Scale)	<ul style="list-style-type: none"> <li>• Midterm Exam..... 25% <b>(Week-09, 4/20)*</b></li> <li>• Final Exam..... 25% <b>(Week-17, 6/17)*</b></li> <li>• Quizzes..... 15%</li> <li>• Problem Sets &amp; Homework..... 20%</li> <li>• Group Oral Presentations..... 15% <b>(Week-14, 5/25, 5/27)*</b></li> </ul> <p>* Dates are subject to change based on progress. Announcements will be made well in advance.</p>
課程要求 (Course Requirements)	Attendance is required
課程進度 (Course Schedule)	
Week	Contents <i>(The course schedule is subject to adjustment based on students' learning progress and needs.)</i>
Week 01 (02/23, 02/25)	<ul style="list-style-type: none"> <li>• Course Description</li> <li>• Dividing Students into Groups</li> <li>• Scheduling Group Supervisions</li> <li>• Pre-test on Chemical English</li> <li>• Applications of Aqueous Equilibria</li> </ul>
Week 02 (03/02, 03/04)	<ul style="list-style-type: none"> <li>• Energy and Thermochemistry <ul style="list-style-type: none"> <li>◊ Energy</li> <li>◊ Enthalpy</li> </ul> </li> <li>• Thermochemistry of Ideal Gas</li> </ul>
Week 03 (03/09, 03/11)	<ul style="list-style-type: none"> <li>• Energy and Thermochemistry <ul style="list-style-type: none"> <li>◊ Calorimetry, Hess Law</li> <li>◊ Standard Enthalpy of Formation</li> <li>◊ Energy Sources-Present and Future</li> </ul> </li> </ul>

Week 04 (03/16, 03/18)	<ul style="list-style-type: none"> <li>● Entropy and Free Energy               <ul style="list-style-type: none"> <li>◊ Spontaneity and Entropy</li> <li>◊ Free Energy and Work</li> <li>◊ Reversible, irreversible and Adiabatic Processes</li> </ul> </li> <li>● Electrochemistry</li> <li>● Galvanic Cell</li> </ul>
Week 05 (03/23, 03/25)	<ul style="list-style-type: none"> <li>● Electrochemistry               <ul style="list-style-type: none"> <li>◊ Reduction Potential and Cell potential</li> <li>◊ Electric Work and Free Energy</li> <li>◊ Electrodes and Concentration Cells</li> <li>◊ Batteries</li> <li>◊ Corrosion and Electrolysis</li> </ul> </li> </ul>
Week 06 (03/30, 04/01) (03/31)	<ul style="list-style-type: none"> <li>● Electrochemistry               <ul style="list-style-type: none"> <li>◊ Commercial Electrolytic Processes</li> </ul> </li> <li>● Quantum Mechanics and Atomic Theory               <ul style="list-style-type: none"> <li>◊ Electromagnetic Radiation</li> <li>◊ Hydrogen Spectrum</li> </ul> </li> </ul>
Week 07 (04/06~04/08)	<ul style="list-style-type: none"> <li>● 民族掃墓節補假（依行政院公告）</li> <li>● 校際活動補假（補校慶運動會活動）</li> </ul>
Week 08 (04/13, 04/15)	<ul style="list-style-type: none"> <li>● Quantum Mechanics and Atomic Theory               <ul style="list-style-type: none"> <li>◊ Bohr Model</li> <li>◊ Quantum Mechanics</li> <li>◊ Wave Function</li> <li>◊ Orbital and Quantum Numbers</li> </ul> </li> </ul>
Week 09 (04/20, 04/22)	<ul style="list-style-type: none"> <li>● Quantum Mechanics and Atomic Theory               <ul style="list-style-type: none"> <li>◊ Electron Spin and Aufbau Principal</li> <li>◊ Atomic Properties</li> </ul> </li> <li>● <b>Midterm Exam</b> (04/20)</li> </ul>
Week 10 (04/27, 04/29)	<ul style="list-style-type: none"> <li>● Bonding Theory               <ul style="list-style-type: none"> <li>◊ Bonding Types</li> <li>◊ Lewis Structures and Octet Rule</li> <li>◊ Molecular Structures: VSEPR Model</li> <li>◊ Hybridization</li> </ul> </li> </ul>
Week 11 (05/04, 05/06)	<ul style="list-style-type: none"> <li>● Bonding Theory               <ul style="list-style-type: none"> <li>◊ Molecular Orbital Theory</li> <li>◊ Molecular Spectroscopy</li> </ul> </li> </ul>
Week 12 (05/11, 05/13)	<ul style="list-style-type: none"> <li>● Chemical Kinetics               <ul style="list-style-type: none"> <li>◊ Reaction Rates</li> <li>◊ Rate Law</li> <li>◊ Integrated Rate Law</li> <li>◊ Reaction Mechanism</li> </ul> </li> </ul>
Week 13 (05/18, 05/20)	<ul style="list-style-type: none"> <li>● Chemical Kinetics               <ul style="list-style-type: none"> <li>◊ Steady State Approximation</li> <li>◊ Catalysis</li> </ul> </li> <li>● Liquids and Solids               <ul style="list-style-type: none"> <li>◊ Intermolecular Forces</li> <li>◊ Liquid and Solid States</li> </ul> </li> </ul>

Week 14 (05/25, 05/27)	<ul style="list-style-type: none"> <li>• Oral Presentation           <ul style="list-style-type: none"> <li>◊ Self Introduction</li> <li>◊ Oral Presentation</li> </ul> </li> </ul>
Week 15 (06/01, 06/03)	<ul style="list-style-type: none"> <li>• Liquids and Solids (05/27)           <ul style="list-style-type: none"> <li>◊ Structures of Solids</li> <li>◊ Intermolecular Forces</li> </ul> </li> <li>• Transition Elements and Coordination Chemistry           <ul style="list-style-type: none"> <li>◊ Transition Elements</li> <li>◊ General Properties</li> <li>◊ Electronic Configuration</li> </ul> </li> </ul>
Week 16 (06/08, 06/10)	<ul style="list-style-type: none"> <li>• Submit the self-assessment form and group mutual assessment form</li> <li>• Curriculum and teaching evaluation questionnaire survey</li> <li>• English listening, speaking, reading and writing post-test score announcement</li> </ul>
Week 17 (06/15, 06/17)	<ul style="list-style-type: none"> <li>• <b><i>Final Exam</i></b> (06/17)</li> <li>• Submit the self-assessment form and group mutual assessment form</li> <li>• Curriculum and teaching evaluation questionnaire survey</li> <li>• English listening, speaking, reading and writing post-test score announcement</li> </ul>
Week 18 (06/22, 06/24)	<ul style="list-style-type: none"> <li>• Flexible teaching is adjusted based on student needs and learning progress.</li> </ul>