Course number	U-LAS13 10032 LE60		
Course title (and course title in English)	Chemistry for non-science majors II-E2 Chemistry for non-science majors II-E2	Instructor's name, job title, and department of affiliation	Institute for Chemical Research Senior Lecturer,PINCELLA, Francesca

Group	Natural Sciences	Field(Classification)	Chemistry(Foundations)

Language of instruction	English	Old group	Group B	Number of credits	2

Number of weekly time blocks	1	Class style	Lecture (Face-to-face course)	Year/semesters	2025・Second semester

Days and periods	Thu.4	Target year	All students	Eligible students	For liberal arts students

[Overview and purpose of the course]

Everything that surrounds us is "chemistry", therefore a basic understanding of chemistry is the key to navigate our daily lives. In this course, we will focus on the basic questions: why and how does matter transform?
This course will cover the states of matter and their transformations, chemical reactions and their equilibria. The students will also be introduced to one of the most important tools of the modern scientist, the scientific method. Furthermore, each topic will be followed by a brief discussion on its relevance in our everyday lives. This course will embrace a "concept development study" where every chemical concept will be developed from the observation and analysis of experimental results followed by critical reasoning (from observation of the phenomenon to its explanation). The students are encouraged to actively participate in class and re-discover chemistry.

[Course objectives]

This course has multiple goals: most importantly, the students will gain a basic knowledge of important chemical concepts. Secondly, the students will become acquainted with the scientific method and the basic vocabulary of chemistry, with the aim to improve their ability to interpret and discern the reliability of the scientific news and information we gather in our daily lives. Thirdly, the "concept development study" approach will foster the students' critical thinking and creativity.

[Course schedule and contents)]

This course consists of 14 lectures, exam and one feedback class.
1. What is chemistry? Why is it important? Understanding the basics of the chemical language and the scientific method. (1 week)
2-4. Ideal gases: Boyle's law, Charles' law, ideal gas law and Dalton's law of partial pressures. Kinetic theory of gases. (3 weeks)
5-7. Chemical reactions and their equilibria: stoichiometry, equilibrium constants, the law of mass action, Le Châtelier's principle. (3 weeks)
8. Review of basic chemical concepts and mid-term exam (1 week)
9. Acid-base equilibrium: Arrhenius acid, Brønsted and Lowry acids, and Lewis acids. (1 week)
10. Reaction rates (1 week)
11-14. Phase transitions: melting, evaporation, sublimation and phase diagrams. Thermodynamic description of phase transitions and phase equilibria. State functions and the laws of thermodynamics. (4 weeks)
15. Exam
16. Feedback（1 week）

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Chemistry for non-science majors II-E2(2)

At the end of each lesson, an "everyday chemistry" topic related to the main topic of the lesson will be introduced. Some of these topics are: the chemistry of scuba diving, hypoxia and carbon monoxide poisoning, flowers as natural pH indicators, the atmospheres of the solar system, and the chemistry of food going bad. Guest lecture by Prof. Forte, Erika (Institute for Research in Humanities): "Science of the Song Dynasty" during regular class time.

[Course requirements]

At the beginning of the course, you do not need any specific prior knowledge of the topics of the course, essential knowledge for the course will be provided as needed in class.

[Evaluation methods and policy]

Evaluation will be based on attendance, active class participation (quizzes and exercises in class, 10%), individual and group assignments ("science in the news" project, 30%), mid-term exam in class (exercises, 30%), and final exam in class (multiple-choice and open questions, 30%).

[Textbooks]

Not used

[References, etc.]

（References, etc.）

John S. Hutchinson 『Concept Development Studies in Chemistry』 （OpenStax CNX） （http://cnx.org/contents/2f58c37f-a92d-490c-8d8d-fa590f8934cf@5.6）

Raymond Chang; Jason Overby 『Chemistry』 （McGraw-Hill US Higher Ed ISE） ISBN:9781260289022

[Study outside of class (preparation and review)]

The students are encouraged to continuously revise the vocabulary and concepts introduced in previous classes. The students should submit the assignments regularly to confirm their progress and understanding.

[Other information (office hours, etc.)]

Office hours: online or in person meetings with the instructor can be requested (appointment by email or on PandA)