Course Specification

Subject code: SCC 2303, Subject: Physical science

General Science Program, Faculty of Education, Suan Sunandha Rajabhat University

Semester: 2nd, Academic Year: 2022

Section One: General Information

1. Code and Course Title

Code: SCC 2303

Course Title: Physical science

2. Credits: 3 (2–2–5)

3. Curriculum and Course Category

3.1 Curriculum: Bachelor of Education Program in General Science

3.2 Course Category: Required courses

4. Course instructor Asst.Prof.Dr. Jadsada Ratniyom

5. Contact Location 1145 Faculty of Education **/ E – Mail** Jadsada.ra@ssru.ac.th

6. Semester / Year

6.1 Semester: 2nd/2022 / 2nd year students

6.2 Number of students accepted: 60 students

7. Pre–requisite course: –

8. Co–requisites course –

9. Learning Location Faculty of Education, Suan Sunandha Rajabhat University

10. Last Date for Preparing and Revising this Course November 2022

Section 2: Objectives and Purposes

1. Course Objectives

Upon completion of this course, Students will gain an understanding of;

1) Functional groups, Naming of organic compounds and writing the resonance structure of organic compounds

2) stereochemistry and the three–dimensional structure of organic molecules

3) an understanding of nucleophiles, electrophiles.

4) the prediction of mechanisms for organic reactions and how to use their understanding of organic mechanisms to predict the outcome of reactions.

2. Purposes for Developing / Revising Course

2.1) To modernize content in accordance with higher education qualification standards.

2.2) To provide students with an understanding of organic chemistry courses in order to contribute to the further development of the quality and career potential of graduates.

Section 3: Course Structure and organization

1. Course Description

Structures; Functional groups; Naming; Stereochemistry; Chemical reactions and mechanism of chemical reactions of organic compounds such as hydrocarbons, aromatic compounds, and organic compounds with other functional groups such as alkyl, halide, alcohol, ether, aldehyde, ketone, carboxylic acid and derivatives, amine and anide.

2. Time Length per Semester

Lecture	**Supplementary Classes** (hours)	***Practice/ Field Work***	***Self–Study hours***
60 hours/semester	Supplemental instruction is provided according to the needs of specific students.	–	Self–study 5 hours per week

๓. Time Length per Week for Individual Academic Consulting and Guidance

The lecturer provides one hour for individual consultation per week

3.1 Self–consultation at Room 1145, Faculty of Education (1 hour /week)

3.2 Consultation via electronic mail (E–Mail): jadsada.ra@ssru.ac.th

3.3 Consultation via Line: @Jade_Jadsada

Section 4: Developing Students' Learning Outcomes

1. Ethics and Morals

1.1 Ethics and Morals students need to develop

O (1) Personal responsibility, punctuality, determination, honesty to oneself and society

● (2) Public–minded, altruistic over self interest

O (3) Being polite and respect others

O (4) Being courageous and express moral and ethical, able to diagnose, manage and think about moral and ethical problems with appropriateness and social suitability.

1.2 Method of Teaching

(1) Lecturing on how class attendance and individual and/or group activities within and outside the class will be organized and assigned.

(2) Assigning students tasks or exercises to practice accountability and punctuality.

1.3 Method of Evaluation

(1) Evaluation of following learning assignments and students' discipline during activities

(2) Classroom participation observation.

2. Knowledge

2.1 Knowledge students need to master

○ (1) Be well–versed in principle, concept Theory, professional content of teachers

● (2) Understand Functional groups; Naming; Stereochemistry; Chemical reactions and mechanism of chemical reactions of organic compounds.

○ (3) Knowledge, understanding of life Understand the community. Understand the world and coexistence based on cultural differences.

○ (4) Knowledge and ability to use Thai and English for communication according to the standards.

○ (5) Recognize the importance and importance of the King's Foundation for Sustainable Development.

2.2 Method of Teaching

(1) Hybrid and active learning integrated with Flipped–classroom learning management by using website, Youtube and google classroom.

(2) Conducting Chemistry experiment and simulation including virtual laboratory.

(3) Discussion and scientific argumentation on concepts in Chemistry.

2.3 Method of Evaluation

(1) Classroom observation.

(2) Scientific skills formative and informative assessment.

(3) Evaluation of students' concepts in chemistry through midterm and final

3. Cognitive Skills

3.1 Cognitive skills students need to develop

O (1) Critical thinking focusing on data analysis and interpretation

O (2) Problem–solving skill focusing on solving physics problems and projects.

O (3) Creative thinking focusing on designing physics learning activities for middle school.

3.2 Method of Teaching

(1) Inquiry–based learning management and group discussions.

(2) Group working in order to brainstorm ideas and using scientific argumentation

(3) Engage in chemistry problems and collecting, analyzing and interpreting data in chemistry

3.3 Method of Evaluation

(1) Assignments on physics problems and projects.

(2) Formative and informative assessments.

(3) Evaluation of group work.

(4) Test of learning outcome.

4. Interpersonal Skills and Responsibilities

4. Interpersonal Skills and Responsibilities students need to develop

O (1) Recognize and understand the knowledge of others. Have a positive mindset, have emotional and social maturity.

O (2) Knowledge and understanding about roles and self–responsibility as well as responsibility for others in group working and continuing self–development.

O (3) Awareness of responsibility for others, being with others, and continuing self–development Communication.

O (4) Being able to create good relationship, responsibility, working with others, being a leader and follower, analyzing and solving problems creatively and effectively.

4.2 Method of Teaching

(1) Students engage in group activities both in laboratory and lecture

(2) Assignments on chemistry problems and projects

4.3 Method of Evaluation

(1) Classroom observation during students' group activity.

(2) Evaluation of individual and team work assignment.

5. Numeral Analysis, Communication and Information Technology Skills

5.1 Numeral Analysis, Communication and Information Technology Skills students need to develop

O (1) Calculating skill and measurement

O (2) Communicating effectively with learners, individuals and groups in a variety of ways, including speaking. Writing and presenting in different formats using the right technology and innovation.

O (3) Using information technology Ready–made programs needed for learning, learning management, work, meetings. Managing and retrieving information. Recognize copyright infringement and plagiarism of works.

5.2 Method of Teaching

(1) Searching and presenting key educational issues using information technology

(2) Active learning by Using situations, problems, case studies, real–world situations in project learning, and research.

(3) Students write and present scientific result using infographic and technology.

5.3 Method of Evaluation

(1) Evaluation of students information technology skill

(2) Evaluation of the students' written scientific report and communication

6. Learning Management Skills

6.1 Learning Management Skills students' needs to develop

O (๑) be able to be Proficient in learning management using variety of methods.

O (๒) Be able to apply psychological knowledge to analyze learners individually

● (๓) Be able to design learning activities and learning environments within the context of a unit of learning and real world.

O (๔) Creating atmosphere and setting the classroom environment for learning.

O (5) Applying 21 century skills and technology to learning management.

6.2 Method of Teaching

Assigning students to organize learning activities based on their assigned topics.

6.3 Method of Evaluation

Evaluate based on the learning activities that students come up with.

<u>หมายเหตุ</u>

สัญลักษณ์ ● หมายถึง ความรับผิดชอบหลัก

สัญลักษณ์ O หมายถึง ความรับผิดชอบรอง

เว้นว่าง หมายถึง ไม่ได้รับผิดชอบ

ซึ่งจะปรากฏอยู่ในแผนที่แสดงการกระจายความรับผิดชอบมาตรฐานผลการเรียนรู้จากหลักสูตรสู่รายวิชา (Curriculum Mapping)

Section 5: Lesson Plan and Assessment

1. Lesson plan

Week	Topic	Hours	Learning Activities/ Teaching materials	Lecturer
1	– Course Introduction –Test basic knowledge **Chapter 1: Introduction to Organic Chemistry** – Functional group classification – Review of lewis structure writing – orbital hybridization (sp^3, sp^2, sp) – Writing 2D and 3D structural formulas	4	–Explain the course description and objective of this course –Test basic knowledge - Use of 5E inquiry–based learning management - Discuss exercises while studying together in the classroom. - Assign online homework	Asst.Prof.Dr.Jadsada Ratniyom
2	**Chapter 2 : Nomenclature of Organic compound [online]** - Naming of hydrocarbon compound and organic compound containing various functions.	4	- Teach by using Flipped–classroom learning management. - Students study on their own through video clips prepared by the instructor. When school hours arrive, homework will be discussed in classroom. - Assign online homework relevant to the lesson.	Asst.Prof.Dr.Jadsada Ratniyom
3	**Chapter 3 : Stereochemistry** Stereochemistry, Enantiomer, Diastereoisomer, conformational isomer	4	- Teach by using 5E inquiry–based learning management - Instructor will give short explanation of	Asst.Prof.Dr.Jadsada Ratniyom

Week	Topic	Hours	Learning Activities/ Teaching materials	Lecturer
			stereochemistry. Students study through teaching materials. - Practice exercise relevant to the lesson will be discussed and practiced in the classroom. - Instructors share teaching recording clip for students to review outside classroom. - Assign online homework relevant to the lesson.	
4	**Chapter 4: Organic reactions and its reaction mechanisms [online]** – Determination of formal charge – resonance theory – Inductive effect –Predicting acidity of organic compounds –Writing arrows shows the movement of electrons. – heterolytic and hemolytic cleavage – nucleophile and electrophile	4	- Teach by using Flipped–classroom learning management. - Students study on their own through video clips prepared by the instructor. When school hours arrive, homework will be discussed in classroom. - Assign online homework relevant to the lesson.	Asst.Prof.Dr.Jadsada Ratniyom
5	**Alkyl halides [online]** –Preparation of alkyl halide –Reaction of alkyl halides (E1 E2 S_N1 and S_N2)	4	- Teach by using 5E inquiry–based learning management - Instructor will give short explanation of stereochemistry. Students study through teaching materials.	Asst.Prof.Dr.Jadsada Ratniyom

Week	Topic	Hours	Learning Activities/ Teaching materials	Lecturer
			- Practice exercise relevant to the lesson will be discussed and practiced in the classroom. - Instructors share teaching recording clip for students to review outside classroom. - Assign online homework relevant to the lesson.	
6	**Alkenes & Alkyne** – structure and Preparation of alkenes – Reaction and mechanism of alkenes – structure and Preparation of alkyne – Reaction and mechanism of alkyne	4	- Teach by using 5E inquiry–based learning management - Instructor will give short explanation of stereochemistry. Students study through teaching materials. - Practice exercise relevant to the lesson will be discussed and practiced in the classroom. - Instructors share teaching recording clip for students to review outside classroom. Assign online homework relevant to the lesson.	Asst.Prof.Dr.Jadsada Ratniyom
7	**Activities to promote learning management methods** Students in each group prepare for teaching on topics they study before midterm, and give a presentation.	4	Student give a presentation	Asst.Prof.Dr.Jadsada Ratniyom

Week	Topic	Hours	Learning Activities/ Teaching materials	Lecturer
8	Midterm Exams			
9	**Aromatic compounds** – aromaticyty – Reaction and mechanism of electrophilic aromatic substitution	4	- Teach by using Flipped–classroom learning management. - Students study on their own through video clips prepared by the instructor. When school hours arrive, homework will be discussed in classroom. - Assign online homework relevant to the lesson.	Asst.Prof.Dr.Jadsada Ratniyom
10	**Alcohol** – Preparation of alcohols – Reactions of alcohol	4	- Teach by using 5E inquiry–based learning management - Instructor will give short explanation of stereochemistry. Students study through teaching materials. - Practice exercise relevant to the lesson will be discussed and practiced in the classroom. - Instructors share teaching recording clip for students to review outside classroom. Assign online homework relevant to the lesson.	Asst.Prof.Dr.Jadsada Ratniyom

Week	Topic	Hours	Learning Activities/ Teaching materials	Lecturer
11–12	**Aldehyde & Ketone** Preparation of Aldehyde & Ketone – Reactions of Aldehyde & Ketone	4	- Teach by using 5E inquiry–based learning management - Instructor will give short explanation of stereochemistry. Students study through teaching materials. - Practice exercise relevant to the lesson will be discussed and practiced in the classroom. - Instructors share teaching recording clip for students to review outside classroom. - Assign online homework relevant to the lesson.	Asst.Prof.Dr.Jadsada Ratniyom
13–14	**Carboxylic acid and its derivatives** - Preparation of carboxylic acids and its derivatives. - Reactions of carboxylic acids and its derivatives.	4	- Teach by using 5E inquiry–based learning management - Instructor will give short explanation of stereochemistry. Students study through teaching materials. - Practice exercise relevant to the lesson will be discussed and practiced in the classroom.	Asst.Prof.Dr.Jadsada Ratniyom

Week	Topic	Hours	Learning Activities/ Teaching materials	Lecturer
			- Instructors share teaching recording clip for students to review outside classroom. - Assign online homework relevant to the lesson.	
15	**Amines** - Preparation of amines - Reactions of amines -	4	- Teach by using 5E inquiry-based learning management - Instructor will give short explanation of stereochemistry. Students study through teaching materials. - Practice exercise relevant to the lesson will be discussed and practiced in the classroom. - Instructors share teaching recording clip for students to review outside classroom. - Assign online homework relevant to the lesson.	Asst.Prof.Dr.Jadsada Ratniyom
16	**Activities to promote learning management methods** Students in each group prepare for teaching on topics they study after midterm, and give a presentation.	4	Student give a presentation	
17	**Final examination**			

2. Course Evaluation

(ระบุวิธีการประเมินผลการเรียนรู้หัวข้อย่อยแต่ละหัวข้อตามที่ปรากฏในแผนที่แสดงการกระจายความรับผิดชอบของรายวิชา (Curriculum Mapping) ตามที่กำหนดในรายละเอียดของหลักสูตร สัปดาห์ที่ประเมิน และสัดส่วนของการประเมิน)

Learning outcome	Method	Week	Percentage
1.2	Attending classes and participating in online homework	ตลอดทั้งภาคการศึกษา	10
2.2, 3.2, 4.2	Problem set	ตลอดทั้งภาคการศึกษา	10
6.3	Work/presentation	7, 16	10%
2.1, 2.2	Midterm exam	8	35%
2.3, 2.4	Final exam	17	35%

Section 6: Learning and teaching resources

1. Textbooks and Main Documents

1) Ratniyom, J. (2563). *Organic chemistry*. Bangkok: SSRU. 837 pages.

2) Wade, L. G. (2020). *Organic Chemistry*: Pearson Education.

3) Solomons, T. W. G., & Fryhle, C. (2020). *Organic Chemistry*: John Wiley & Sons.

2. Important Documents for Extra Study

1) Clayden, J.; Greeves, N.; Warren, S. *Organic Chemistry*; OUP Oxford, 2012.

2) Miller, A.; Solomon, P. H. *Writing Reaction Mechanisms in Organic Chemistry*; Harcourt/Academic Press, 2000.

๓) เจษฎา ราษฎร์นิยม. (2561). *เอกสารคำสอนวิชาเคมีอินทรย์*. กรุงเทพฯ: มหาวิทยาลัยราชภัฏสวนสุนันทา.

3. Suggestion Information (Printing Materials/Website/CD/Others)

1) http://www.masterorganicchemistry.com/organic-1/

2) http://www.masterorganicchemistry.com/org-2-post-index/

3) http://www.masterorganicchemistry.com/summary-sheets/

Section 7 Course Evaluation and Revising

1. Strategies for Course Evaluation by Students

(1) Students evaluate the effectiveness of the course according to the content objectives through learning management system.

(2) Students' interview about opinions of learning management.

2. Strategies for Course Evaluation by Lecturers

The students' marks from the tests, assignments, scientific skills assessment, project evaluation, and observation form.

3. Teaching Improvement

Workshop for teaching and learning improvement and mentoring for student teacher hosted by SEAMEO STEM ED

4. Feedback for Achievement Standards

(1) Revise the course in terms of academic principles by examining the reports and the tasks.

(2) Revise the course activity accomplishment by examining the score result from participation, responsibility, discipline, and determination in conducting the projects.

(3) Revise the course from the students' marks.

5. Methodology and Planning for Course Review and Improvement

Have the meetings among the program committee regularly in order to discuss and synthesize the information from the teaching evaluation, the appropriateness of the activity arrangement, comments from the previous meetings and after the teaching, and students' marks of learning achievement. After that, take all information into consideration for planning the improvement plan of the course.

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Curriculum Mapping based on program specification TQF 2

General course information Subject	1. Ethic and Morality				2. Knowledge					3. Cognitive			4. Interpersonal Skills and Responsibilities				5 Numeral Analysis, Communication and Information Technology Skills			6. Learning Management Skills students' needs to develop				
	1	2	3	4	1	2	3	4	5	1	2	3	1	2	3	4	1	2	3	1	2	3	4	5
SCC2303 วิทยาศาสตร์กายภาพ	○	○	●	○	○	●	○	○	○	○	○	○	○	○	○	○	○	○	●	○	○	●	○	○