TQF.3

☑ Bachelor's Degree
☐ Master's Degree

TQF. 3 Course Specification

Course Code: BMA 2402

Course Title: Set Theory

Credits: 3(3-0-6)

Program: Bachelor of Education Program in Mathematics

(Bilingual Program)

Semester: Summer   **Academic Yea**r: 2024

College of Hospitality Industry Management

Suan Sunandha Rajabhat University

(CHM, SSRU)

Content

Section 1 General Information

1. Code and Course Title:

Course Code: BMA 2402

Course Title (English): Set Theory

ชื่อวิชา (ภาษาไทย): ทฤษฎีเซต

2. Credits: 3(3-0-6)

3. Curriculum and Course Category:

3.1 Curriculum: Bachelor of Education Program in Mathematics

3.2 Course Category:

☐ General Education ☑ Required Course

☐ Elective Course ☑ Cluster in Teaching Profession

4. Lecturers Responsible for Course and Instruction

4.1 Lecturer Responsible for course:

Asst.Prof. Dr. Supotch Chaiyasang

4.2 Instructional Course Lecturers:

(1) Asst.Prof. Dr. Supotch Chaiyasang

(2) Assoc.Prof. Dr. Komon Pisal

5. Contact / Get in Touch:

Room Number 305   Tel. 034-964946 Ext. 320

E-mail: supotch.ch@ssru.ac.th

6. Semester / Year of Study

6.1 Semester: Summer 2023   Year of Study: Undergraduate Student Year 2

6.2 Number of students enrolled: 19

7. Prerequisite Course

Fundamentals Mathematics

8. Co-requisite Course

None

9. Learning Location

College of Hospitality Industry Management Building, Nakorn Pathom Campus

Room No. 206

Tuesday 9.00 – 12.00 , 13,00 – 16.00

10. Last Date for Preparing and Revising this Course:

August 15, 2024

Section 2 Aims and Objectives

1. Course Aims

At the end of this course students will reach the desired learning outcomes based on six domains, as mentioned in the curriculum specification (TQF2), as follows:

1.1 Morals and Ethics

(1) Have acting with respect to rules of agreement in mathematics.

(2) Have integrity, honesty and teaching professional ethics.

(3) Have discipline, self and social responsibility.

1.2 Knowledge

(1) Be able to use the basic knowledge of number theory that accordance with the standards of Basic Core Curriculum B.E. 2008 (Revision 2017) in Mathematics.

(2) Have strong mathematical content knowledge and pedagogical content knowledge needed to support students' learning.

(3) Have knowledge and understanding principles and concepts of number theory.

1.3 Cognitive Skills

(1) Be able to provide solutions for problems involving types of models and operations.

(2) Be able to develop and demonstrate critical thinking to connect between various number theory topics and other application areas.

(3) Be able to identify and use mathematical representations to model and interpret concepts and principles for problem solving and proof reasonably.

1.4 Interpersonal Skills and Responsibility

(1) Have responsibility for building a positive attitude towards number theory.

(2) Be able to work collaboratively and demonstrate to be a good leader and a good follower.

(3) Be able to strengthen teachers' potential and capabilities in teaching number theory.

1.5 Numerical Analysis, Communication and Information Technology Skills

(1) Have concepts, principles, and theories of technology and innovation that promote learning quality development.

(2) Be able to apply mathematical processes and skills in solving problems.

(3) Be able to design, create, implement, and evaluate innovation for improvement mathematics classroom environment.

1.6 Learning Management Skills

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

(2) Be able to provide the learners with essential opportunities to enhance learning concepts and motivate active learning in mathematical process for problem solving.

(3) Be able to develop the learning materials to engage students' learning.

2. Course Objectives

At the end of this course, the student will be able to present a rigorous development of Set Theory using axioms, definitions, examples, theorems and their proofs.

2. Purposes for Developing / Revising Course (content / learning process / assessment / etc.)

According to the standards of professional knowledge and experience for requirement courses, undergraduate students program in mathematics (bilingual program) should have essence of knowledge in Mathematics Areas as follows:

(1) effectively express the concepts and results of Mathematics.

(2) construct mathematical proofs of statements and find counterexamples to false statements.

(3) collect and use numerical data to form conjectures about the integers.

(4) understand the logic and methods behind the major proofs in Mathematics.

Section 3 Course Structure

1. Course Outline

Introduction to set theory , sets and their operations , relations and functions , types of functions, operations of functions, infinite sets, countable and uncountable sets

2. Time Length per Semester (Lecture – hours / Practice – hours / Self Study – hours)

Lecture	Practice/ Field Work/Internship	Self-Study	Remedial Class
6hours/week		6 hours/week	3+ (if any)

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

3.1 Self consulting at the lecturer's office: Room Number 305

3.2 Consulting via office telephone: Tel. 034-964946 Ext. 320 or lecturer's mobile phone: Asst. Prof. Dr. Supotch Tel. 081-480-0821

3.3 Consulting via E-Mail: supotch.ch@ssru.ac.th

Section 4 Developing Student's Learning Outcomes

Learning Standards/Outcomes	Learning Activities	Learning Assessment
1. Morals and Ethics (1) Have acting with respect to rules of agreement in mathematics. (2) Have integrity, honesty and teaching professional ethics. (3) Have discipline, self and social responsibility.	- Demonstration - Group Work	Group discussion Report
2. Knowledge (1) Be able to use the basic knowledge of number theory that accordance with the standards of Basic Core Curriculum B.E. 2008 (Revision 2017) in Mathematics. (2) Have strong mathematical content knowledge and pedagogical content knowledge needed to support students' learning.	1. Explain some of the concepts of number theory, a primary area of mathematics, using examples. 2. Discuss mathematical ideas and concepts within the context of number theory	1. Exercises 2. Group report presentation

Learning Standards/Outcomes	Learning Activities	Learning Assessment
(3) Have knowledge and understanding principles and concepts of number theory.		
3. Cognitive Skills (1) Be able to provide solutions for problems involving types of models and operations. (2) Be able to develop and demonstrate critical thinking to connect various number theory topics and other application areas. (3) Be able to identify and use mathematical representations to model and interpret concepts and principles for problem solving and proof reasonably.	1. Use problem-based learning and internet-based learning to construct cognitive skills in solving mathematics classroom problems. 2. Discussion and presentation of research findings – students write reports, and other forms of work documentation to include in their portfolios or oral presentation their findings from discussion / searching information.	1. Individual portfolio 2. Term papers 3. Group report presentation
4. Interpersonal Skills and Responsibilities	1. Use research-based learning and internet-based learning on teaching number theory	1. Term papers

Learning Standards/Outcomes	Learning Activities	Learning Assessment
(1) Have responsibility for building a positive attitude towards using educational innovation and information technology. (2) Have knowledge and understanding of human relations to work in team both as leader and follower. (3) Be able to identify problems and seek best solutions to strengthen teachers' potentiality and capabilities in academic and professional career.	impact on students' achievement. 2. Students work in small groups. They plan to use mathematical process and skills in problem solving related to number theory.	2. Group report presentation
5. Numerical Analysis, Communication and Information Technology Skills (1) Be able to apply numerical analysis in problem solving. (2) Have concepts, principles, and theories of technology	1. Use research-based learning and internet-based learning on teaching number theory impact on students' achievement. 2. Students work in small groups. They plan to use information technology to create mathematical process	1. Individual portfolio 2. Term papers 3. Group report presentation

Learning Standards/Outcomes	Learning Activities	Learning Assessment
and innovation that promote learning quality. (3) Be able to design, create, implement, and evaluate innovation for improvement learning environment based on education quality.	and skills in problem solving related to number theory.	
6. Learning Management Skills (1) Be able to design learning activities and learning environments within the context of a unit of learning and real world. (2) Be able to provide the learners with essential opportunities to enhance learning concepts and motivate active learning in mathematical process for problem solving.	Discussion and presentation of learning and teaching with technology and research on development of mathematical thinking and knowledge in math class.	1. Individual portfolio 2. Term papers 3. Group report presentation

Learning Standards/Outcomes	Learning Activities	Learning Assessment
(3) Be able to develop the learning materials to engage students' learning.		

Section 5 Lesson Plan and Assessment

1. Lesson Plan

Week	Topic/Outline	Hours	Learning Activities and Medias
1	**Unit 1** sets and their operations	6	Lecture, self - study, and discussion
2	**Unit 2 relations and functions**	6	Lecture, self - study, and discussion
3-4	**Unit 3** operations on functions	**12**	Lecture, self - study, and discussion
	Mid-Term Examination	2	**Paper-Test**
5-6	**Unit 4 infinite sets and count able sets**	12	Lecture, self - study, and discussion
7-8	**Unit 5** uncountable sets	12	Lecture, self - study, and discussion
	Final Examination	2	**Paper-Test**
	Total of Hours	48 +	**Extra hours for independence study**

2. Learning Assessment Plan

Learning Outcomes	Assessment Activities	Time Schedule (Week)	Proportion for Assessment (%)
1. Morals and Ethics (1) Have acting with respect to rules of agreement in mathematics. (2) Have integrity, honesty and teaching professional ethics. (3) Have discipline, self and social responsibility.	1. Individual portfolio 2. Group discussion	Throughout semester	5 %
2. Knowledge (1) Be able to use the basic knowledge of number theory that accordance with the standards of Basic Core Curriculum B.E. 2008 (Revision 2017) in Mathematics.	1. Term papers 2. Group report presentation	Throughout semester	40 %

Learning Outcomes	Assessment Activities	Time Schedule (Week)	Proportion for Assessment (%)
(2) Have strong mathematical content knowledge and pedagogical content knowledge needed to support students' learning. (3) Have knowledge and understanding principles and concepts of number theory.			
3. Cognitive Skills (1) Be able to provide solutions for problems involving types of models and operations. (2) Be able to develop and demonstrate critical thinking to connect various number theory topics and other application areas.	1. Individual portfolio 2. Term papers 3. Group report presentation	Throughout semester	30 %

Learning Outcomes	Assessment Activities	Time Schedule (Week)	Proportion for Assessment (%)
(3) Be able to identify and use mathematical representations to model and interpret concepts and principles for problem solving and proof reasonably.			
4. Interpersonal Skills and Responsibilities (1) Have responsibility for building a positive attitude towards using educational innovation and information technology. (2) Have knowledge and understanding of human relations to work in team both as leader and follower. (3) Be able to identify problems and seek best solutions to strengthen	1. Checklists 2. Interviews	Throughout semester	5 %

Learning Outcomes	Assessment Activities	Time Schedule (Week)	Proportion for Assessment (%)
teachers' potentiality and capabilities in academic and professional career.			
5. Numerical Analysis, Communication and Information Technology Skills (1) Be able to apply numerical analysis in problem solving. (2) Have concepts, principles, and theories of technology and innovation that promote learning quality. (3) Be able to design, create, implement, and evaluate innovation for improvement learning	1. Individual portfolio 2. Term papers 3. Group report presentation	Throughout semester	10 %

Learning Outcomes	Assessment Activities	Time Schedule (Week)	Proportion for Assessment (%)
environment based on education quality.			
6. Learning Management Skills (1) Be able to design learning activities and learning environments within the context of a unit of learning and real world. (2) Be able to provide the learners with essential opportunities to enhance learning concepts and motivate active learning in mathematical process for problem solving. (3) Be able to develop the learning materials to engage students' learning.	1. Individual portfolio 2. Term papers 3. Group report presentation	Throughout semester	10 %

Section 6 Learning and Teaching Resources

1. Textbook and Main Documents

Hammack R. Book of Proof, Richard Hammack (publisher), 2013.

Lipschutz Seymour Set Theory and Related Topics, Schum's Outline Series, McGraw – Hill, 1998.

สถาบันส่งเสริมการสอนวิทยาศาสตร์และเทคโนโลยี หนังสือเรียนรายวิชาเพิ่มเติมคณิตศาสตร์

 ชั้นมัธยมศึกษาปีที่ 4 เล่ม 1 , โรงพิมพ์ สกสค., 2563.

สุเทพ ทองอยู่ ทฤษฎีเซต เอกสารโรเนียว ภาควิชาคณิตศาสตร์ มหาวิทยาลัยศรีนครินทร วิโรฒ มปพ.

2. Important Documents for Extra Study

Hammack R. Book of Proof, Richard Hammack (publisher), 2013.

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

สุพจน์ ไชยสังข์ การสอนเซตในชั้นมัธยมศึกษาตอนปลาย (บทความตีพิมพ์ ในนิตยสารของ สสวท.)

Section 7 Course Evaluation and Revising

1. Strategies for Course Evaluation by Students

Using survey questions to collect information from the students' opinions to improve the course and enhance the curriculum. Examples of questions:

(1) Content objectives were made clear to the students.

(2) The content was organized around the objectives.

(3) Content was sufficiently integrated.

(4) Content was sufficiently integrated with the rest of the first-year curriculum.

(5) The instructional materials used were effectively.

(6) The learning methods appropriate assessed the students' understanding of the content.

(7) Overall, Students are satisfied with the quality of this course . …………………….. etc. ……………………………

2. Strategies for Course Evaluation by Lecturer

2.1 Lecturers team observe the class and discuss the results as follow:

(1) The lecturer is well prepared for class sessions.

(2) The lecturer answers questions carefully and completely.

(3) The lecturer uses examples to make the materials easy to understand.

(4) The lecturer stimulated interest in the course.

(5) The lecturer made the course material interesting.

(6) The lecturer is knowledgeable about the topics presented in this course.

(7) The lecturer treats students respectfully.

(8) The lecturer is fair in dealing with students.

(9) The lecturer makes students feel comfortable about asking question.

(10) Course assignment are interesting and stimulating.

(11) The lecturer's use of technology enhanced learning in the classroom.

……………………….. etc. ………………………………

1.2 The director / head of program construct assessment items to evaluate four dimensions of lecturer's competencies: teaching skills, organization and presentation of materials, management of the learning environment, and teaching attitudes.

3. Teaching Revision

Lecturer revises teaching / learning process based on the results from the students' survey questions, the lecturer team's observation, and classroom research.

4. Feedback for Achievement Standards

College of Hospitality Industry Management Administrator Committee monitor to assessment process and Grading.

5. Methodology and Planning for Course Review and Improvement

(1) Revise and develop course structure and process every two years.

(2) Assign different lecturers teach this course to enhance students' performance.

Curriculum Mapping Illustrating the Distribution of Program Standard Learning Outcomes to Course Level

Courses	1. Morals and Ethics			2. Knowledge			3. Cognitive Skills			4. Interpersonal Skills and Responsibility			5. Numerical Analysis, Communication and Information Technology Skills			6. Learning Management Skills		
Course Category:	● **Major Responsibility**									○ **Minor Responsibility**								
Requirement Course— Teaching Profession Course	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Course Code: BMA2305 Course Title: Number Theory	●	○	○	○	●	○	○	●	○	○	○	○	○	●	○	○	○	○

Remark: Symbol ● means "major responsibility" Symbol ○ means "minor responsibility"   No symbol means "no responsibility"

Expected learning outcomes are combined for all types of instructional activities.