TQF. 3

☑ Bachelor's Degree

☐ Master's Degree

Course Specification

Course Code: MMA 1302

Course Title: Dynamic Software in Mathematics Education

Credits: 3(2-2-5)

Programs: Bachelor of Education Program in Mathematics Education
(Bilingual Program)

Semester: 1 **Academic Year:** 2023

College of Hospitality Industry Management
Suan Sunandha Rajabhat University
(CHM, SSRU)

Section 1 General Information

1. Code and Course Title: MMA 1302 Dynamic Software in Mathematics Education

ชื่อวิชา (ภาษาไทย): MMA 1302: ซอฟต์แวร์พลวัตในคณิตศาสตร์ศึกษา

2. Credits: 3(2-2-5)

3. Curriculum and Course Category :

Curriculums: Bachelor's of Education, Mathematics (Bilingual Program)

Course Category:

☐ General Education ☑ Required Course

☐ Elective Course ☐ Others: …….

4. Lecturers: Asst.Prof. Dr. Krongthong Khairiree

5. Year / Semester

Students Year 1 / Semester 1/2566

6. Prerequisite Course

None

7. Co-requisite Course :

None

8. Learning Location

College of Hospitality Management, Suan Sunandha Rajabhat University, Nakorn Patom Education Center

9. Last Date for Preparing and Revising this Course:

June, 2023

Section 2 - Aims and Objectives

2.1 Course Objectives

At the end of this course, the students will be able to perform in the following areas of performance:

1) Determine the dynamic software program to be used in primary and secondary mathematics education;
2) Apply the Geometer's Sketchpad and/or other program in teaching primary and secondary mathematics; and
3) Create instructional materials in mathematics with The Geometer's Sketchpad; and Augmented Reality (AR) and/or Artificial intelligent (AI).

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

Section 3 Course Structure

3.1 Course Descriptive

Background information about dynamic software in mathematics education; The Geometer's Sketchpad; Teaching primary and secondary mathematics with The Geometer's Sketchpad and others; Creating instructional materials in mathematics with The Geometer's Sketchpad; and Augmented Reality (AR) and/or Artificial intelligent (AI) through smartphone.

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

Lecture	**Practice/Field Work/Internship**	**Self Study**	Remedial Class
32 hours	32	80 hours	6 (if any)

3.3 Time Length per Week for Individual Academic Consulting and Guidance

At least 5 hours / week

Individual consulting and guidance

Self-consulting at the lecturer's office:

Room Number 305, CHM Building, Nakhon-Pathom Campus

Thursday: 9.00 – 12.00

Friday: 9.00 – 12.00

Consulting via office telephone/mobile phone:

081-3432853

Consulting via email:

krongthong.kh@ssru.ac.th

Consulting via social media platform (Facebook/Twitter/Line):

None

Consulting via Computer Network (Internet/Web board):

www.elic.ssru.ac.th/

Section 4 Developing Student's Learning Outcomes

Expected students' learning outcomes are categorized into five domains, developed from curriculum specification (TQF2), as follows:

1. Morals and ethics

1.1 Learning outcomes to be developed

- 1) To have personal responsibility, corporate responsibility and moral reasoning
- 2) Can adjust to work as a team both as leader or follower and work effectively with others;
- 3) Have discipline, self, and social responsibility.

2. Teaching strategies

1) using Blended Learning and on Line Learning, lecture and group discussion
2) Using Student-centered: Problem-Based learning and Cooperative learning approaches
3) Encouraging the students to have integrity, honesty, and discipline such as unselfishness and self-control.

3. Assessment & evaluation strategies

1) Attendance record
2) Performance Assessment (on-site)
3) System log (online/on-demand)

2. Knowledge

2.1 Learning outcomes to be developed

- 1) Be able to comply knowledge on using dynamic software program in primary and secondary mathematics;
- 2) Able to use computer dynamic software program such as the Geometer's Sketchpad and/or other program ;
- 3) Have knowledge and understanding principles and concepts of dynamic software program in primary and secondary mathematics;.

2.2 Teaching strategies

1) Students are able to learn both independently and cooperatively through online learning;
2) Students learn new skills and apply Blended Learning and on Line Learning in new knowledge and unexpected situations.
3) Using brainstorming to encourage students generate many ideas and using higher order thinking.

2.3 Assessment and evaluation strategies

1) Using rubrics for complex authentic task
2) Using formative and summative tests
3) Using students' report and presentation.

3. Cognitive skills

3.1 Learning outcomes to be developed

- 1) Be able to use dynamic software program such as the Geometer's Sketchpad and/or other program;
- 2) Able to create instructional materials in mathematics with The Geometer's Sketchpad; and
- 3) Able to develop instructional materials in mathematics using The Geometer's Sketchpad and/or other program including AR/AI.

3.2 Teaching strategies

1) Use internet-based learning and blended learning in using dynamic software program in mathematics.
2) Use problem-based learning in mathematics and real life problem;
3) students write reports, and able to present their findings from discussion / searching information.

3.3 Assessment and Evaluation strategies

1) Using rubrics for complex authentic task
2) Using formative and summative tests
3) Using group report and presentation.

4. Interpersonal Skills and Responsibilities

4.1 Learning outcomes to be developed

- 1) effective problem-solvers, applying critical and creative thinking to a range of problems.
- 2) Have responsibility for assignment: select ideas in business statistics from different theoretical perspectives;
- 3) Can adjust to work in team both as leader or follower and work effectively with others

4.2 Teaching strategies

1) Find, acquire, evaluate, manage and use relevant information in a range of media.
2) Use internet-based learning and web-based data on business statistics; and

3) Apply cooperative learning method and Problem-Based Learning (PBL) in business statistics.

4.3 Assessment & evaluation strategies

1) Performance Assessment (on-site)
2) System log (online/on-demand)
3) Project work, group report and presentation.

5. Numerical Analysis, Communication, and Information Technology Skills

5.1 Learning outcomes to be developed

- 1) Able to develop instructional materials in mathematics using The Geometer's Sketchpad and/or other program including AR/AI.;
- 2) Able to apply knowledge from website incorporate with dynamic software in teaching primary and secondary mathematics;
- 3) Able to present well-reasoned arguments using technology as appropriate.

5.2 Teaching strategies

1) Using problem-based learning research-based learning and internet-based learning to enhance students' thinking skills.
2) Using dynamic mathematics software such as the Geometer's Sketchpad and/or other program including AR/AI;
3) Encourage the students to develop their higher thinking skills and providing diversity environments for students to construct and implement their knowledge.

5.3 Assessment and evaluation strategies

1) Using rubrics for complex authentic task;
2) Using formative and summative tests; and
3) Using individual portfolio, project work, group report and presentation.

6. Learning Management Skills

6.1 Learning Outcomes to be Developed

- 1) Be able to design learning activities and learning environments within the context of primary and secondary mathematics and the real world.
- 2) Be able to provide the learners with essential opportunities to enhance learning concepts and motivate active learning in mathematical problem solving.
- 3) Be able to develop the instructional materials in mathematics using The Geometer's Sketchpad and/or another program including AR/AI to engage students' learning.

6.2 Teaching Strategies

1) Using real-world problems within primary and secondary mathematics;
2) Using dynamic mathematics software such as the Geometer's Sketchpad and/or another program including AR/AI;
3) Using dynamic statistics software tools to reduce students' anxiety and negativity attitudes.

6.3 Assessment and evaluation strategies

1) Using a rubric for group work
2) Using assignment tasks and presentation

Remark: Symbol ● means "major responsibility"

Symbol ○ means "minor responsibility"

No symbol means "no responsibility"

Section 5 - Lesson Plan and Assessment

1. Lesson plan

Week	Topic/Outline	Teaching-Learning Model	Content Management	Assessment
1	• Course Outline • Pretest • Introduction to dynamic software program in mathematics	Room 309/ Computer lab Room 211/ Online	• GSP • PowerPoint • YouTube VDO	• Attendance Record • System log • Pretest
2	• Principle of using the Geometer's Sketchpad (GSP) in mathematics and animation	Room 309/ Computer lab Room 211/ Online	• GSP • PowerPoint • Lecture Notes • Worksheet	• Attendance Record • System log - Quiz
	• Transformation Geometry using GSP • Exemplar of Transformation Geometry using GSP	Room 309/ Computer lab Room 211/ Online	• GSP • PowerPoint • Lecture Notes • Worksheet	• Attendance Record • System log - Quiz
4	• Transformation, Symmetry, and Tessellations using GSP	Room 309/ Computer lab Room 211/ Online On-Demand	• GSP • Lecture Notes • Worksheet	• Attendance Record • System log - Quiz
5.	• Exploring Geometry: Circle with GSP	Room 309/ Computer lab Room 211/ Online On-Demand	• GSP • Lecture Notes • Worksheet	• Attendance Record • System log • - Quiz
6.	• Exploring Geometry: Pythagorean Theorem with GSP	Online/ On Demand	• GSP • Lecture Notes • Worksheet	• Attendance Record • System log
7.	• Exploring Geometry: Similarity with GSP • **Project Work Assignments & Activities**	Room 309/ Computer lab Room 211/ Online On-Demand	• GSP • Lecture Notes • Worksheet	• Attendance Record • System log
8.	• **Mid-Term Test**	Online/ On Demand		• Attendance Record • System log • Test

Week	Topic/Outline	Teaching-Learning Model	Content Management	Assessment
	• **Project Work Assignments & Activities**			
9.	• Exploring Algebra with GSP/MathLab	Room 309/ Computer lab Room 211/ Online On-Demand	• GSP • Lecture Notes • Worksheet	• Attendance Record • System log • Quiz
10-12.	• Constructing Conic Sections: Parabola, Circles, Ellipse, and Hyperbola with GSP/Mathlab	Room 309/ Computer lab Room 211/ Online On-Demand	• GSP • Lecture Notes • Worksheet	• Attendance Record • System log • Assignment
13	• Developing instructional materials in mathematics using GSP incorporate with AR/AI.	Online/ On Demand/ On site	• GSP • Lecture Notes • Worksheet	• Attendance Record • System log • Work assignment • W
14	• Exploring Trigonometric Ratio and Trigonometric Functions	Online/ On Demand	Google Meet • http://www.elic.ssru.ac. th/	• GSP • Lecture Notes • Worksheet
15	• Discovering Statistics with TinkerPlots/Fathom	Online/ On Demand	Google Meet • http://www.elic.ssru.ac. th/	• GSP • Lecture Notes • Worksheet •
16	• Mark up classes • Students' Project Work Assignments & Activities		•	• GSP • Lecture Notes • Worksheet
	Final Examination			

2. Learning assessment plan

Learning Outcomes	Assessment Activities	Schedule (Week)	Proportion for Assessment (%)
1.1, 1.2, 1.3 2.1, 2.2, 2.3, 4.1, 4.2, 4.3 5.1, 5.3 6.1, 6.2, 6.3	1) Attendance record 2) Performance Assessment (on-site/online) 3) System log (online/on-demand) 4) Quiz	1, 3, 5, 7, 9, 11, 13, 15	40
2.2, 2.3, 5.2	Examination	17	30
3.1, 3.2, 3.3 4.1, 4.2, 4.3, 5.1, 5.2, 5.3 6.1, 6.2, 6.3	1) Criteria for assignment 2) Self-and peer assessments 3) Using group report and presentation 4) Using formative and summative tests	2, 4, 6, 10, 12, 14	30

Section 6 – Learning and Teaching Resources

1. Textbook and main documents

(1) Dynamic Software Program: The Geometer's Sketchpad

(2) Textbook:

- Exploring Geometry with The Geometer's Sketchpad, By Bennett, D.
- Fun with Mathematics and Animation using The Geometer's Sketchpad, by Asst.Prof.Dr. Krongthong Khairiree
- Discovering Mathematics: Mathematical Problem Solving Approach 1-6 by Asst.Prof.Dr. Krongthong Khairiree

(3) Course materials provided by the lecturers

2. Important documents for extra study

Documents suggested by the lecturers

3. Suggested information (Printing Materials/Website/CD/Others)

Information retrieved from search engines (e.g., Google) and online videos

Section 7 - Course Evaluation and Revising

1. Strategies for course evaluation by students

Using a questionnaire to collect students' opinions to improve the course and enhance the curriculum. Sample questions:

(1) The Learning Management System (e.g. Moodle & Google Classroom) and social media platforms (e.g. Facebook & Line) are useful and provide accessibility to learners. Other online learning tools such as Kahoot! and Quizizz are also fun to interact with.

(2) Online contents are highly accessible and have better quality comparing with printed materials.

(3) With the Learning Management System used, students can follow up with the course and check their learning progress.

(4) Students can contact the lecturer easily using the internal messaging system, feedback system, and social networking.

(5) As this course is skill-focused, students have mathematical knowledge and skills useful to students' studying and future jobs.

…….. etc. ……

2. Strategies for course evaluation by the lecturer

The lecturer observes the class and determine if:

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 assignments are interesting and stimulating.
11) The lecturer's use of technology enhanced learning in the classroom.

…….. etc. ……

3. Teaching revision

The lecturer revises the teaching and learning process based on the results from the questionnaire results.

4. Feedback for achievement standards

CHM administrator committees monitor the 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 to teach this course to enhance students' vision.

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: Requirement Course—Major Required Course	● **Major Responsibility**												○ **Minor Responsibility**					
	1	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
Course Code: MMA 1302 Course Title: Dynamic Software in Mathematics Education	●	○	○	●	●	○	●	○	○	●	○	○	●	●	●	●	●	●

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.