

TQF. 3



Bachelor's Degree

Master's Degree

## Course Specification

**Course Code:** BMA 3301

**Course Title:** Blended Learning in Secondary Mathematics

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

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

**Semester:** 3

**Academic Year:** 2024

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

## Section 1 General Information

**1. Code and Course Title:** BMA 3301 Blended Learning in Secondary Mathematics

**2. ชื่อวิชา (ภาษาไทย):** BMA 3301: การเรียนรู้แบบผสมผสานในคณิตศาสตร์มัธยมศึกษา

**3. 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:**

Mr. Luechai Tiprungsri

**5. Year / Semester**

Students Year 1 / Semester 3/2024

**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, 2024

## 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) Have strong mathematical content knowledge and pedagogical content knowledge in teaching secondary mathematics.
- 2) identify students' misconceptions, students' learning styles and use blended learning in mathematics classes;
- 3) use critical thinking to connect various mathematical topics and mathematical software applications; and
- 4) create assessment and evaluation rubrics for secondary mathematics.

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

## Section 3 Course Structure

### 3.1 Course Descriptive

Methods of teaching secondary mathematics; learning difficulties and misconception; learning styles; cooperative learning and/or collaborative learning; higher order thinking skills in 21st Century; Massive Open Online Course (MOOC) in mathematics; flipped classroom; handheld technology; Advanced level of using The Geometer's Sketchpad; Augmented Reality (AR) and blended learning through smartphone; problem based learning and project based learning; assessment and action research in secondary mathematics classroom.

### 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 Education Campus

Mon-Friday 09.00 – 16.00

##### **Consulting via office telephone/mobile phone:**

081-9725793

##### **Consulting via email:**

luechai.ti@ssru.ac.th

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

None

##### **Consulting via Computer Network (Internet/Web board):**

[www.elic.ssru.ac.th/](http://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) apply mathematical content knowledge and pedagogical content knowledge to solve mathematical problem solving
- 2) Have knowledge and understanding principles and concepts of mathematical problem solving skills and mathematical problem solving strategies.
- 3) Able to apply computer dynamic software program such as the Geometer's Sketchpad and/or other program in solving mathematics problems;

#### 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 apply knowledge learned to solve problem-based learning;
- 2) Able to create learning instruction to solve mathematics problems in corporate 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 problems;
- 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) Have responsibility for assignments: select ideas in mathematical problem solving strategies from different theoretical perspectives;
- 2) effective problem-solvers, applying critical and creative thinking to a range of problems.
- 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 mathematical problem solving;
- 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.

**Remark:** Symbol ● means “major responsibility”

Symbol ○ means “minor responsibility”

No symbol means “no responsibility”

During of pandemic of COVID -19, teaching strategies may be changed by using Massive Open Online Courses (MOOC) prepared by lecturers and/or other educational organization.

## 6. Learning Management

## Section 5 - Lesson Plan and Assessment

### 1. Lesson plan

No.	Topic/Outline	Teaching-Learning Model	Program/Teaching Strategies	Content Management	Assessment
1_1	<ul style="list-style-type: none"> <li>Course Outline</li> <li>Pretest</li> <li>Learning styles</li> </ul>	Onsite	Room 211/ Google Meet	<ul style="list-style-type: none"> <li>GSP</li> <li>PowerPoint</li> <li>YouTube</li> <li>VDO</li> </ul>	<ul style="list-style-type: none"> <li>Attendance Record</li> <li>Moodle</li> <li>Pretest</li> </ul>
1-2	<ul style="list-style-type: none"> <li>Learning difficulties and misconception;</li> <li>Methods of teaching secondary mathematics</li> </ul>	Onsite	Room 211/ Google Meet	<ul style="list-style-type: none"> <li>GSP</li> <li>PowerPoint</li> <li>Lecture Notes</li> <li>Worksheet</li> </ul>	<ul style="list-style-type: none"> <li>Attendance Record</li> <li>Moodle</li> <li>System log - Quiz</li> </ul>
2-1	<ul style="list-style-type: none"> <li>Cooperative learning</li> <li>Collaborative learning</li> </ul>	Onsite/Online	Room 211/ Google Meet	<ul style="list-style-type: none"> <li>GSP</li> <li>PowerPoint</li> <li>Lecture Notes</li> <li>Worksheet</li> </ul>	<ul style="list-style-type: none"> <li>Attendance Record</li> <li>Moodle</li> <li>System log - Quiz</li> </ul>
2_2	<ul style="list-style-type: none"> <li>Higher order thinking skills in 21st Century;</li> </ul>	Onsite/ On Demand	Room 211/ Google Meet  <a href="http://www.elic.ssruc.ac.th/">http://www.elic.ssruc.ac.th/</a>	<ul style="list-style-type: none"> <li>GSP</li> <li>Lecture Notes</li> <li>Worksheet</li> </ul>	<ul style="list-style-type: none"> <li>Attendance Record</li> <li>Moodle</li> <li>System log - Quiz</li> </ul>
3_1.	<ul style="list-style-type: none"> <li>Flipped classroom;</li> </ul>	Onsite/ On Demand	Room 211/ Google Meet  <a href="http://www.elic.ssruc.ac.th/">http://www.elic.ssruc.ac.th/</a>	<ul style="list-style-type: none"> <li>GSP</li> <li>Lecture Notes</li> <li>Worksheet</li> </ul>	<ul style="list-style-type: none"> <li>Attendance Record</li> <li>Moodle</li> <li>Quiz</li> </ul>
3_2.	<ul style="list-style-type: none"> <li>Massive Open Online Course (MOOC) in mathematics</li> <li><b>Project Work Assignments &amp; Activities</b></li> </ul>	Onsite	<ul style="list-style-type: none"> <li>Room 2011/</li> <li>Google Meet</li> <li>Google Meet</li> </ul> <a href="http://www.elic.ssruc.ac.th/">http://www.elic.ssruc.ac.th/</a>	<ul style="list-style-type: none"> <li>GSP</li> <li>Lecture Notes</li> <li>Worksheet</li> <li>Moodle</li> </ul>	<ul style="list-style-type: none"> <li>Attendance Record</li> <li>Moodle</li> <li>System log</li> <li>- Quiz</li> </ul>
4	<ul style="list-style-type: none"> <li><b>Mid - Term Test</b></li> <li><b>Project Work</b></li> </ul>	Onsite	Google Meet  <a href="http://www.elic.ssruc.ac.th/">http://www.elic.ssruc.ac.th/</a>	<ul style="list-style-type: none"> <li>GSP</li> <li>Lecture Notes</li> <li>Worksheet</li> <li>Moodle</li> </ul>	<ul style="list-style-type: none"> <li>Moodle</li> <li>Quiz</li> </ul>

No.	Topic/Outline	Teaching-Learning Model	Program/Teaching Strategies	Content Management	Assessment
	<b>Assignments &amp; Activities</b>				
5_1	<ul style="list-style-type: none"> <li>Advanced level of using The Geometer's Sketchpad;</li> <li>Handheld technology;</li> </ul>	Onsite/Online	Room 211/ Google Meet	<ul style="list-style-type: none"> <li>GSP</li> <li>Lecture Notes</li> <li>Worksheet</li> <li>Moodle</li> </ul>	<ul style="list-style-type: none"> <li>Attendance Record</li> <li>Moodle</li> <li>System log</li> <li>- Quiz</li> </ul>
5_2	<ul style="list-style-type: none"> <li>Augmented Reality (AR) and blended learning through smartphone</li> </ul>	Onsite	Room 211/ Google Meet <a href="http://www.elic.ssruc.ac.th/">http://www.elic.ssruc.ac.th/</a>	<ul style="list-style-type: none"> <li>GSP</li> <li>Lecture Notes</li> <li>Worksheet</li> <li>Moodle</li> </ul>	<ul style="list-style-type: none"> <li>Attendance Record</li> <li>Moodle</li> <li>System log</li> <li>- Quiz</li> <li>Assignment</li> </ul>
6_1	<ul style="list-style-type: none"> <li>Problem based learning</li> <li>Project based learning;</li> </ul>	On site	Room 211/ Google Meet <a href="http://www.elic.ssruc.ac.th/">http://www.elic.ssruc.ac.th/</a>	<ul style="list-style-type: none"> <li>GSP</li> <li>Lecture Notes</li> <li>Worksheet</li> <li>Moodle</li> </ul>	<ul style="list-style-type: none"> <li>Attendance Record</li> <li>Moodle</li> <li>Work assignment</li> </ul>
6_2	<ul style="list-style-type: none"> <li>Assessment and action research in secondary mathematics classroom.</li> </ul>	Onsite	Room 211/ Google Meet <a href="http://www.elic.ssruc.ac.th/">http://www.elic.ssruc.ac.th/</a>	<ul style="list-style-type: none"> <li>GSP</li> <li>Lecture Notes</li> <li>Worksheet</li> </ul>	<ul style="list-style-type: none"> <li>Attendance Record</li> <li>System log</li> <li>Assignment</li> </ul>
7	<ul style="list-style-type: none"> <li>Students' Project Work Assignments &amp; Activities</li> </ul>		Room 211/ Google Meet <a href="http://www.elic.ssruc.ac.th/">http://www.elic.ssruc.ac.th/</a>	<ul style="list-style-type: none"> <li>GSP</li> <li>Lecture Notes</li> <li>Worksheet</li> </ul>	
8.	<b>Final Examination</b>				

Note: -

## 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:

Bergmann, J. & Sams, A. (2012). *Flip Your Classroom: Reach Every Student in Every Class Every Day*. ISTE: International Society for Technology in Education.

Khairiree, K. (2018). *Flipped classroom and the geometer’s sketchpad: students’ investigation-a square peg in a round hole*. International College, Suan Sunandha Rajabhat University, Bangkok, Thailand.

Khairiree, K. & Tran Vui. (2021). *Discovering Mathematics: Mathematical Problem Solving Approach 1-6*. Bangkok: Pada Education Publication.

Krulik, S. (2008). *Problem Solving Strategies for Efficient and Elegant Solutions Grades 6-12: A Resource for the mathematics Teacher*. California: Corwin Press. A SAGE Company, U.S.A.

(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		
	● Major Responsibility									○ Minor Responsibility					
Course Category: Requirement Course Major Required Course	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
BMA2303 Mathematical Problem Solving	●	○	○	●	●	○	○	●	○	○	●	○	○	●	○

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