TQF.3

| |
|---|
| ☑ Bachelor's Degree |
| ☐ Master's Degree |

# TQF. 3 Course Specification

**Course Code:** BMA3302

**Course Title:** Innovation and Technology for Mathematics Education

**Credits:** 3(3-0-6)

**Program**: Bachelor of Education Program in Mathematics

(Bilingual Program)

**Semester**: 3 **Academic Year**: 2021

**College of Hospitality Industry Management**

**Suan Sunandha Rajabhat University**

**(CHM, SSRU)**

# Content

# Section 1 General Information

## 1. Code and Course Title:

Course Code: BMA3302

Course Title (English): Innovation and Technology for Mathematics Education

ชื่อวิชา (ภาษาไทย): นวัตกรรมและเทคโนโลยีสำหรับคณิตศาสตร์ศึกษา

## 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:

Mr. Luechai Tiprunsri

4.2 Instructional Course Lecturers:

(1) Mr. Luechai Tiprungsri

(2) Assoc.Prof. Chaweewan Kaewsaiha

## 5. Contact / Get in Touch:

Room Number 305 Tel. 034-964946 Ext. 320

E-mail: Luechai.ti@ssru.ac.th

## 6. Semester / Year of Study

6.1 Semester: 3/2021 Year of Study: Undergraduate Student Year 1

6.2 Number of students enrolled: 20

## 7. Prerequisite Course

None

## 8. Co-requisite Course

None

## 9. Learning Location

College of Hospitality Industry Management Building, Nakorn Pathom Campus

Room No. 211

Tuesday 13.00 – 16.00 Thursday 13.00 – 16.00

## 10. Last Date for Preparing and Revising this Course:

March 15, 2022

# 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 integrity, honesty and teaching profession ethics;

(2) Have discipline, self and social responsibility;

(3) Have knowledge and understanding of educational law.

### 1.2 Knowledge

(1) Be able to use the basic knowledge of educational concept, theory, technology and innovation that promote the learning quality development in mathematics;

(2) Be able to select, develop and produce media and instrument that promote learning in mathematics;

(3) Be able to demonstrate the relationship between the Education Standards and the new ways of learning in mathematics.

### 1.3 Cognitive Skills

(1) Be able to organize activities that promote learning and using creativity and thinking tools in mathematics;

(2) Be able to manage learning resources and network in mathematics;

(3) Be able to prepare innovation design, creation, implementation, evaluation, and improvement in mathematics.

### 1.4 Interpersonal Skills and Responsibility

(1) Have responsibility for building positive attitude towards using innovation and information technology in mathematics;

(2) Have knowledge and understanding of human relations

to work in team both as leader or follower;

(3) Be able to identify problems and seek best solutions to strengthen teachers' potentiality and capabilities in academic and professional career.

**1.5 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 the learning quality;

(3) Be able to design, create, implement, and evaluate innovation for improvement learning environment based on education quality.

**1.6 Learning Management Skills**

(1) Be able to design learning activities and learning environments for learner's development;

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

(3) Be able to locate a variety of learning resources to promote the learning by learners.

## 2. Course Objectives

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

(1) Able to select, design, create and improve innovation for learners to achieve good learning in mathematics;

(2) Able to develop technology and information and information for learners to achieve good learning in mathematics;

(3) Able to locate a variety of learning sources to promote learning mathematics by learners.

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

According to TQF (Thailand Quality Framework: HEd.) and the Teachers' Council of Thailand with the standards of professional knowledge and experience for requirement courses, undergraduate students program in mathematics (bilingual program) should have essence of knowledge in educational innovation and information technology as follows:

(1) Educational concept, theory, technology and innovation that promote the learning quality development;

(2) Technology and Information;

(3) Analysis of problems arising from use of technology and information innovation;

(4) Learning sources and network;

(5) Innovation design, creation, implementation, evaluation and improvement;

(6) Information technology for teachers

# Section 3 Course Structure

## 1. Course Outline

A framework for 21st century education; Structuring and managing ICT-enabled learning environment; The scaffolding technological pedagogy content knowledge lesson design model; Learning with social media; Massive Open Online Course (MOOC) in mathematics;

Instructional materials using technology to support assessment and evaluation.

กรอบของการศึกษาในศตวรรษที่ 21 การสร้างโครงสร้างและการจัดการเทคโนโลยีสารสนเทศเพื่อการสื่อสารเสริมสร้างประสบการณ์การเรียนรู้ รูปแบบการออกแบบบทเรียนที่เน้นการสร้างพื้นฐานของการใช้เทคโนโลยีในการสอนเนื้อหาวิชาความรู้ การเรียนรู้ด้วยเครือข่ายสังคมรายวิชาออนไลน์ปลายเปิดเพื่อมหาชน (MOOC) ในคณิตศาสตร์ วัสดุการสอนที่ใช้เทคโนโลยีสนับสนุนการวัดและการประเมินผล

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

| **Lecture** | **Practice/ Field Work/Internship** | **Self-Study** | Remedial Class |
|---|---|---|---|
| 48 hours | - | 80 hours | 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: Mr. Luechai Tiprungsri Tel. 081-972-5793

3.3 Consulting via E-Mail: Luechai.ti@ssru.ac.th
chaweewan.ka@ssru.ac.th

# Section 4 Developing Student's Learning Outcomes

| Learning Standards/Outcomes | Learning Activities | Learning Assessment |
|---|---|---|
| **1. Morals and Ethics**<br>(1) Have integrity, honesty and teaching profession ethics;<br>(2) Have discipline, self and social responsibility;<br>(3) Have knowledge and understanding of educational law | - Demonstration<br>- Group Work | Group discussion Report |
| **2. Knowledge**<br>(1) Be able to use the basic knowledge of educational concept, theory, technology and innovation that promote the learning quality development in mathematics;<br>(2) Be able to select, develop and produce media and instrument that promote learning in mathematics;<br>(3) Be able to demonstrate the relationship between | 1. Introduce the educational innovation and Technology in mathematics<br>2. Have the students develop their plans to establish mathematics innovation and technology | 1. Term papers<br>2. Group report presentation |

| Learning Standards/Outcomes | Learning Activities | Learning Assessment |
|---|---|---|
| the Education Standards and the new ways of learning mathematics. | | |
| **3. Cognitive Skills**<br>(1) Be able to organize activities that promote learning and using creativity and thinking tools;<br>(2) Be able to manage learning resources and network;<br>(3) Be able to prepare innovation design, creation, implementation, evaluation, and improvement in mathematics. | 1. Use problem-based learning and internet-based learning to construct cognitive skills in solving mathematics classroom problems.<br>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<br>2. Term papers<br>3. Group report presentation |
| **4. Interpersonal Skills and Responsibilities**<br>(1) Have responsibility for building positive attitude towards using educational innovation and information technology; | 1. Use research-based learning and internet-based learning on policy issues in using innovation and technology impact on students' achievement<br>2. Students work in small group. They plan to use | 1. Term papers<br>2. Group report presentation |

| Learning Standards/Outcomes | Learning Activities | Learning Assessment |
|---|---|---|
| (2) Have knowledge and understanding of human relations to work in team both as leader or follower;<br>(3) Be able to identify problems and seek best solutions to strengthen teachers' potentiality and capabilities in academic and professional career. | innovation and technology ethically. | |
| **5. Numerical Analysis, Communication and Information Technology Skills**<br>(1) Be able to apply numerical analysis in problem solving;<br>(2) Have concepts, principles, and theories of technology and innovation that promote the learning quality;<br>(3) Be able to design, create, implement, and evaluate innovation for improvement learning | 1. Use research-based learning and internet-based learning to analyze national policy about using innovation and technology.<br>2. Students work in small group. They plan to use technology to analyze data and present their report both in oral and written. | 1. Individual portfolio<br>2. Term papers<br>3. Group report presentation |

| Learning Standards/Outcomes | Learning Activities | Learning Assessment |
|---|---|---|
| environment based on education quality. | | |
| **6. Learning Management Skills**<br>(1) Be able to design learning activities and learning environments for learner's development;<br>(2) Be able to provide the learners with essential opportunities to enhance learning concepts and motivate active engagement in mathematical process for problem solving through innovation and technology;<br>(3) Be able to locate a variety of learning resources to promote the learning by learners. | Discussion and presentation of learning and teaching with technology and research on development of mathematical thinking and knowledge in math class. | 1. Individual portfolio<br>2. Term papers<br>3. Group report presentation |

# Section 5 Lesson Plan and Assessment

## 1. Lesson Plan (Summer Course)

| Week | Topic/Outline | Hours | Learning Activities and Medias |
|---|---|---|---|
| 1 | **Unit 1** A framework for 21st century education | 6 | 1. Demonstration using innovation in teaching mathematics with the GSP and other programs.<br>2. Students work with a small group to discuss about the importance of innovation and technology. |
| 2 | **Unit 2** Innovation and Technology in 21st Century Learning | 6 | 1. Introduce thinking skills in 21st century learning for active learning.<br>2. Students work with a small group to discuss about the advantages of thinking skills in 21st century learning. |
| 3 - 4 | **Unit 3** Innovation for Teaching and Learning Strategies | 12 | 1. Introduce innovation for teaching and learning strategies focus on active learning.<br>2. Students work with a small group to discuss and create innovation for teaching and learning focus on active learning. |
| 5 | **Mid-Term Examination** | 3 | **Paper-Test** |

| Week | Topic/Outline | Hours | Learning Activities and Medias |
|---|---|---|---|
| 6 | **Unit 4** Technological pedagogical content knowledge : A framework for teacher knowledge | 6 | 1. Introduce A framework for technological pedagogical content knowledge.<br>2. Students work with a small group to search information about TPACK for teachers in teaching mathematics. |
| 7 | **Unit 5** Social media and Massive Open Online Course (MOOC) | 6+ | 1. Introduce questioning techniques in math class<br>2. Students discuss about real situation in learning mathematics by using questioning techniques |
| 8 | **Final Examination** | 3 | **Paper-Test** |
| **Total of Hours** | | 42+ | **Extra hours for independence study** |

## 2. Learning Assessment Plan

| Learning Outcomes | Assessment Activities | Time Schedule (Week) | Proportion for Assessment (%) |
|---|---|---|---|
| **1. Morals and Ethics**<br>(1) Have integrity, honesty and teaching profession ethics; | 1. Individual portfolio<br>2. Group discussion | Throughout semester | 5 % |

| Learning Outcomes | Assessment Activities | Time Schedule (Week) | Proportion for Assessment (%) |
|---|---|---|---|
| (2) Have discipline, self and social responsibility;<br>(3) Have knowledge and understanding of educational law. | | | |
| **2. Knowledge**<br>(1) Be able to use the basic knowledge of educational concept, theory, technology and innovation that promote the learning quality development in mathematics;<br>(2) Be able to select, develop and produce media and instrument that promote learning in mathematics;<br>(3) Be able to demonstrate the relationship between the | 1. Term papers<br>2. Group report presentation | Throughout semester | 40 % |

| Learning Outcomes | Assessment Activities | Time Schedule (Week) | Proportion for Assessment (%) |
|---|---|---|---|
| Education Standards and the new ways of learning in mathematics. | | | |
| **3. Cognitive Skills**<br>(1) Be able to organize activities that promote learning and using creativity and thinking tools in mathematics;<br>(2) Be able to manage learning resources and network;<br>(3) Be able to prepare innovation design, creation, implementation, evaluation, and improvement in mathematics. | 1. Individual portfolio<br>2. Term papers<br>3. Group report presentation | Throughout semester | 30 % |
| **4. Interpersonal Skills and Responsibilities**<br>(1) Have responsibility for building positive | 1. Checklists<br>2. Interviews | Throughout semester | 5 % |

| Learning Outcomes | Assessment Activities | Time Schedule (Week) | Proportion for Assessment (%) |
|---|---|---|---|
| attitude towards using educational innovation and information technology;<br>(2) Have knowledge and understanding of human relations to work in team both as leader or follower;<br>(3) Be able to identify problems and seek best solutions to strengthen teachers' potentiality and capabilities in academic and professional career. | | | |
| **5. Numerical Analysis, Communication and Information Technology Skills**<br>(1) Be able to apply numerical analysis in problem solving; | 1. Individual portfolio<br>2. Term papers<br>3. Group report presentation | Throughout semester | 10 % |

| Learning Outcomes | Assessment Activities | Time Schedule (Week) | Proportion for Assessment (%) |
|---|---|---|---|
| (2) Have concepts, principles, and theories of technology and innovation that promote the learning quality;<br><br>(3) Be able to design, create, implement, and evaluate innovation for improvement learning environment based on education quality. | | | |
| **6. Learning Management Skills**<br>(1) Be able to design learning activities and learning environments for learner's development;<br>(2) Be able to provide the learners with essential opportunities | 1. Individual portfolio<br>2. Term papers<br>3. Group report presentation | Throughout semester | 10 % |

| Learning Outcomes | Assessment Activities | Time Schedule (Week) | Proportion for Assessment (%) |
|---|---|---|---|
| to enhance learning concepts and motivate active engagement in mathematical process for problem solving through innovation and technology;<br>(3) Be able to locate a variety of learning resources to promote the learning by learners. | | | |

# Section 6 Learning and Teaching Resources

## 1. Textbook and Main Documents

Li, K.C, Tsang E.Y.M & Wong, B.T.M. (2020). **Innovating education in technology-supported environments**. Singapore: Springer. ISBN 978-981-6591-5 (eBook).

## 2. Important Documents for Extra Study

Law, N., Yuen, A. & Fox, R. (2011). Educational innovations beyond technology: Nurturing leadership and establishing learning organizations (2011th edition). Singapore: Springer. ISBN-10: 038-7711-376.

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

Office of Educational Technology. (2017). Reimagining the role of technology in education: 2017 National education technology plan update. Retrieved May 2,2022 from https://tech.ed.gov/files/2017/01/NETP17.pdf

# 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: BMA3302<br>Course Title: Innovation and Technology for 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.