TQF.3

☑ Bachelor's Degree

☐ Master's Degree

TQF. 3 Course Specification

Course Code: BMA2403

Course Title: Trigonometry with Technology

Credits: 3(2-2-5)

Program: Bachelor of Education Program in Mathematics

(Bilingual Program)

Semester: 1   **Academic Yea**r: 2022

College of Hospitality Industry Management

Suan Sunandha Rajabhat University

(CHM, SSRU)

Content

Section 1 General Information

1. Code and Course Title:

Course Code: BMA2403

Course Title (English): Trigonometry with Technology

ชื่อวิชา (ภาษาไทย): ตรีโกณมิติกับเทคโนโลยี

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

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 Tiprungsri

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: 1/2022 Year of Study: Undergraduate Student Year 2

6.2 Number of students enrolled: 19

7. Prerequisite Course

None

8. Co-requisite Course

None

9. Learning Location

College of Hospitality Industry Management Building, Nakorn Pathom Campus

Room No. 301

Tuesday 9.00 – 12.00

10. Last Date for Preparing and Revising this Course:

June 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 mathematical concept, theory, and technology that promote the learning quality development in mathematics;

(2) Be able to apply factual knowledge, conceptual knowledge, procedural knowledge, and metacognitive knowledge to solve mathematics problems.

(3) Be able to use accurate content and demonstrate 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 use multiple 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 technology in mathematics.

(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.

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 information communication technology that promote the learning quality.

(3) Be able to design, create, implement, and evaluate information technology 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 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 identify the six trigonometric functions using right triangle and unit circle on the coordinate plane.

(2) Able to use technology to determine the graph of trigonometric functions for learners to achieve good learning in mathematics.

(3) Able to solve applied problems using trigonometric functions.

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 using technology for learning mathematics as follows:

(1) To provide additional opportunities for learners to see and interact with mathematical concepts.

(2) To explore and make discoveries with simulations, digital tools and web-based graphing calculator.

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

Section 3 Course Structure

1. Course Outline

Right triangle relationship; Trigonometric values of the unit circle; Trigonometric functions on the coordinate plane; Transformation of trigonometric functions; Trigonometric identities; Trigonometric techniques in analytic geometry; Trigonometric form of complex numbers; Exemplar of learning instruction in trigonometry incorporate with The Geometer's Sketchpad

ความสัมพันธ์ของรูปสามเหลี่ยมมุมฉาก ค่าของตรีโกณมิติบนวงกลมหน่วย ฟังก์ชัน ตรีโกณในระนาบพิกัดฉาก การแปลงของฟังก์ชันตรีโกณมิติ เอกลักษณ์ตรีโกณมิติ เทคนิค ตรีโกณมิติในเรขาคณิตวิเคราะห์ รูปแบบตรีโกณมิติของจำนวนเชิงซ้อน ซอฟต์แวร์ประยุกต์สำหรับ ตรีโกณมิติ

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

Lecture	Practice/ Field Work/Internship	Self-Study	Remedial Class
32 hours	32 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 (1) Have integrity, honesty, and teaching profession ethics. (2) Have discipline, self, and social responsibility. (3) Have knowledge and understanding of educational law	- Demonstration - Group Work	Group discussion Report
2. Knowledge (1) Be able to use the basic knowledge of mathematical concept, theory, and technology that promote the learning quality development in mathematics. (2) Be able to apply factual knowledge, conceptual knowledge, procedural knowledge, and metacognitive knowledge to solve mathematics problems. (3) Be able to use accurate content and demonstrate the	1. Introduce the technology in learning trigonometry 2. Have the students develop their plans to establish trigonometric functions using technology	1. Term papers 2. Group report presentation

Learning Standards/Outcomes	Learning Activities	Learning Assessment
new ways of learning in mathematics.		
3. Cognitive Skills (1) Be able to organize activities that promote learning and using creativity and thinking tools in mathematics. (2) Be able to use multiple learning resources and network in mathematics. (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 applied trigonometric 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) Have responsibility for building positive attitude towards using technology in mathematics. (2) Have knowledge and understanding of human	1. Use research-based learning and internet-based learning on issues in using technology impact on students' achievement in learning trigonometry 2. Students work in small group. They plan	1. Term papers 2. Group report presentation

Learning Standards/Outcomes	Learning Activities	Learning Assessment
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.	to use innovation and technology ethically.	
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. Use research-based learning and internet-based learning to analyze contents about using technology in learning trigonometry 2. Students work in small group. They plan to use technology to learn trigonometric topics and present their report both in oral and written.	1. Individual portfolio 2. Term papers 3. Group report presentation

Learning Standards/Outcomes	Learning Activities	Learning Assessment
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 technology. (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 2. Term papers 3. Group report presentation

Section 5 Lesson Plan and Assessment

1. Lesson Plan (Summer Course)

Week	Topic/Outline	Hours	Learning Activities and Medias
1 - 2	**Introduction to Course:** BMA2403 Trigonometry with Technology **Unit 1** The Trigonometry of right triangles	8	1. Introduce course description 2. Demonstration the trigonometric ratios with the GSP and other programs. 3. Students work with a small group to discuss about the importance of trigonometry.
3 - 4	**Unit 2** Unit Circle Trigonometry	8	1. Introduce the concepts of unit circle trigonometry 2. Students work with a small group to compare between trigonometry of right triangles and unit circle
5 - 7	**Unit 3** Trigonometric Functions in the Coordinate Plane	12	1. Introduce concepts and principles of trigonometric functions in the coordinate plane 2. Students work with a small group to discuss and create trigonometric functions in coordinate plane using the GSP software.
8	**Mid-Term Examination**	3	**Paper-Test**

Week	Topic/Outline	Hours	Learning Activities and Medias
9 - 10	**Unit 4** Transformation of trigonometric functions	8	1. Introduce concepts and principles of transformation of trigonometric functions 2. Students work with a small group to discuss and create transformation of trigonometric functions in coordinate plane using the GSP software.
11- 13	**Unit 5** Trigonometric identities and Techniques in Analytic Geometry	12	1. Introduce concepts and principles of trigonometric identities and techniques in analytic geometry 2. Students work with a small group to prove trigonometric identities
14 - 16	**Unit 6** Complex Numbers and Polar Coordinates	12	1. Introduce concepts and principles of trigonometric form of complex numbers 2. Students work with a small group to convert trigonometric form of complex numbers to rectangular form or polar coordinates
17	**Final Examination**	3	**Paper-Test**
	Total of Hours	64+	**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 integrity, honesty and teaching profession ethics; (2) Have discipline, self and social responsibility; (3) Have knowledge and understanding of educational law.	1. Individual portfolio 2. Group discussion	Throughout semester	5 %
2. Knowledge (1) Be able to use the basic knowledge of mathematical concept, theory, and technology that promote the learning quality development in mathematics; (2) Be able to apply factual knowledge, conceptual knowledge,	1. Assignments 2. Group activities and presentation	Throughout semester	40 %

Learning Outcomes	Assessment Activities	Time Schedule (Week)	Proportion for Assessment (%)
procedural knowledge and metacognitive knowledge to solve mathematics problems; (3) Be able to use accurate content and demonstrate the new ways of learning in mathematics.			
3. Cognitive Skills (1) Be able to organize activities that promote learning and using creativity and thinking tools in mathematics; (2) Be able to use multiple learning resources and network in mathematics; (3) Be able to prepare innovation design, creation, implementation,	1. Individual portfolio 2. Assignments 3. Group presentation	Throughout semester	30 %

Learning Outcomes	Assessment Activities	Time Schedule (Week)	Proportion for Assessment (%)
evaluation, and improvement in mathematics.			
4. Interpersonal Skills and Responsibilities (1) Have responsibility for building positive attitude towards using 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. Checklists 2. Interviews	Throughout semester	5 %

Learning Outcomes	Assessment Activities	Time Schedule (Week)	Proportion for Assessment (%)
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. Individual portfolio 2. Assignments 3. Group presentation	Throughout semester	10 %
6. Learning Management Skills (1) Be able to design learning activities and learning environments for learner's development;	1. Individual portfolio 2. Assignments 3. Group presentation	Throughout semester	10 %

Learning Outcomes	Assessment Activities	Time Schedule (Week)	Proportion for Assessment (%)
(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 technology; (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

Sundstrom, T. & Schlicker, S. (2016) Trigonometry. (eBook). Retrieved 3 July 2022 from https://scholarworks.gvsu.edu

2. Important Documents for Extra Study

Kissane, B., & Kemp, M. (2009). Teaching and learning trigonometry with Technology. Retrieved 3 July 2022 from https://atcm.mathandtech.org

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

Johnson, L. (2016). Trigonometry: An overview of important

    topics. Retrieved 3 July 2022 from https://www.studocu.com

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**								
Elective Course	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
Course Code: BMA2403 Course Title: Trigonometry with Technology	●	○	○	○	●	●	○	●	○	●	●	○	●	○	○	○	○	○

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.