

**Course Specification**

**Course Code:** MMA 2302

**Course Title:** Calculus II

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

**Programs:** Mathematics

TQF. 3

 Bachelor’s Degree

 Master’s Degree

**Semester:** 1 **Academic Year:** 2024

**College of Hospitality Industry Management Suan Sunandha Rajabhat University**

**(CHM, SSRU)**

**Section 1 - General Information**

**1. Course code and course title**

Course code: MMA 2302

Course title (English): Calculus II

**2. Credits**

3(3-0-6)

**3. Curriculum and course category**

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

Course Category:

 General Education  Required Course

 Elective Course  Others: …………….

**4. Lecturer**

Lecturer responsible for this course: Asst. Prof. Dr. Supotch Chaiyasang

Instructional course lecturers: Asst. Prof. Dr. Supotch Chaiyasang

Assoc. Prof. Dr. Komol Paisal

**5. Contact**

Room Number: 305 Tel.: 081-480-0821 Email[: Supc 5987 @ hotmail.com .](mailto::%20Sup%20c%205987%20@%20hotmail.com%20.%20C@ssru.ac.th)

**6. Semester/Academic year**

Semester: 1 Academic Year: 2024, Wednesday 9:00 AM – 12.00 PM, Room # 301

Number of enrolled students: 19

**7. Pre-requisite course**

Calculus I

**8. Co-requisite course**

None

**9. Learning center**

CHIM Building, Nakhon-Pathom Campus

**10. Last date for preparing and revising this course**

December 2021

**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**

**Learning outcomes to be developed**

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

2) Have integrity, honesty, and teaching profession ethics.

3) Have discipline, self, and social responsibility.

**1.2 Knowledge**

**Learning outcomes to be developed**

1) Be able to comply knowledge accordance with the standards of Basic Education 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 calculus.

**1.3 Cognitive skills**

**Learning outcomes to be developed**

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 calculus topics and between calculus 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**

**Learning outcomes to be developed**

1) Have responsibility for building positive attitude towards calculus.

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

3) Be able to strengthen teachers’ potentiality and capabilities in teaching calculus.

**1.5 Numerical analysis, communication, and information technology skills**

**Learning outcomes to be developed**

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**

**Learning outcomes to be developed**

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. Objectives for developing/revising course (Content/Learning Process/Assessment/ etc.)**

Using the Framework for the 21st Century Learning process, students learn to integrate supportive technologies (i.e., Online Learning), inquiry-and problem-based learning instructional approaches, and higher order thinking.

**Section 3 - Characteristics and Operations**

1. **Course description**

Vectors in three dimensions; Solid analytic geometry; Partial differentiations

and applications ; Integrations and applications ; Application of using dynamic

software in Calculus II.

**2. Time length per semester (Lecture/Practice/Self-study hours)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Lecture** | **Practice**/  **Field Work**/**Internship** | **Self-Study** | **Remedial Class** |
| 3 hours/week | | 6 hours/week | 1 hour/week  (If any) |

**3. Individual consulting and guidance**

**Self-consulting at the lecturer’s office**:

Room Number 305, CHM Building, Nakhon-Pathom Campus

Mon., 9 AM – 4 PM

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

034-964946

**Consulting via email**: [Chaweewan.ka@ssru.ac.th](mailto:Chaweewan.ka@ssru.ac.th)

**Consulting via social media platform (Facebook/Twitter/Line)**: None

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

https://elchm.ssru.ac.th/chaweewan\_ka

**Section 4 - Developing Students’ 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) Have acting with respect to rules of agreement in mathematics. |
| ○ | 2) Have integrity, honesty, and teaching profession ethics. |
| ○ | 3) Have discipline, self, and social responsibility. |

**1.2 Teaching strategies**

1) Train the students to have characteristics of good problem solvers with confidence, potential, and challenge.

2) Encourage the students to have integrity, honesty, and discipline such as unselfishness and self-control.

**1.3 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**

**2**

|  |  |
| --- | --- |
| ○ | 1) Be able to comply knowledge accordance with the standards of Basic Education Core  Curriculum B.E.2008 (Revision 2017) in Mathematics |
| ● | 2) Have strong mathematical content knowledge and pedagogical content knowledge  needed to support students’ learning. |
| ●  **.2** | 3) Have knowledge and understanding principles and concepts of calculus.  **Teaching strategies**  1) Using brainstorming to encourage students generate many ideas and using higher order thinking. |

2) Using problem-based learning, research-based learning, and computer-based learning

to enhance students’ knowledge.

**2.3 Assessment & evaluation strategies**

1) Using rubrics for complex authentic task

2) Using formative and summative tests

3) Using mathematics tasks and presentation

**3. Cognitive skills**

**3.1 Learning outcomes to be developed**

|  |  |
| --- | --- |
| ○ | 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  calculus topics and between calculus 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. |

**3.2 Teaching strategies**

1) Encourage the students develop their higher thinking skills such as providing diversity environments for students to construct and implement their knowledge.

2) Using problem-based learning, research-based learning, and computer-based learning

to enhance students’ thinking skills.

**3.3 Assessment & evaluation strategies**

1) Using rubrics for complex authentic task

2) Using formative and summative tests

3) Using mathematics tasks and presentation

**4. Interpersonal skills and responsibilities**

**4.1 Learning outcomes to be developed**

|  |  |
| --- | --- |
| ○ | 1) Have responsibility for building positive attitude towards calculus. |
| ○ | 2) Be able to work collaboratively and demonstrate to be a good leader and a good  follower. |
| ○ | 3) Be able to strengthen teachers’ potentiality and capabilities in teaching calculus. |

**4.2 Teaching strategies**

1) Using cooperative learning through interpersonal communication and interaction.

2) Demonstrate the ability to apply appropriate interpersonal and teamwork skills in a variety of learning environment.

3) Using problem-based learning, research-based learning to enhance students’

experiences for further development their learning.

**4.3 Assessment & evaluation strategies**

1) Performance Assessment (on-site)

2) System log (online/on-demand)

3) 360-degree assessment

**5. Numerical analysis, communication, and information technology skills**

**5.1 Learning outcomes to be developed**

|  |  |
| --- | --- |
| ○ | 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. |

**5.2 Teaching strategies**

1) Encourage the students develop their higher thinking skills such as providing diversity environments for students to construct and implement their knowledge.

2) Using problem-based learning, research-based learning, and computer-based

learning to enhance students’ thinking skills.

**5.3 Assessment & evaluation strategies**

1) Using rubrics for complex authentic task

2) Using formative and summative tests

3) Using mathematics tasks 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  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. |

**6.2 Teaching Strategies**

1) Using real world problems within the mathematics classroom.

2) Using dynamic mathematics tools to reduce mathematics anxiety and negativity attitude.

**6.3 Assessment & evaluation strategies**

1) Using rubric for group work

2) Using assignment task and presentation **Remark:** Symbol ● means “major responsibility” Symbol ○ means “minor responsibility”

No symbol means “no responsibility”

During of outbreak of COVID-19, teaching strategies may be changed by using Massive

Open Online Courses prepared by lecturers and/or other educational organization.

**Section 5 - Lesson Plan and Assessment**

**1. Lesson plan**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Week** | **Topic/Outline** | **Teaching- Learning Model** | **Program/Teaching**  **Strategies** | **Content**  **Management** | **Assessment** |
| 1 | **Course Introduction**  - Course outlines  - Grading criteria  **-** Review of calculus I | Online | Google Meet | - PowerPoint  - YouTube VDO | - Attendance  Record  - System log |
| 2 | **-** Review of calculus I | Online | Google Meet | - PowerPoint  - YouTube VDO  - Lecture Notes  - Worksheet | - Attendance  Record  - System log  - Quiz |
| 1. – 4 | -Derivative and Integration of Trigonometric Functions and exponential functions | Online | Google Meet | - PowerPoint  - YouTube VDO  - Lecture Notes  - Worksheet | - Attendance  Record  - System log  - Quiz |
| 5 - 7 | -Vectors in three dimensions | Online/ On Demand | Google Meet | - PowerPoint  - YouTube VDO  - Lecture Notes  - Worksheet | - Attendance  Record  - System log  - Quiz |
| 8 | **Mid-term examination (On-site)** | | | | |
| 9 - 11 | -Solid Analytic Geometry | Online | Google Meet | - PowerPoint  - YouTube VDO  - Lecture Notes  - Worksheet | - Attendance  Record  - System log  - Quiz |
| 12 - 13 | Partial differentiation and Applications | Online/ On Demand | Google Meet | - PowerPoint  - YouTube VDO  - Lecture Notes | - Attendance  Record  - System log |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Week** | **Topic/Outline** | **Teaching- Learning Model** | **Program/Teaching**  **Strategies** | **Content**  **Management** | **Assessment** |
| 14-15 | Double and .Triple integrations |  | [http://www.elic.ssr](http://www.elic.ssr/) u.ac.th | - Worksheet  - GSP | - Assignment |
| 16 | Using Technology in calculus | Online/ On Demand | Google Meet [http://www.elic.ssr](http://www.elic.ssr/) u.ac.th | - PowerPoint  - YouTube VDO  - Lecture Notes  - Worksheet  - GSP | - Attendance  Record  - System log  - Assignment |
| 17 | **Final Examination** | | | | |

**Note:** Lesson plan might be affected by the COVID-19 pandemic.

**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 | 30 |
| 2.2, 2.3, 5.2 | Examination | 17 | 40 |
| 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) 360-degree assessment | 2, 4, 6, 10,  12, 14 | 30 |

**Section 6 - Learning and Teaching Resources**

**1. Textbook and main documents**

• Herman, E.J. & Strang, G. (2018). Calculus Volume 1. Rice University, Houston, Texas.

• 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 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.

Vision: Smart Archetype University of the Society

**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— | **1** | **2** |  **Major Responsibility**  **Minor Responsibility**  **3 1 2 3 1 2 3 1 2 3 1 2 3 1** | | | | | | | | | | | | | | | **2** | **3** |
| Major Required Course |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Course Code: MMA2301  Course Title: Calculus I |  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

**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.

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