

## Course Outline

### MA216: CALCULUS FOR SOCIAL SCIENCE I

**Semester 1/2022 (August 8 – November 26, 2022)**

**Number of Credit:** 3

**Prerequisite:** -

**Course Description:** Limits and continuity of one variable functions, derivatives of algebraic functions and transcendental functions, implicit differentiation, higher order derivatives, Roll's theorem, the mean value theorem, applications of derivative for determining limits and maximum and minimum of functions, differentials and its applications, antiderivatives, indefinite integrals and integration, definite integrals and application of area solving, functions of several variables, limits and continuity of functions of several variables, partial derivatives, the chain rule, total differential and its applications.

No credit for students who are currently taking or have earned credits of MA111 or MA211 or MA218

#### Course Objectives:

- Introduce calculus and its applications
- Strengthen mathematical skills to prepare for higher-level mathematics
- Raise the appreciation for mathematics and its applications

#### Class Time and Logistic

**Class day & Time:** Section 046401: Tuesday and Thursday, **08.00AM – 09.30AM**  
Section 046402: Tuesday and Thursday, **09.30AM – 11.00AM**

**Class Venue:** Section 046401: Room **302**, 3rd floor, Faculty of Economics  
Section 046402: Room **304**, 3rd floor, Faculty of Economics

**Teaching Materials Platform:** Microsoft Teams

- Section 046401: **Team Code:** **TBA**
- Section 046402: **Team Code:** **TBA**

**Instructor: Name:** Assoc. Prof. Dr. Saifon Chaturantabut

**Office Hours:** by appointment

**Email:** [saifon@mathstat.sci.tu.ac.th](mailto:saifon@mathstat.sci.tu.ac.th)

**Main Text:** Stewart, James, Calculus, 8th ed., Cengage Learning, 2016.

**Recommended Texts & Materials**

- Anton, H., Bivens, I., and Davis, S. Calculus, 9th ed., John Wiley & Sons, Inc., 2009.
- L.J. Goldstein, D.C. Lay, and D.L. Schneider, Calculus and its Applications, 12th ed., Prentice Hall, 2010

**Suggested Readings:** Any calculus textbook

**Grading Criteria\*:**

Midterm Examination 40% (Tuesday, September 27, 2022 / 09.00-11.00 AM)

Final Examination 50% (Tuesday, December 6, 2022 / 09.00-Noon)

Quizzes/Assignments/Attendance/Participation 10%

*\*Note: Any change will be announced during the class.*

**Expected Learning Outcomes:** Students understand the course materials and can apply them to some related situations, as well as other related classes in the future.

**Tentative Class Schedule**

| Week | Topic                                                                                                                                                   | Activities/Text & Materials/Media         |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|
| 1    | Course Overview<br>Limits and Continuity <ul style="list-style-type: none"> <li>- Limits (An Intuitive Approach)</li> <li>- Computing Limits</li> </ul> | Lecture<br>Discussion<br>Practice         |
| 2    | Limits and Continuity <ul style="list-style-type: none"> <li>- Techniques for computing limits</li> <li>- Limits at Infinity</li> </ul>                 | Lecture<br>Discussion<br>Practice         |
| 3    | Limits and Continuity <ul style="list-style-type: none"> <li>- Limits of Trigonometric Functions</li> <li>- Continuity</li> </ul>                       | Lecture<br>Discussion<br>Practice<br>Quiz |

| <b>Week</b> | <b>Topic</b>                                                                                                                                                                                                               | <b>Activities/Text &amp; Materials/Media</b> |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|
| 4           | Differentiation <ul style="list-style-type: none"> <li>- The Derivative</li> <li>- Techniques of Differentiation</li> </ul>                                                                                                | Lecture<br>Discussion<br>Practice<br>Quiz    |
| 5           | Differentiation <ul style="list-style-type: none"> <li>- The Chain Rule</li> <li>- Implicit Differentiation</li> </ul>                                                                                                     | Lecture<br>Discussion<br>Practice<br>Quiz    |
| 6           | Differentiation <ul style="list-style-type: none"> <li>- Derivatives of Logarithmic and Exponential Functions</li> <li>- Higher Derivatives</li> </ul>                                                                     | Lecture<br>Discussion<br>Practice<br>Quiz    |
| 7           | Applications of Differentiation <ul style="list-style-type: none"> <li>- Linear Approximations and Differentials</li> <li>- L'Hospital's Rule; Indeterminate Forms</li> </ul>                                              | Lecture<br>Discussion<br>Practice<br>Quiz    |
|             | <b>Midterm Exam</b>                                                                                                                                                                                                        |                                              |
| 8           | Applications of Differentiation <ul style="list-style-type: none"> <li>- Related Rates</li> <li>- Rolle's Theorem; Mean Value Theorem</li> </ul>                                                                           | Lecture<br>Discussion<br>Practice<br>Quiz    |
| 9           | Applications of Differentiation <ul style="list-style-type: none"> <li>- Interval of Increase and Decrease; Concavity</li> <li>- Relative Extreme; First and Second Derivative Tests</li> <li>- Curve Sketching</li> </ul> | Lecture<br>Discussion<br>Practice<br>Quiz    |
| 10          | <ul style="list-style-type: none"> <li>- Maximum and Minimum Values of a Function and applications</li> </ul> Integration <ul style="list-style-type: none"> <li>- Antiderivatives; The Indefinite Integral</li> </ul>     | Lecture<br>Discussion<br>Practice<br>Quiz    |
| 11          | Integration <ul style="list-style-type: none"> <li>- The Definite Integral</li> <li>- The Fundamental Theorem of Calculus</li> <li>- Evaluating Definite Integrals by Substitution</li> </ul>                              | Lecture<br>Discussion<br>Practice<br>Quiz    |
| 12          | Techniques of Integration <ul style="list-style-type: none"> <li>- Integration by Parts</li> <li>- Improper Integrals</li> </ul>                                                                                           | Lecture<br>Discussion<br>Practice<br>Quiz    |

| Week | Topic                                                                                           | Activities/Text & Materials/Media         |
|------|-------------------------------------------------------------------------------------------------|-------------------------------------------|
| 13   | Applications of Definite Integral<br>- Area Between Curves                                      | Lecture<br>Discussion<br>Practice<br>Quiz |
| 14   | Functions of several Variables<br>- Function of Two or More Variable<br>- Partial Derivatives   | Lecture<br>Discussion<br>Practice<br>Quiz |
| 15   | Functions of Several Variables<br>- The Chain Rule<br>- Total Differential and Its Applications | Lecture<br>Discussion<br>Practice<br>Quiz |
|      | <b>Final Exam</b>                                                                               |                                           |

### ACADEMIC CALENDAR & HOLIDAY SEMESTER 1/2022

| Semester 1/2022 (August 8 – November 26, 2022)              |                                                                                       |
|-------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Registration at REG TU (*ID.62-64)                          | July 11 - 14, 2022                                                                    |
| Registration at REG TU (*ID.65)                             | July 26, 2022                                                                         |
| Tuition Fee Payment Period (Via TU Greats App)              | July 15 - 17, 2022                                                                    |
| Classes Begin                                               | August 8, 2022                                                                        |
| Add-drop period                                             | August 8 – 21, 2022<br>(from 9.00 AM of August 8 to 10.30 PM of August 21)            |
| <i>H.M. Queen Sirikit The Queen Mother's Birthday*</i>      | <i>August 12, 2022</i>                                                                |
| Tuition Fee Payment Period (Via TU Greats App)              | August 22 – 24, 2022<br>(9 AM - 10.30 PM)                                             |
| Mid-term Examination Period                                 | September 25 – October 2, 2022                                                        |
| Withdrawal period with "W" on record                        | August 26 – October 16, 2022<br>(from 9.00 AM of August 26 to 10.30 PM of October 16) |
| <i>H.M. King Bhumibol Adulyadej The Great Memorial Day*</i> | <i>October 13, 2022</i>                                                               |
| <i>King Chulalongkorn's Day*</i>                            | <i>October 23, 2022</i>                                                               |
| <i>Substitution for King Chulalongkorn's Day*</i>           | <i>October 24, 2022</i>                                                               |
| Last day of class for Semester 2/2021                       | November 26, 2022                                                                     |
| Final exam period                                           | November 28 – 30, December 1 – 4, 6 – 9, 13 – 16, 2022                                |
| <i>H.M. King Bhumibol Adulyadej The Great's Birthday*</i>   | <i>December 5, 2022</i>                                                               |
| <i>Constitution Day*</i>                                    | <i>December 10, 2022</i>                                                              |
| <i>Substitution for Constitution Day*</i>                   | <i>December 12, 2022</i>                                                              |
| Submitting Forms for Degree Conferral                       | August 8 – 21, 2022                                                                   |

Remark \* Holiday, No classes during this period