Course Syllabus

1. **Course Number:** 2301107
2. **Course Credit:** 3 credits
3. **Course Title:** CALCULUS I
4. **Department of Mathematics and Computer Science** **Faculty of Science**
5. **Semester:** Fall
6. **Academic Year:** 2021
7. **Instructors:** Before Midterm: Assoc. Prof. Ratinan Boonklurb, Ph.D.
   Office: MHVH 1208/8, ☎02-218-7120 Email: ratinan.b@chula.ac.th
   After Midterm: Asst. Prof. Teeraphong Phongpattanacharoen, Ph.D.
   Office: MHVH 1309/7, ☎02-218-7127 Email: teeraphong.p@chula.ac.th
8. **Course Requirement:**
   - **8.1.Prerequisite:** -
   - **8.2.Co requisite:** -
9. **Status:** Required
10. **Curriculum:** Bachelor of Science (BBTech)
11. **Level:** Bachelor
12. **Number of Hours/Week:** 3
13. **Course Description:**

Limits and continuity; differentiation and its applications; integration; applications of integral; transcendental functions; techniques of integration; improper integrals.

14. **Course Outline**

14.1. Behavioral objectives: After finishing this course, students should be able to

1. find limits and verify continuity of given functions;
2. find derivatives of given functions using formulas and the chain rule;
3. find higher-order derivatives;
4. find derivatives of functions defined implicitly and solve related rate problems;
5. find differential of functions;
6. use differentials to estimate values of functions;
7. find indefinite and definite integrals of given functions;
8. find derivatives and integrals of transcendental functions;
9. find extrema of functions and inflection points of curves and sketch graphs;
10. use the chain rule to solve related rate problems;
11. find the limit of functions in the indeterminate forms;
12. find integral of functions by applying various techniques;
13. use definite integrals to calculate the area between curves, volumes of solid objects and length of curves;

14. verify the convergence of given improper integrals;

14.2. Contents: See Lecture-by-Lecture Breakdowns

14.3. Media: Blackboard Learn Chula, YouTube, Zoom

14.4. Assignment through Network System: Blackboard Learn Chula

14.5. Evaluation:

14.5.1. Assessment of academic knowledge

Quiz I (Tue Sep 7, 2021: 10 AM-NOON) 2*hr*.	15 %
MIDTERM (Mon Sep 27, 2021: 9 AM-12 PM) 3*hr*.	35 %
Quiz II (Tue Nov 2. 2021: 10 AM-NOON) 2*hr*.	15 %
FINAL EXAM (Tue Dec 7, 2021: 1-4 PM) 3*hr*.	35 %

14.5.2. Assessment of work, assigned tasks or classroom activities

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15. References:

15.1.1. Contents:

15.1.2. Assessment of work or classroom activities -

15.1.3. Assessment of the assigned tasks -

16. References:

16.1. Required Text: : James Stewart, Calculus Early Transcendental 7e, Brooks/Cole Thomson Learning 2012.

16.2. Supplementary Texts:

- Howard Anton, et al., *Calculus with Analytic Geometry*, 7th edition, John Wiley & Sons, 2002
- Henry Edwards and David Penney, *Calculus with Analytic Geometry*, 6th edition, Prentice Hall 2002.
- Thomas and Finney, *Calculus and Analytic Geometry*, 9th edition, Addition-Wesley, 1996.

16.3. Research Articles / Academic Articles -

16.4. Electronic Media or Websites All related websites

17. Teacher Evaluation The final evaluation will be given online via CUCAS system.

BBTech (2021) 2301107 LECTURE-BY-LECTURE BREAKDOWNS

Before Midterm

Lectures before Midterm	Material Covered (Tentative) in the Clips
1 (Tue Aug 10, 10am–noon) +Zoom Meeting at 10am	- Introduction to Calculus - Limit and Continuity (§2.2, 2.3, 2.5)
1 (Wed Aug 11, 9am–10am)	- Limit at infinity; Horizontal Asymptotes (§2.6) - Determine the infinite limit ($= \pm\infty$) (§2.2)
2 (Tue Aug 17, 10am–noon) +Zoom Meeting at 10am	- Derivatives (§2.7, 2.8) - Derivative of Polynomials (§3.1) - Derivative of Exponential Functions (§3.1)
2 (Wed Aug 18, 9am–10am)	- The Product and Quotient Rules (3.2) - Derivatives of Trigonometric Functions (§3.3)
3 (Tue Aug 24, 10am–noon) +Zoom Meeting at 10am	- The Chain Rule (§3.4) - Higher Derivatives (§2.8) - Implicit Differentiation (§3.5)
3 (Wed Aug 25, 9am–10am)	- Derivatives of Inverse Trig Functions (§3.5) - Logarithmic Functions (§3.6)
4 (Tue Aug 31, 10am–noon) +Zoom Meeting at 10am	- Logarithmic Differentiation (§3.6) - Related Rates (§3.9)
4 (Wed Sep 1, 9am–10am) +Zoom Meeting at 10am	- Linear Approximations and Differentials (§3.10) REVIEW FOR Quiz I
5 (Tue Sep 7, 10am–noon) ***Quiz I (2hrs.)***	***§2.2–2.3, 2.5–2.8, 3.1–3.6 for 15%***
5 (Wed Sep 8, 9am–10am)	I.F. and the L'Hôpital's Rule (§4.4) L'Hôpital's Rule (other I.F.) (§4.4)
6 (Tue Sep 14, 10am–noon) +Zoom Meeting at 10am	- Min/Max Values (§4.1, 4.3) - Optimization Problems (§4.7)
6 (Wed Sep 15, 9am–10am)	- Concavity Test (§4.3) - Asymptotes
7 (Tue Sep 21, 10am–noon) +Zoom Meeting at 10am	Curve Sketching (§4.5)
7 (Wed Sep 22, 9am–10am) +Zoom Meeting at 10am	REVIEW FOR MIDTERM
Thu Sep 30, 9-12 AM ***MIDTERM (3hrs.)***	***§3.9–3.10, 4.1, 4.3, 4.4, 4.5, 4.7 for 35%***

PLEASE NOTE THE FOLLOWING STATEMENTS:

1. You may consult the textbook for deeper detail.
2. We will communicate for Q and A and announcement via Zoom Meeting, email and Line open chat (QR code below). Please use your real name for entering this Chat.

After Midterm

Lectures after Midterm	Material Covered (Tentative) in the Clips
1 (Tue Oct 5) 10am-noon +Zoom Meeting at 10am	- Antiderivatives (§4.9) - Indefinite Integrals (§5.4)
1 (Wed Oct 6) 9am-10am	- Antiderivatives (§4.9) - Indefinite Integrals (§5.4)
2 (Tue Oct 12) 10am-noon +Zoom Meeting at 10am	- Definite Integral (Riemann Sum) (§5.1, 5.2) - The Fundamental Theorem of Calculus (§5.3)
2 (Wed Oct 13) 9am-10am	Holiday
2 Make-Up	- The Substitution Rule I (§5.5)
3 (Tue Oct 19) 10am-noon +Zoom Meeting at 10am	- The Substitution Rule I (§5.5) - Improper Integrals I & II (§7.8)
3 (Wed Oct 20) 9am-10am	- Improper Integrals Mixed (§7.8) - Area between Curves (§6.1)
4 (Tue Oct 26) 10am-noon +Zoom Meeting at 10am	- Volumes I (Cross Sections & Disks) (§6.2)
4 (Wed Oct 27) 9am-10am +Zoom Meeting at 10am	- Volumes II (Shells) (§6.3) REVIEW FOR Quiz II
5 (Tue Nov 2) 10am-noon *Quiz II (2hrs.)*	*§4.9, 5.1–5.5, 7.8 for 15%*
5 (Wed Nov 3) 9am-10am	- Arc Length (§8.1) - Integration by Parts (§7.1)
6 (Tue Nov 9) 10am-noon +Zoom Meeting at 10am	- Integration by Parts (§7.1) - Trig Integrals (§7.2)
6 (Wed Nov 10) 9am-10am	- Trig Substitutions (§7.3)
7 (Tue Nov 16) 10am-noon +Zoom Meeting at 10am	- Trig Substitutions (§7.3) - Partial Fraction Decompositions (§7.4)
7 (Wed Nov 17) 9am-10am	- Integration by Partial Fractions (§7.4)
8 (Tue Nov 23) 10am-noon +Zoom Meeting at 10am	- Strategy for Integration (§7.5)
8 (Wed Nov 24) 9am-10am +Zoom Meeting at 10am	Review for FINAL EXAM
Tue Dec 7, 1-4 PM *FINAL EXAM (3hrs.)*	*§6.1–6.3, 7.1–7.5, 8.1 for 35%*