

Calculus I
Course Outline (updated 20 February 2024)
Course 0941002 Section 03, Spring 2024
Wednesdays 11:00 - 11:50, Thursdays 16:00 - 17:50, Room: E1-2 #331
Chungbuk National University

This document prevails whenever interpretations of the course syllabus (the version in 개신누리) and that of this document conflict. This document contains terms and conditions on how this class will be administered throughout the semester. Registering for this class means you agree on plans, policies, and details in this document. You MUST drop this course if you disagree with any item listed in this document. Also, some parts of this document is only tentative and subject to change for the reason that the main textbook is not yet published. It will be confirmed around the end of February 2024. Please come back to the course webpage for an updated version of this document.

Instructor: Dr. Byungdo Park

Email: byungdo@chungbuk.ac.kr

Office hours: Wednesdays 15:00–15:50 at E1-1 #110 or by appointment.

Class webpage: Announcements, homework, exam schedules and other relevant information will be posted on the following webpage: https://byungdo.github.io/teaching/s2024_calc1.html which is also accessible via instructor's webpage: <https://byungdo.github.io/>

Textbook:

- 고두원 외, *미적분학*, 제1판(2024), 경문사, ISBN-13: 9791160736908.

References:

- Richard E. Johnson and Fred L. Kiokemeister, *Calculus With Analytic Geometry*, 6th Edition (1978), William C Brown Pub, ISBN-13: 9780205059171.
- Michael Spivak, *Calculus*, 4th Edition (2008), Publish or Perish, ISBN-13: 9780914098911.
- Tom M. Apostol, *Calculus, Vol. 1: One-Variable Calculus, with an Introduction to Linear Algebra*, 2nd edition (1991), Wiley, ISBN-13: 9780471000051.

Prerequisites: None, however the instructor assumes that you have mastered mathematics of the level of Precalculus (0941004) and the standard analytic geometry in high school curricula.

Overtallies: This section of Calculus I is for *physics* major freshmen. Students from other majors are of course very welcome to enroll in this section, however, if the class is full, overtallies will be granted only to physics major freshmen entered in March 2024. No need to put up any online request against it – it will be only dismissed.

Course description: Calculus on steroids. This is an year-long calculus course for college freshmen who already have a decent exposure to calculus. The first half, which is this course, covers all conventional topics in single-variable calculus including limit of functions and sequences, differentiation, integration, series convergence tests, Taylor expansions, and calculus on polar coordinates. Phrasing differently, this one-semester course covers virtually everything typically covered in an year-long Calculus I, II sequence in the US. Naturally, the pace will be quite rapid and at times you gotta bite the bullet since there won't be much room for you to relax and appreciate the material.

Course objectives: At the end of the course students should be able to:

- Evaluate limit of functions and understand formal definitions of limits and continuity.
- Find derivatives and apply differentiation rules.
- Understand the meaning of first and second derivatives and apply it for a curve sketching and related rates problems.
- Find antiderivatives by applying various integration techniques.
- Understand fundamental theorem of calculus and apply it for various practical calculations involving integrals.
- Do calculus in polar coordinate.
- Evaluate limit of sequences and carry out convergence tests for series.
- Understand the radius of convergence of power series as well as power series representation of functions.

Details on class proceeding: The instructor will give lectures on the material following the weekly lesson plan and assign weekly homework problems.

Grading policies: 23% each from three 50-minute midterm exam (total 69%), 23% from 50-minute final exam, and 8% from attendance. Absolute evaluation [A: 100–90 points, B: 89.99–80 points, C: 79.99–70 points, D: 69.99–60 points, F: less than 60 points] with curving. Here the curving means a horizontal shift of the bell-shaped curve of %-score distribution in either directions using a rational constant which is determined at the discretion of the instructor. The only exception (that is unlikely to happen) to the absolute evaluation: If your total score is less than 60 points after curving *and* greater than or equal to 60 points before curving, then D is assigned instead of F. Grading policies in the attendance policies, academic integrity policies, and classroom attitude policies are applied in higher priority (in this order) than the above grading policies. Those who are in their final semester and have to show up to work during the semester, special rules apply in accordance with the university policies (cf. 충북대학교 학칙 제34조의2, 학사운영규정 제86조의3).

Homework policies: A list of homework problems will be posted on the class webpage roughly in weekly basis. The instructor will assign as many homework problems as it is needed to master the subject. However, homework will not be collected, will not be graded, and will not be used as a constituent of your final score. Instead, some of your exam problems will be identical to your

homework problems.

Classroom attitude policies: The instructor may apply up to 5 points per day (up to 10 points per day for repeated cases) of deduction of your total score against any of your attitude which the instructor views it inappropriate. The sum of total score deduction due to these policies may not exceed 20 points throughout the semester. Inappropriate attitudes are (i) anything you do in the classroom that disturbs and/or distracts the instructor or other students or (ii) disturbing and/or distracting the instructor from administering this class. If you violate, you will be notified via email registered in 개신누리 and it gets confirmed if you do not dispute in a written form in 7 days.

Attendance policies: (1) Attendance data will be collected in every class meeting and will be used for determining your final grade. You will get a grade F if you have missed more than 25% of class meeting hours. Up to 3 hour of absence there is no penalty on your score. After that, you lose 1% of total score for an absence to each 50-minute long class meeting, with a maximum total loss 8% from your total score.

(2) If you have permissible reasons for your absence in accordance with the Regulation on Academic Management of the CBNU Article 52(1) (충북대학교 학사운영규정 제52조(공결승인) 제1항), you will need to contact your department secretary to follow the procedure for getting an approval on your absence bringing proper documentation as proof. That said, you have to fill out a form and submit it along with appropriate proofs before the absence or after seven days of the date of absence.

(3) If you responded to an attendance call and leave the classroom (even if you come back later) while the lecture is still going on, you will be considered to be absent for that attendance call *if you report later to the instructor that you left during the class within that day's class*. If you don't report and your arbitrary and sudden leave gets caught, you will be considered to be absent for that day's class and it will be treated as a violation of classroom attitude policies.

(4) Any dispute about in-class attendance records must be made before the instructor physically leaves the classroom after that day's class meeting.

Makeup exam policies: If you could not take any exam and would like to take a makeup exam to the missing exam, you must follow the following guideline:
<https://byungdo.github.io/teaching/makeup.pdf>

Assessment of learning: The assessment will be based on the abovementioned grading policy.

Important dates:

- Wednesday April 10th – National election day. Make-up date: TBA
- Wednesday May 15th – Buddha's birthday. Make-up date: TBA
- Thursday June 6th – Memorial day. Make-up date: TBA

Weekly lesson plan: Those sections under the bracket “[...]” stands for *presto*; i.e., it will be covered in a very fast and brief manner). Double brackets would then mean *prestissimo*.

Week 1: Going-over the syllabus, functions, [[trigonometric functions]], inverse trigonometric functions. (Sections 1.1–1.3)

Week 2: Inverse hyperbolic functions, limit of functions. (Sections 1.3–1.4)

Week 3: Continuity, derivatives and laws of differentiation, chain rule, derivatives of inverse functions, implicit differentiation (Sections 1.5, 2.1–2.2)

Week 4: Derivatives of (inverse) trigonometric, exponential, logarithmic functions, and [hyperbolic and inverse hyperbolic functions], [[higher derivatives]] (Sections 2.3–2.6)

Week 5: 1st midterm exam (50-minute), extrema, mean-value theorem, L'Hôpital's theorem (Sections 3.2–3.3)

Week 6: Increasing and decreasing functions and the first derivative test, concavity, the second derivative test, asymptotes, curve sketching, [[optimization, Newton's method]] (Sections 3.4–3.8)

Week 7: [Antiderivatives, substitutions, integration by parts], partial fractions, irrational functions as as integrands (including trigonometric substitutions), trigonometric integrals (Sections 4.1–4.5)

Week 8: Definite integrals and their properties, fundamental theorem of calculus (Sections 5.1–5.3)

Week 9: Substitutions, integration by parts, improper integrals, [[approximation of integrals]], areas, volumes. (Sections 5.3–6.2)

Week 10: 2nd midterm exam (50-minute). Length of curves and areas, mean value property, [[work]], [rectangular coordinate system], polar coordinate, graphs in polar coordinate (Sections 6.3–7.3)

Week 11: [Cylindrical and spherical coordinate system], [[parametric equations]], [calculus in polar coordinate]. (Sections 7.4–7.8)

Week 12: Limit of sequences and functions, convergence of series. (Sections 8.1, 8.2)

Week 13: Leeway for the Week 12. 3rd midterm exam (50-minute). (Sections 8.1, 8.2)

Week 14: Convergence tests and absolute convergence. (Sections 8.4)

Week 15: Power series, Maclaurin series, Taylor series. (Sections 8.5) A 50-minute final exam.

Dispute policies: (1) The instructor will announce a date and an interval of time for you to see (and dispute if you wish) your graded papers. For that you have to respond and set up an appointment by email until the specified deadline. If you respond, the instructor will give you a specified date, time, and location for you to show up. There will be an option to give up your rights to dispute and just get notified your scores by email.

(2) If the specified date and an interval of time in the announcement conflicts with your other classes or other equivalently official schedules, you may request a rescheduling by attaching your time table or a relevant document showing that you have other official matters.

(3) If you do not respond by the deadline in each announcement, the instructor will have to assume that you give up your right to dispute and the grading is flawless. For example, if you inquire after your letter grade is assigned, the instructor will only look into whether there is any error in entering your final grade

and will dismiss all inquiries on the raw data.

Accommodating disabilities in learning and assessment: The instructor is committed to providing access to all students. If you need accommodation in classroom or in assessment, you are encouraged to set up an appointment with the instructor at your soonest availability so that we can figure out the best way to accommodate you. Possible accommodations include, but not limited to, provision of materials from lectures, permission to hire an assistant for taking notes, audio-recording lectures, and aid/assistant devices, extension of due dates for assignments, alternative assessment for in-class presentations, extension of exam hours, and provision of an accommodating exam locations and exam sheets.

Academic integrity: It is expected that you will complete all exams without giving or receiving help from anyone. Electronic devices are not allowed in any in-class exam. If you violate any of these policies, you receive score zero to that exam at the discretion of the instructor. In addition, your case will be handled through the standard procedure of the university. Note that a use of your smartphone during an exam is simply a cheating.

Email policies: All emails addressed to the instructor should have a title containing the course title, name, and a brief summary as well as a body starting with "Dear Professor Last name" and ending with "Sincerely, Your full name", which contains greetings, your name and department, a brief and clear purpose written politely. Any email deviating from this format will not be accepted and will be dismissed without any rejection reply. The corresponding disadvantages are solely and entirely on the student.

이메일 작성규칙: 담당교수에게 보내지는 모든 이메일의 제목에는 과목명, 신원, 요지가 포함되어 있어야 하며, 본문은 반드시 "OOO 교수님께"로 시작하여 인사, 신원, 용건을 간단 명료하고 예의바르게 기술한 후 "OOO 올림" 또는 "OOO 드림"으로 끝나야 합니다. 이 형식에 어긋난 이메일은 접수하지 않으며, 반려회신 없이 종결합니다. 이에 따른 불이익은 전적으로 학생의 단독 책임입니다.

English usage policies: Lectures in this course will be given in Korean, but most of written materials will be in English. For example, the course syllabus, most of boardwork, exam problems, homework, solutions to exams, course webpage, announcements, but not limited to those. English sentences to be used in this course should be understandable enough based on the regular Korean public high school curriculum. Nonetheless if your English skill is not competent enough to follow this course or understanding announcements, it is your responsibility to ask the instructor to also provide an explanation in Korean. The instructor will take those questions under an attitude of helping students' understanding, but taking into account the contents of each question, he may reject the question or advise the questioner to visit him during his office hour to ask the question about Korean translation.

영어 사용 정책: 본 강좌에서 강의는 한국어로 이루어집니다만, 글의 경우 대부분 영어가 사용될 것입니다. 수업계획서, 칠판 판서의 대부분, 시험문제, 숙제, 시험문제에 대한 풀이, 강좌의 웹페이지, 공지사항 등이 예가 될 수 있으며, 이상 열거한 것들로 한정되지 않습니다. 본 강좌에서 사용될 영어 문장들은 한국의 공립 고등학교 정규 교과과정을 기초로 할 때 충분히 이해될 수 있어야 합니다만, 만약 수강생 본인의 영어실력이 본 강좌를 따라오거나 공지사항을 이해하기에 충분치 못하다면, 담당교수에게 한국어로 추가 설명을 요청하는 것은 학생 본인의 몫입니다. 담당 교수는 학생들의 이해를 도우려는 자세로 질문을 받을 것이지만, 질문의 내용에 따라 답을 하지 아니할 수도 있고, 면담시간에 개별 방문하여 질문하도록 안내할 수도 있습니다.