Calculus II
Course Outline
Course 0941003 Section 02, Fall 2022
Tuesdays 11:00 - 11:50, Thursdays 10:00 - 11:50, Room: E1-2 #306
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.

Instructor: Dr. Byungdo Park

Email: byungdo@g.cbnu.ac.kr (alternatively, use byungdopark1@gmail.com if it does not work)

Office hours: Tuesdays 18:00–18:50 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/f2022_calc2.html which is also accessible via instructor's webpage: https://byungdo.github.io/

Textbook:

- 고두원 외, *미적분학*, 초판(2021), 경문사, ISBN-13: 9791160734997.

References:

- Erwin Kreyszig, *Advanced Engineering Mathematics*, 8th Edition, ISBN-13: 9780471154969

- Jerrold Marsden and Anthony Tromba, *Vector Calculus*, 6th Edition, W. H. Freeman, ISBN-13: 9781429215084

- Jerry B. Marion and Stephen T. Thronton, *Classical Dynamics of Particles and Systems*, 4th Edition, Saunders College Publications, ISBN-13: 9780030973024

- Edward M. Purcell, *Electricity and Magnetism*, 2nd Edition, Cambridge University Press, ISBN-13: 9781107013605

Prerequisites: Calculus I (0941002). If you did not pass Calculus I yet, the instructor strongly dissuade you from registering for this class. The instructor does not stop you registering for this class at your own risk.

Overtallies: This section of Calculus II is for *statistics* 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 statistics major freshmen entered in March 2022. No need to put up any online

request against it – it will be only dismissed.

Course description: This is the second-half of an year-long calculus course for college freshmen who already have taken Calculus I. We begin with vectors and matrices using which we study basic calculus of multivariable functions and vector-valued functions including partial derivatives, double and triple integrals, vector fields, line and surface integrals of vector fields, and three important integral theorems of Green, Stokes, and Gauss. As it was so in Calculus I, this course is again "on steroids" – the pace will be quite rapid and mostly uphills while the most important theorems appear at the end of the semester. Nonetheless, understanding those integral theorems will be rewarding and become a great asset of yours while studying other subjects in sciences an engineering.

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

- Find determinant and inverse of a matrix and carry out basic operations using vectors in $\mathbb{R}^3$.

- Understand the meaning of limit and continuity and explain differences compared to the single-variable case.

- Compute partial derivatives and apply chain rules.

- Calculate directional derivatives and explain their meanings.

- Use Lagrange's multipliers for finding constrained extrema.

- State what Fubini's theorem says and apply it in calculating multiple integrals.

- Calculate multiple integrals using appropriate changes of coordinates.

- Calculate gradient of a function as well as curl and divergence of a vector field and explain their physical meanings.

- State Green's, Stokes', and Gauss' theorems and explain their physical meanings.

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 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 applies 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.

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) Any dispute about in-class attendance records must be made before the instructor physically leaves the classroom after that day's class meeting. If your attendance call is responded by a person other than you, a penal responsibility will be pursued against responsible individuals.

Assessment of learning: The assessment will be primarily done by the abovementioned grading policy. Nonetheless, the instructor will also take into account students' devotions and efforts for this course so that those qualitative elements are not going to be neglected.

Important dates:

- Tuesday September 27th – CBNU Anniversary. Make-up date: TBA

Weekly lesson plan: Those sections under the bracket "[$\cdots$]" 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. Taylor and Maclaurin series (Section 8.6)

Week 2: Vectors and matrices (Sections 9.1, 9.3)

Week 3: Determinants, cofactors, and inverse of a matrix (Sections 9.4–9.5)

Week 4: Cross products, multivariable functions (Sections 9.8, 10.1)

Week 5: Limits and continuity of multivariable functions, partial derivatives(Sections 10.2–10.3)

Week 6: A 50-minute exam covering sections 8.6–9.8, chain rule (Section 10.5)

Week 7: Directional derivatives, gradients, tangent planes, and normal lines (Sections 10.6–10.7)

Week 8: Maxima and minima, Lagrange's multipliers, double integrals (Sections 10.8, 10.9, 11.1)

Week 9: Fubini's theorem, change of coordinates and substitutions (Sections 11.2–11.3)

Week 10: A 50-minute exam covering sections 10.1–10.9, triple and iterated integrals, [coordinate changes] (Sections 11.4–11.5)

Week 11: [[parametrization of curves and surfaces]], line and surface integrals of real-valued functions (Sections 11.6–11.7)

Week 12: Vector fields, orientations, path integrals (Sections 12.1–12.3)

Week 13: A 50-minute exam covering sections 11.1–11.7, Surface integrals, curl and divergence (Sections 12.4–12.5)

Week 14: Green's theorem and 2D divergence theorem (Sections 12.6)

Week 15: Stokes' and Gauss' divergence theorems, proofs if time permits, 50-minute final exam covering sections 12.1–12.8 (Sections 12.7–12.8)

Dispute policies: (1) You may set up an appointment with the instructor to get information about the raw data (such as your exam scores, attendance data, etc) which will consist of your total score. For that, you have to send an email to the instructor to set up an appointment. Typically the meeting will take place during the office hour (you cannot walk-in for this purpose; set up an appointment first) but if you have a class at the same time, you should attach your time table showing that you have another class during the office hour.

(2) If you do not set up an appointment and do not dispute about the raw data, the instructor will have to assume that you give up your right to dispute. After the final exam, the instructor will announce the last day for dispute. After this date, the instructor will only look into whether there is any error in entering your final grade and will dismiss all inqueries 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 acoommodate 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.

Classroom policies: You are expected to respect other people in the classroom during all class meetings and your interactions online (such as email exchanges). If you do one of the following, you will receive a penalty of lowering your final grade by one-letter (i.e., your A+ will become B+). You will be notified via email registered in 개신누리 and you will have 7 days to dispute in a written form.

(A) Talking to other people including self during the lecture to an extent that the lecture gets disturbed.

(B) Leaving the classroom while the lecture is still going on. If you (may) have to leave the classroom during the class, come to the instructor before the class begins and get a permission. Otherwise, you will get a penalty: To remove it, you will have to prove the urgency through a dispute under a proper documentation.

(C) Not leaving the classroom within 1-minute of the instructor's notice asking you to leave the classroom immediately, while the instructor may add additional penalties at every 1-minute of not complying with the notice.

(D) Doing anything that disturbs the lecture or the instructor's class administration that the instructor already announced it will be viewed as a violation of the classroom policies.

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 예의 바르게 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, 담당 교수에게 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.