ADA University, School of IT and Engineering
MATH 1222 – Calculus II
Spring 2023
Credits: 6.00

Instructor: Yagub Aliyev, PhD
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Office Hours: Monday to Friday 10.00-11.00 (check my schedule) or by appointment.

Note for smokers: I am very sensitive to the smell of smoking. Please, don't smoke cigarettes or e-cigarettes before coming to my lectures, exams, and my office. Thank you for your understanding.

Course Description
This course focuses on multivariable differential and integral calculus as opposed to calculus of a single variable that students learned in MATH 1111 (Calculus I) course. It provides the necessary background for more advanced mathematical courses. Students will get familiar with such important concepts as infinite sequence and series, a function of several variables, partial derivative, vector field, a line integral and multivariable integral.

Course Objectives
Upon successful completion of this course students should be able to:

1. Compute the limits of the functions of more than one variable, partial derivatives.
2. Solve unconstrained and constrained optimization (extrema) problems.
3. Analyze infinite series for convergence using various tests; know how to represent function with power series.
4. Compute the double and triple integrals; use the iterated integrals to measure area, volume and mass.
5. Compute the line and surface integrals; understand and know how to use the Green's theorem, the Divergence theorem, the Stokes' theorem.

Prerequisites
Calculus I (differentiation and integration skills) is a prerequisite for this course.

Textbooks

1. *Thomas' Calculus Early Transcendentals, Twelfth Edition. (Main Textbook)*
2. James Stewart's Calculus, 7th edition (Secondary Textbook)
3. Frank Ayres, Elliot Mendelson, Calculus, 4th edition, Schaum's Outlines.
4. Howard Anton, Calculus, John Wiley and Sons / New York – 1999.
5. C. Henry Edwards, David E. Penney Calculus (6th Edition) 6th Edition
6. Robert Adams, Calculus A Complete Course, Pearson, Toronto, 2006
7. Calculus by Jon Rogawski

Course Assessment.
The assessment of objectives is achieved through HW, Assignments, quizzes, and examinations (midterm and final)

Grading Policy
Grade components are the following:
Homework (Blackboard Assignment) – 15%
Quizzes (10 Quizzes each giving 3%)– 30%
Assignment (Hard Problem) – 5%

Assignment (GeoGebra Applet) – 5%
Assignment (Flipgrid) – 5%
Midterm exam – 15%
Final exam – 25%
A passing grade is 60 (D)

Homework Rules
For Homework problems, we will use the Blackboard Assignments. You are asked to submit handwritten solutions as one pdf file. Please, pay attention to rotated and dark pages. It is impossible to read them, and I will put zero for such submissions. The number of problems which is necessary to solve from each Homework Set will be announced in the instructions accompanying the Homework Sets.

Assignment (Hard Problem)
I will give you one hard problem from an old problem book about **Calculus**. You need to solve and present the the solution as a handwriting and as a youtube video. **The solutions without a youtube presentation won't be accepted.**

Assignment (GeoGebra Applet)
You will be asked to create a Geogebra Applet demonstrating some Multivariable Function and other things. The use of sliders (if possible) is strongly recommended. Be careful to put reasonable limits to the sliders. The details will be given in the Assignments page of Blackboard. You should submit a 1 page report about the calculations of derivatives, the link to this applet and the link of the 1 minute YouTube video of its creation where you explain with your own voice what you did there. Use screen recorders for this purpose. All the submissions should be through the Blackboard.

Assignment (Flipgrid)
You will be asked to create and submit a short video about the topic assigned to you.

Exam Rules
No electronic devices (cellphones, laptops, smart watches, calculators) are permitted.
No collaboration during in-class quizzes and examinations. All quizzes and exams are in-class and closed book/notes if pandemics situation will let us do this otherwise they will be online assignments and open book. There will be no make-up quizzes and exams. A missed quiz or examination counts as a zero.

Attendance Policy
Regular attendance is important. Some lecture material is not in the textbook. You are not allowed to come to class late. If you miss a class it is your responsibility to find out about any announcements made in class.

Academic Integrity
In order to maintain a culture of academic integrity, members of the ADA University community are expected to promote honesty, trust, fairness, respect and responsibility. Check
https://www.ada.edu.az/frq-content/plugins/policies_x1/entry/20210820115209_06140500.pdf

for more information. A student who is unsure whether an action constitutes an offence, or who needs help in learning how to avoid offences (e.g., plagiarism, cheating) or about "rules" for group work/collaboration should seek guidance from the course instructor or academic advisor.

Course Content

Lectures	Topic	Reading
1.	Sequences; Infinite Series	Thomas', Ch. 10: 10.1 – 10.2
2.	Convergence Tests (Integral, Comparison, etc.)	Thomas', Ch. 10: 10.3 – 10.6
3.	Power Series; Taylor and Maclaurin Series, Binomial Series	Thomas', Ch. 10: 10.7 – 10.10
4.	Parameterizations of Plane Curves; Calculus with Parametric Curves; Polar coordinates; Conics.	Thomas', Ch. 11: 11.1-11.7;
5.	Vectors; The Dot Product; The Cross Product; Lines and Planes in Space; Vector-Valued Functions.	Ch. 12: 12.2 – 12.5 Ch. 13
	Midterm	
6.	Functions of several variables; Limit and Continuity	Thomas', Ch.14: 14.1 – 14.2
7.	Partial Derivatives and Differentiability; The Chain Rule; Directional Derivative and Gradient	Thomas', Ch.14: 14.3 – 14.5
8.	Tangent Planes and Normal Lines; Differentials	Thomas', Ch.14: 14.6
9.	Extreme Values; Saddle Points; The Method of Lagrange Multipliers	Thomas', Ch.14: 14.7 – 14.8
10.	Double and Iterated Integrals over rectangular and general regions; Applications: Area by Double Integration, Triple Integral, Substitution in Multiple integrals	Thomas', Ch. 15: 15.1 – 15.8
11.	Line Integrals; Vector Fields; Work	Thomas', Ch. 16: 16.1 – 16.2
12.	Conservative Fields and Potential Functions; Green's Theorem	Thomas', Ch. 16: 16.3 – 16.4
13.	Surface Area; Surface Integrals; Stokes' Theorem, The Divergence Theorem and a Unified Theory	Thomas', Ch. 16: 16.5 – 16.8