



«Approved»

Dean

Syzdykova Z.A

2024

Syllabus

Academic Year 2024 -2025

General information	
Course Title	Calculus 2
Degree Cycle (Level)/ Major	6B06102 Software Engineering
Year, semester	1,2
Number of Credits	5
Language of Delivery:	English
Prerequisites	"Calculus 1"
Postrequisites	Numerical Methods, Calculus III
Lecturer (Lecturers)	Aliya Aruova, Candidate of Physical and Mathematical Sciences, Associate Professor, a.aruova@astanait.edu.kz , Astana IT University, C1 block, 3rd floor, office #C1.332
2. Goals, objectives and learning outcomes of the course	
1. Course description	Upon successful completion of Calculus 2 the student will have an understanding of topics listed below, be able to solve routine problems, and be able to apply the ideas in the appropriate areas
2. Course objectives:	By the end of this course the students should: Compute the limit, derivatives, and integral of a multidimensional and vector-valued function; Calculate the arc length of a curve and its curvature; identify the unit tangent, unit normal and binormal vectors; Calculate the tangential and normal components of a vector; Describe motion in space.
3. Course Learning Outcomes:	Calculus 2 satisfies the university core curriculum requirement in Mathematics: <i>"Students graduating from Astana IT University should be able to demonstrate the ability to apply quantitative and logical skills to solve problems."</i> It meets the TTU general education student learning outcomes for mathematics that students will: Apply arithmetic, algebraic, geometric, statistical and logical reasoning to solve problems. Represent and evaluate basic mathematical and/or logical information numerically, graphically, and symbolically. Students will become proficient in techniques of differentiation, understand the concept of rate of change and how to use it to solve real world problems, the concept of definite and indefinite integral and their relations to area and rate of change. In particular, the students will Be able to explain the concept of continuous functions Differentiation to solve related rate and optimization problems Compute definite and indefinite integrals

4. Methods of Assessment	The expected learning outcomes for the course will be assessed through graded activities and ungraded activities. The graded activities include exams, homework, quizzes, and midterms. The ungraded activities will be used to monitor your progress. A variety of these ungraded assessment techniques may be employed, including problems to be completed during class, direct questioning of students, answering students' questions in class, one-minute classroom assessment techniques, and discussions during office hours.
5. Reading List	<p>1. George B. Thomas, Jr., Ross L. Finney. Calculus and analytic geometry. - 9th ed. 1992.</p> <p>2. Thomas' Calculus. By George B. Thomas, revised by J. Hass, C. Heil, M.D. Weir, Pearson Publishing Company. 14th edition.</p> <p>3. S.L. Ross, Differential Equations - John Wiley & Sons, 1984, 3rd ed.</p> <p>4. G. N. Berman, A collection of problems on a course of Mathematical Analysis</p>
2. Resources	Online journals, articles, papers, books and internet resources.
3. Course policy	<p>Course and University policies include:</p> <p>Attendance: Attendance is not allocated any grading points in the marking scheme, but is compulsory to pass the course. Normally, students are required to achieve course attendance of a minimum 70% to get admitted to the examination rubric.</p> <p>In case a student misses 30% or more class sessions without a valid excuse, the instructor has the right to mark him as "not graded." In such case, a student is not admitted to the exam and automatically fails the course. It should be NOTED that in cases when a student is excused for 30% of the scheduled class sessions or more, he or she has to study material provided under the course on their own. Course instructors might provide additional opportunities to submit missed graded pieces of work during office hours or conduct alternative assessment exercises using the method of his or her choosing.</p> <p>Preparation for Class: Class participation is a very important part of the learning process in this course. Although not explicitly graded, students will be evaluated on the QUALITY of their contributions and insights. Quality comments possess one or more of the following properties:</p> <ul style="list-style-type: none"> - Offers a different and unique, but relevant, perspective; - Contributes to moving the discussion and analysis forward; - Builds on other comments. <p>Classwork: Each lecture and practical lesson lasts 50 minutes for offline classes and 40 minutes for online classes. Students are expected to complete all readings and assignments ahead of time, attend class regularly, and participate in class discussions. In case of systemic student misconduct, the student can be dispensed from the classes.</p> <p>Being late on class: When students come to class late, it can disrupt the flow of a lecture or discussion, distract other students, impede learning, and generally erode class morale. Moreover, lateness can become chronic and spread throughout the class if left unchecked. Therefore, being late to class is not welcome and can be a restriction activity by the course instructor.</p>

Attestation I and II: Students who score less than 25% for Attestation period I or Attestation period II (RK1/RK2) automatically fail the course.

Homework / Assignments: The assignments are designed to acquaint students with the theoretical knowledge and practical skills required for the course. The textbook readings will be supplemented with materials collected from recent professional articles and journals. In the case of using someone's work (papers, articles, and other publications), all works must be properly cited. Failure to cite work will result in cheating from the students and may be the subject of additional disciplinary measures.

Late submissions: Most assignments will be discussed in class on the due date. It is expected that all work will be submitted on time. All grades are based on a percentage grading scale.

In the case of some extraordinary event, students should notify the course instructor and request an extension of the deadline for submission. If approved, a new date will be given to the student depending upon the circumstances of the instructor.

Final exam

At the completion of this course, the Final Exam will be given in the written form

Laptops and mobile devices can only be used for classroom purposes when directed by the course instructor. Misuse of laptops or handheld devices will be considered a breach of discipline, and the instructor will initiate appropriate action.

Online lessons can be used in case there won't be a chance to make offline traditional lessons. It must not discourage the interest and enthusiasm of students. The main software to run online lessons is Microsoft Teams for video calls and live webinars and Moodle (moodle.astanait.edu.kz) as a Learning Management System. Also, some alternatives such as Telegram, Zoom, or other messenger may be involved as an additional workaround.

Cheating and plagiarism are defined in the Academic conduct policies of the university and include:

1. Submitting work that is not your own papers, assignments, or exams;
2. Copying ideas, words, or graphics from a published or unpublished source without appropriate citation;
3. Submitting or using falsified data;
4. Submitting the same work for credit in two courses without prior consent of both instructors.

Any student who is found cheating or plagiarizing on any work for this course will receive 0 (zero) for that work, and further actions will also be taken regarding the academic conduct policies of the university.

Academic Conduct Policies of the university: The full texts of all the academic conduct codes will be posted to the students using the Learning Management System (moodle.astanait.edu.kz).

Contacting the Course instructor: The easiest and most reliable way to get in touch with the course instructor is by email. Students must feel free to send

	an email if they have a question related to the course. The instructor responds as soon as they can but not always instantaneously. Besides that, students are also welcome to arrange a one-to-one meeting with the instructor during office hours to discuss the class offline and online.
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3. Course Content

#	Abbreviation	Meaning
1	ISIS	Instructor-supervised independent work
2	SIS	Students' independent work
4	PA	Practical assignment
6	MCQ	Multiple choice quiz

Week	Topic and Content	Lectures	Practical lessons	References	SIS and IS hours
1	Infinite series. Series without negative terms. Convergence tests. Alternating series.	3	2	G.Thomas, R.Finney. Calculus and analytic geometry §8.2 -8.7 [1]	PA5, 10
2	Power series. Taylor series and Maclaurin series	3	2	G.Thomas, R.Finney. Calculus and analytic geometry §8.8 – 8.10, [1]	PA6, 10
3	Applications of power series. Trigonometric series and Fourier series for functions with period 2π	3	2	G.Thomas, R.Finney. Calculus and analytic geometry §8.11 [1] The lectures	PA7, 10
4	Ordinary differential equations of the first order and methods of their solutions.	3	2	S.L.Ross, Differential Equations – John Wiley & Sons, 1984, 3 rd ed.	PA3, 10
5	Ordinary differential equations of higher-order. Linear equations with constant coefficients	3	2	S.L.Ross, Differential Equations – John	PA4, 10

				Wiley & Sons, 1984, 3 rd ed.	
Intermediate exam					
6	Functions of two or more independent variables. Domain and continuity. Differential. Partial derivatives with constrained variables.	3	2	G.B.Thomas, Jr., R.L.Finney Calculus and Analytic Geometry. II.12.1 – Ch. 12.6	PA1, 10
7	Directional derivatives. Gradient vectors and tangent planes. Maxima, minima, and saddle points. Lagrange multipliers.	3	2	G.Thomas, R.Finney. Calculus and analytic geometry Ch. 12.7-12.9	PA2, 10
8	Double integrals, their properties, and evaluations. Area. Double integral in Polar form. Substitutions in double integrals.	3	2	G.Thomas, R.Finney. Calculus and analytic geometry § 13.1, 13.2, 13.3, 13.7 [1]	PA8, 10
9	Triple integrals. Substitutions in triple integrals.	3	2	G.Thomas, R.Finney. Calculus and analytic geometry § 13.4, 13.6, 13.7,[1]	PA9, 10
10	Applications of multiple integrals. Triple integrals in rectangular coordinates: volumes and average values.	3	2	Thomas' Calculus. Ch. 15.5, 15.6 , [2]	PA10,10
Endterm exam					
Total		30	20		100
Final Exam					

3. Student Performance Evaluation System for the Course

Period	Assignments	Number of points	Total
1 st attestation	a. 2 Homework b. 1 Quiz c. Midterm	20+20 20 40	100

2 nd attestation	a. 2 Homework b. 1 Quiz c. Pre-Final	20+20 20 40	100
Final exam	A written exam		100
Total	0,3*1stAtt+0,3*2ndAtt+0,4*Final		100

****** The number of assignments can be different. It depends from the course program and designed by syllabus. But the total points of the assignment are 60 in each control period.

Achievement level as per course curriculum shall be assessed according to the evaluation chart adopted by the academic credit system.

Letter Grade	Numerical equivalent	Percentage	Grade according to the traditional system
A	4,0	95-100	Excellent
A-	3,67	90-94	
B+	3,33	85-89	
B	3,0	80-84	Good
B-	2,67	75-79	
C+	2,33	70-74	
C	2,0	65-69	Satisfactory
C-	1,67	60-64	
D+	1,33	55-59	
D	1,0	50-54	Fail
FX	0	30-49	
F	0	0-29	

Based on the specific grade for each assignment, and the final grade, following criteria must be satisfied:

Grade	Criteria to be satisfied
90-100	<ul style="list-style-type: none"> - Work would be worthy of further dissemination under appropriate conditions - Mastery of advanced methods and techniques at a level beyond that explicitly taught - Ability to synthesize and employ in an original way idea from across the subject - Outstanding command of critical analysis and judgement
80-89	<ul style="list-style-type: none"> - Excellent range and depth of attainment of intended outcomes - Mastery of a wide range of methods and techniques - Evidence of study and originality of what has been taught - Able to display a command of critical analysis and judgement
70-79	<ul style="list-style-type: none"> - Attained all the intended learning outcomes for a unit - Able to use well a range of methods and techniques to come to conclusions - Able to employ critical analysis and judgement


60-69	<ul style="list-style-type: none"> - Some limitations in attainment of learning objectives, but has managed to grasp most of them - Able to use most of the methods and techniques taught - Evidence of study and comprehension of what has been taught but grasp insecure - Some grasp of the issues and concepts underlying the techniques and material taught, but weak and incomplete
50-59	<ul style="list-style-type: none"> - Attainment of only a minority of the learning outcomes - Able to demonstrate a clear but limited use of some of the basic methods and techniques taught - Weak and incomplete grasp of what has been taught - Deficient understanding of the issues and concepts underlying the techniques and material taught
25-49	<ul style="list-style-type: none"> - Attainment of nearly all the intended learning outcomes deficient - Lack of ability to use at all or the right methods and techniques taught - Inadequately and incoherently presented - Wholly deficient grasp of what has been taught - Lack of understanding of the issues and concepts underlying the techniques and material taught
0-24	No significant assessable material, absent or assessment missing a must pass component

4. Methodological Guidelines

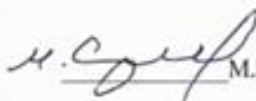
Assessment is administered continuously throughout the course. The students are rated against their performance in continuous rating administered throughout the semester (60%) and summative rating done during the examination session (40%), total 100%. Continuous rating is students' on-going performance in class and independent work. Class work is assessed for attendance, laboratory works' defense and in-class assessments.

Mid-term and End-term is a review of the topics covered and assessment of each student's knowledge.

5. Lecturer (lecturers) approvals Full name Job title Date Sign

Full name	Job title	Date	Sign
Aliya Aruova	Associate Professor	30/11/2024	

Head of Department

 M. Sergaziev