

SYLLABUS OF MATH 141 BASIC CALCULUS I

2025-2026 FALL SEMESTER, IZTECH

Instructors:

Inst. Dr. Barış ÇİÇEK bariscicek@iyte.edu.tr

Classroom: Prof. Dr. Erdal SAYGIN Lecture Hall

Course Schedule (Theory): Monday 9:45, 10:45, 11:45

Res. Asst. Dr. Aylin BOZACI SERDAL aylinbozaci@iyte.edu.tr

Classroom: Prof. Dr. Erdal SAYGIN Lecture Hall

Course Schedule (Theory): Monday 13:30, 14:30, 15:30

Res. Asst. Dr. Cihan SAHİLLİOĞULLARI cihansahillioogullari@iyte.edu.tr

Classroom: Prof. Dr. Erdal SAYGIN Lecture Hall

Course Schedule (Theory): Wednesday 9:45, 10:45, 11:45

Res. Asst. Dr. Sinem BENLİ GÖRAL sinembenli@iyte.edu.tr

Classroom: Prof. Dr. Erdal SAYGIN Lecture Hall

Course Schedule (Theory): Wednesday 13:30, 14:30, 15:30

Microsoft Teams Code: **vuu393b**

Please sign up the Teams group for following the announcements!

Textbook: Thomas G, M. Weir, J. Hass, Thomas' University Calculus. Early Transcendentals, Pearson Education, in SI Units 15th global edition

Auxiliary Textbook: J. Hass, M. D. Weir, G.B. Thomas, University Calculus. Early Transcendentals, Addison Wesley, Fourth Edition

Additional Sources:

- 1) Ayres F, Mendelson E, Schaum's outline of Calculus, McGraw-Hill, 1990
- 2) Stewart, Calculus, Metric Version, 8th Edition, 2016
- 3) Marsden J, Weinstein A. Calculus Unlimited, Benjamin, 1981
- 4) Dunham W. The Calculus Gallery: Masterpieces from Newton to Lebesgue, 2004
- 5) Silverman R.A. Essential Calculus and Analytic Geometry, Dover, 2003

Course Schedule for Applications:

Friday: tutorials and problem solving session

First Course starts at 10:45 and

Second Course starts at 11:45

Office Hour: Students can ask questions at any time during midday at the Tutoring Center in the mathematics department building.

ECTS (European Credit Transfer System): 5 ECTS

The total number of study hours a student is supposed to devote per week: 9 hours

Scheme of The Lectures

- Lectures will be face to face.
- Two hours of tutorials per week: Review and problem solving sections
- Scope: First 5 chapters of the textbook:
 - Chapter 1: Functions,
 - Chapter 2: Limits and Continuity,
 - Chapter 3: Differentiation,
 - Chapter 4: Applications of Derivative,
 - Chapter 5: Integration

Grading Policy: All the midterms will be on Friday during the tutorial sessions. The date and place of the final exam will be announced by the secretary of the mathematics department. We can announce the date on the teams group after the secretary post it.

- 2 Midterm exams, 30% each. $30 \times 2 = 60\%$ in total.
- The final exam 40%
- **All the sessions will take the same exams!**
- **All the sessions will be graded together!**

!!! The passing grade for this course is relative. While a score **below 40 will result in an automatic failure**, a score of **40 or above is necessary but not sufficient to pass**. The final passing grade will be set by considering the statistical distribution of grades (e.g., mean, median) in the class.

The dates of the Midterms:

- **First midterm:** 14 November 2025 Friday 10:45 a.m.
- **Second midterm:** 19 December 2025 Friday 10:45 a.m.
- **Final exam:** To be announced by the department
- **Make-up Exam:** 26 January 2026 Monday

Course materials:

The course materials, including lecture notes, shall not be disseminated. Each student is supposed to assume the personal responsibility of note-taking during lectures.

Attendance:

Attendance is mandatory. Students are expected to adhere to the attendance regulations of the university. Failure to meet these attendance requirements both for the exams and for the lectures will result in a grade designation of N/A.

Learning Outcome: A student following the lectures fairly can gain information about:

- real numbers, polynomials, trigonometric functions, inverse of a function
- graphs of functions, slopes, lines curves.

- the concepts of limit and continuity along with its related arithmetic
- the concept of derivative and integration with applications
- calculations related to the limits, derivatives of functions, and integrations

Ability Outcome: A student following the lectures fairly can improve his/her following capabilities:

- mathematical thinking and problem solving skills
- using and understanding of mathematical symbols and terminology
- improving and assessing innovative thoughts

MATH 141 BASIC CALCULUS I

Detailed Syllabus

Chapter 1 FUNCTIONS

Weeks: 2 weeks:

- **1st week: (Sections 1.1- 1.2)**
 1. Real lines, intervals, lines, slope
 2. Functions. Domain and Range
 3. Graphs of Functions
 4. Piecewise Defined Functions
 5. Parametric Function
 6. Linear functions. Power Functions.
 7. Polynomial Functions. Rational Functions
 8. Even and Odd Functions
 9. The Absolute Value Function
- **2nd week: (Section 1.2 - Section 1.5)**
 1. Combining Functions; Shifting and Scaling Graphs
 2. Trigonometric Functions
 3. Exponential Functions
 4. Inverse Functions and Logarithms

Chapter 2 LIMITS AND CONTINUITY

Weeks: 3 weeks:

- **3rd week: (Section 2.1-2.3)**

1. Rates of Change and Tangent Lines to Curves
 2. Limit of a Function and Limit Laws
 3. The Precise Definition of a Limit
- **4th week: (Section 2.4-2.5)**
 1. One –sided Limits
 2. Limits Involving Infinity; Asymptotes
 - **5th week: (Section 2.6)**
 - 1- Continuity at a Point. Definition
 - 2- Continuity Test. Discontinuities
 - 3- Continuous Functions. Composites. Continuous Extension to a Point
 4. Intermediate Value Theorem for Continuous Functions

Chapter 3 DIFFERENTIATION

Weeks: 3 weeks

- **6th week: (Section 3.1-3.4)**
 1. Tangent lines and the derivative at a point
 2. The derivative as a function
 3. The differentiation rules
 4. The derivative as a rate of change
- **7th week: (Sections 3.5- 3.8)**
 1. Derivatives of Trigonometric Functions
 2. The Chain Rule
 3. Implicit Differentiation
 4. Derivatives of Inverse Functions and Logarithms
- **8th week: (Section 3.9-3.11)**
 - 1-Inverse Trigonometric Functions
 - 2-Related Rates
 - 3-Linearization and Differentials

Chapter 4 APPLICATIONS OF DERIVATIVES

Weeks: 3 weeks:

- **9th week: (Section 4.1-4.3)**
 1. Extreme Values of Functions on Closed Intervals
 2. The Mean Value Theorem

3. Monotonic Functions and the First Derivative Test

- **10th week:** (Section 4.4-4.5)
 1. Concavity and Curve Sketching
 2. Indeterminate Forms and L'Hospital's Rule
- **11th week:** Concavity and Curve Sketching (Section 4.6 and 4.8)
 - 1- Applied Optimization
 - 2- Antiderivatives

Chapter 5 INTEGRATION

Weeks: 3 weeks:

- **12th week:** (Section 5.1-5.3)
 - 1-Area and Estimating Finite Sums
 - 2-Sigma Notation and Limits of Finite Sums
 - 3-The Definite Integral
- **13th week:** (Section 5.3-5.4)
 - 1-The Fundamental Theorem of Calculus
 - 2-Indefinite Integrals and the Substitution Method
- **14th week:** (Section 5.6)
Definite Integral Substitutions and the Area Between Curves