

Course: MATHEMATICS Semester 1 - 60 hours

Prerequisites	Basic algebra
Course aim and skills acquired	The aim of the course is to improve all the basic skills needed for studying at WUT. Students will revise all the basics from algebra, elementary set theory and logic, elementary geometry, the theory of polynomials. As a result, students should be able to apply this in computing derivatives and calculating integrals, which is crucial for the majority of classes held at every department of WUT.
Course contents	<p>Class 1: Introduction to mathematics – notation; basic types of numbers: Integers, Rational Numbers, Irrational Numbers. Basic rules of algebraic operations.</p> <p>Class 2: Basic rules of algebraic operations and proper use of brackets, continuation.</p> <p>Class 3: Basic algebraic operations on fractions.</p> <p>Class 4: Basic algebraic operations on fractions, continuation.</p> <p>Class 5: Algebraic identities such as a square of a sum, a cube of a sum, sum/difference of cubes, root of a square, Pascal pyramid.</p> <p>Class 6: Algebraic identities such as a square of a sum, a cube of a sum, sum/difference of cubes, root of a square, Pascal pyramid, continuation.</p> <p>Factorial and its properties.</p> <p>Class 7: Elementary set theory: intervals and logic operations on them.</p> <p>Class 8: Elementary set theory: intervals and logic operations on them, continuation.</p> <p>Quantifiers and basics of mathematical logic.</p> <p>Class 9: Quantifiers and basics of mathematical logic, continuation.</p> <p>Class 10: Quantifiers and basics of mathematical logic, continuation.</p> <p>Class 11: Revision.</p> <p>Class 12: Test 1</p> <p>Class 13: Cartesian coordinate system. Vectors and basic vector algebra.</p> <p>Class 14: Skew lines in the plane, parallel and perpendicular lines.</p> <p>Class 15: Distance between two points on the plane. Distance in the space.</p> <p>Class 16: Distance from a point to a line - formula.</p> <p>Class 17: The simplest figures on the plane (lines, curves on the plane (such as $x=a$, $y=a$, circles, etc.).</p> <p>Class 18: Planar sets and solids. Areas, volumes and other geometric properties, continuation</p> <p>Class 19: Revision and Test 2</p> <p>Class 20: Introduction to function theory: domain, counter-domain, range, properties of functions like one-to-one or onto, inverse function, monotonicity and composition of functions</p> <p>Class 21: Absolute value function, equations and inequalities</p> <p>Class 22: Absolute value function, equations and inequalities, continuation.</p> <p>Class 23: Linear functions, quadratic functions: roots, vertex form, graph, equations and inequalities involving quadratic functions.</p> <p>Class 24: Linear functions, quadratic functions: roots, vertex form, graph, equations and inequalities involving quadratic functions, continuation.</p> <p>Class 25: Revision and Test 3.</p> <p>Class 26: Quadratic functions and modelling problems.</p> <p>Class 27: Division of polynomials, roots of polynomials, factorization of polynomials, (generalized) Bezout theorem.</p> <p>Class 28: Division of polynomials, roots of polynomials, factorization of polynomials, (generalized) Bezout theorem, continuation.</p> <p>Class 29: Equations and inequalities involving polynomials.</p> <p>Class 30: Equations and inequalities involving polynomials, continuation.</p>
Literature	<p>1) precalTB2019.pdf (washington.edu)</p> <p>2) alg_complete.pdf (lamar.edu)</p>
Students input	Students are expected to attend every single class, follow the classes carefully, submit assignments, revise material after each class and finally ask as many questions as they need to fully understand the topic.
Assessment criteria	There will be 3 tests during the semester, up to 10 points for each. Activity in class is counted up to 10 points, and attendance in class as well. There will be a final exam held at the end of the semester, counted up to 50 points. To sum up, students can get up to 100 pts. The final grade will be assigned according to the following scheme:

	<p>SCORE – GRADE</p> <p>≤ 50pts – 2.0</p> <p>$50.5 \leq \dots \leq 60$pts – 3.0</p> <p>$60.5 \leq \dots \leq 70$pts – 3.5</p> <p>$70.5 \leq \dots \leq 80$pts – 4</p> <p>$80.5 \leq \dots \leq 90$pts – 4.5</p> <p>$90.5 \leq \dots$ – 5.0</p>
--	---

Course: MATHEMATICS Semester 2 - 60 hours

Prerequisites	All the material from Mathematics Semester 1
Course aim and skills acquired	The aim of this course is to introduce students to the basics of differential and integral calculus. This is necessary to understand topics covered at the University.
Course content	<p>Class 1: Basic operations on powers.</p> <p>Class 2: Exponential functions.</p> <p>Class 3: Logarithms.</p> <p>Class 4: Logarithms, continuation. Graphs of logarithms and exponential functions: scaling, shifting. Equations and inequalities involving logarithms and exponential functions.</p> <p>Class 5: Equations and inequalities involving logarithms and exponential functions, continuation.</p> <p>Class 6: Radians and degrees, trigonometric functions – $\sin x$, $\cos x$, $\tan x$, $\cot x$, basic properties (domain, range, period).</p> <p>Class 7: Trigonometric functions – basic properties (domain, range, period), continuation.</p> <p>Class 8: Equations and inequalities involving trigonometric functions.</p> <p>Class 9: Equations and inequalities involving trigonometric functions, continuation.</p> <p>Class 10: Test 1.</p> <p>Class 11: Limits of sequences, limits of functions.</p> <p>Class 12: Introduction to differentiation. The definition of derivative.</p> <p>Class 13: Basic derivatives, basic differentiation techniques.</p> <p>Class 14: Basic derivatives, basic differentiation techniques, continuation.</p> <p>Class 15: Basic derivatives, basic differentiation techniques, continuation.</p> <p>Class 16: Monotonicity and extrema.</p> <p>Class 17: Monotonicity and extrema, continuation.</p> <p>Class 18: Monotonicity and extrema, continuation. Convexity, concavity.</p> <p>Class 19: Convexity, concavity, asymptotes, graphs.</p> <p>Class 20: Revision and Test 2.</p> <p>Class 21: Introduction to integration. Basic integrals of functions.</p> <p>Class 22: Basic integrals of functions, continuation. Basic integration techniques (by substitution, by parts).</p> <p>Class 23: Basic integration techniques (by substitution, by parts), continuation.</p> <p>Class 24: Basic integration techniques (by substitution, by parts), continuation.</p> <p>Class 25: Basic integration techniques (by substitution, by parts), continuation. Integration by partial fractions.</p> <p>Class 26: Integration by partial fractions, continuation.</p> <p>Class 27: Integration by partial fractions, continuation.</p> <p>Class 28: Definite integral and area under the curve.</p> <p>Class 29: Test 3.</p> <p>Class 30: Revision of differentiation and integration.</p>
Literature	<ol style="list-style-type: none"> 1) precalTB2019.pdf (washington.edu) 2) alg_complete.pdf (lamar.edu) 3) Calculus I - Derivatives (lamar.edu) 4) Calculus I - Integrals (lamar.edu)

Students input	Students are expected to attend every single class, follow the classes carefully, submit assignments, revise material after each class and finally ask as many questions as they need to fully understand the topic.
Assessment criteria	<p>There will be 3 tests during the semester, up to 10 points for each. Activity in class is counted up to 10 points, and attendance in class as well. There will be a final exam held at the end of the semester, counted up to 50 points. To sum up, students can get up to 100 pts. The final grade will be assigned according to the following scheme:</p> <p>SCORE – GRADE ≤50pts – 2.0 50.5≤...≤60pts – 3.0 60.5≤...≤70pts – 3.5 70.5≤...≤80pts – 4 80.5≤...≤90pts – 4.5 90.5≤... – 5.0</p>