Matura-Content in Mathematics

Text book: Mathematics Higher Lever (Core), Fabio Cirrito, ISBN 1 876659 11 4

In the following, all the topics of the Matura-content are listed along with some of the key terms. Roughly speaking, the syllabus of the Matura corresponds with the content of the Cirrito text book. Exceptions are listed: Sections or whole chapters of the textbook, which may be omitted, are mentioned separately. Also, additional Matura-content, not covered in the Cirrito text book, is noted.

Although I have taken all possible care to ensure the correctness of the following, no warranty can be accepted regarding the correctness, accuracy, up-to-dateness, reliability and completeness of the content of this information.

Basic Content

Foundational Mathematics covered in year 1 & 2 using different German text books

Basic Algebra (chapters 2, 3 & 4)
Real Numbers, Absolute Value, Linear and Quadratic Equations, Simultaneous Equations;
Algebra of Polynomials, Equations and Inequations, Roots, The Binomial Theorem;

Additional Content (not covered in Cirrito text book): Equations with Roots, Powers a^b (for any real number b) and their Properties

Omit from Cirrito text book: 3.3 Remainder Theorem; 3.4 Factor Theorem

Basic Geometry (not covered in the Cirrito text book)
Pythagoras Theorem, Similarity, Properties of (Special) Triangles and Quadrilaterals, Properties of Circles (Tangents, Angles in Circles, Arcs, Sectors and Segments);
Equations of Straight Lines in 2D;
Volume and Surface Area of Prisms, Pyramids, Cylinders, Cones and Spheres,
Lines and Planes and their Positions and Angles in 3D.

Functions, Relations and Graphs (chapters 5, 6 & 7)
Definitions of Relations and Functions, Domain and Range, Asymptotes, Standard Functions, Inverse Functions, Transformation of Functions and Mappings of Graphs (Translations, Reflections and Stretches), Exponents and Logarithms, The Number *e*

Omit from Cirrito text book: 6.4 Reciprocal of a Function

Sequences and Series (chapter 8)
Representation of Sequences, Arithmetic and Geometric Sequences and Series, Sigma Notation, Convergence of Sequences and Series

Trigonometry (chapters 9 &10)
Trigonometry for Right-angled Triangles (SOH-CAH-TOA), Calculations in General Triangles (Area, Sine-Rule, Cosine-Rule), Degrees and Radians, Arcs and Sectors of a Circle;
Definitions of Sin, Cos and Tan in the Unit Circle, Trigonometric Functions and their Inverses, Trigonometric Identities and Equations

Combinatorics or Counting Principles (chapter 14)
Multiplication Principle, Permutations and Combinations

Core Matura-Content

Most of the topics of year 3 & 4 are covered in the Cirrito text book. Exceptions are listed.

Differential Calculus (chapters 18, 19, 20 & 21)
Rates of Change, Definition of the Derivative and Differentiability of a Function;
Rules of Differentiation (Product-, Quotient- and Chain Rule), Derivatives of Standard Functions;
Properties of Curves: Tangents, Normals and Asymptotes, Increasing and Decreasing Functions, Minima and Maxima, Concavity and Points of Inflection;
Applications (incl. Applied Minima and Maxima Problems)

Additional Content (not covered in Cirrito text book): Limit of a Function, Continuity; Newton-Raphson-Procedure to Approximate the Solutions of Difficult Equations

Omit from Cirrito text book: 19.4 Derivative of Inverse Trigonometric Function; 19.7 Implicit Differentiation; 21.4 Related Rates

Integral Calculus (chapter 22)
Antiderivatives, Indefinite and Definite Integrals (Definition and Properties), Integration of Standard Functions, Calculating Areas and Volumes of Solids of Revolution with Integrals

Additional Content (not covered in Cirrito text book): Integrals and Infinity (Improper Integrals and Series); Approximation of Definite Integrals with Rectangles, Trapeziums or Parabolas (Simpson's Rule)

Omit from Cirrito text book: 22.7 Applications to Probability

Analytic and Vector Geometry (chapters 26 & 27)
Algebra and Geometry of Vectors, Properties of Vectors, Magnitude of Vectors, Scalar Product and Vector Product;
Vector and Cartesian Equations of Lines and Planes, Intersection of Lines and Planes

Additional Content (not covered in Cirrito text book): Vector and Cartesian Equations of Circles and Spheres (see also chapter 5.1); Tangents and Tangent Planes; Angles of Intersection of Lines and Planes; Distance between Point and Plane; Applications to Areas and Volumes

Probability and Statistics (chapters 13.4, 15 & 16.1-3)
Frequency and Probability, Definition and Laws of Probability (Sample Space, Outcome, Event, Axioms), Finding Probabilities (Laplace-Rule, Diagrams, Combinatorics), Conditional Probability;
Discrete Random Variables and Probability Distributions, Mean and Variance, Binomial Distribution

Omit from Cirrito text book: 15.3.3 Independence
16.4-5 Hypergeometric and Poisson Distribution

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R. Kleiner, Kantonsschule Im Lee, Winterthur

Mathematics Curriculum – Years 3 and 4

Differential Calculus part 1 (chapters 18.1-4, 19.1-3, 19.5-6, 19.8)
Rates of Change, Definition of the Derivative and Differentiability of a Function; Rules of Differentiation (Product-, Quotient- and Chain Rule), Derivatives of Standard Functions

Additional Content (not covered in Cirrito text book): Limit of a Function, Continuity

Omit from Cirrito text book: 19.4 Derivative of Inverse Trigonometric Function; 19.7 Implicit Differentiation

Circles and Spheres (not covered in Cirrito text book)
Additional Content (not covered in Cirrito text book): Cartesian Equations of Circles and Spheres (see also chapter 5.1)

Vector and Analytic Geometry 1 & 2 (chapters 26 and 27)
Algebra and Geometry of Vectors, Properties of Vectors, Magnitude of Vectors, Scalar Product and Vector Product;
Vector and Cartesian Equations of Lines and Planes Intersection of Lines and Planes

Differential Calculus 2 (chapter 20)
Properties of Curves: Tangents, Normals and Asymptotes, Increasing and Decreasing Functions, Minima and Maxima, Concavity and Points of Inflection

Integral Calculus 1 (chapter 22.1-6, 22.8)
Antiderivatives, Indefinite and Definite Integrals (Definition and Properties), Integration of Standard Functions, Calculating Areas with Integrals;
Applications of Integration, Calculating Volumes of Solids of Revolution with Integrals

Omit from Cirrito text book: 22.7 Applications to Probability

Probability 1 (chapter 15)
Frequency and Probability, Definition and Laws of Probability (Sample Space, Outcome, Event, Axioms), Finding Probabilities (Laplace-Rule, Diagrams, Combinatorics), Conditional Probability (Bayes' Theorem)

Omit from Cirrito text book: 15.3.3 Independence

Differential Calculus 3 (chapters 21.1-3, 21.5)
Applications (incl. Applied Minima and Maxima Problems)

Additional Content (not covered in Cirrito text book): Newton-Raphson-Procedure to Approximate the Solutions of Difficult Equations

Omit from Cirrito text book: 21.4 Related Rates

Analytic and Vector Geometry 3 (not covered in Cirrito text book)
Additional Content (not covered in Cirrito text book): Tangents and Tangent Planes; Angles of Intersection of Lines and Planes; Distance between Point and Plane; Applications to Areas and Volumes

Integral Calculus 2 (additional topics)
Additional Content (not covered in Cirrito text book): Integrals and Infinity / Improper Integrals (cf Series); Approximation of Definite Integrals with Rectangles, Trapeziums or Parabolas (Simpson's Rule)

Probability and Statistics 2 (chapters 13.4 & 16.1-3)
Discrete Random Variables and Probability Distributions, Mean and Variance, Binomial Distribution

Omit from Cirrito text book: 16.4-5 Hypergeometric and Poisson Distribution