Freie Universität Bozen
Libera Università di Bolzano
Università Liedia de Bulsan

Syllabus
Course description

Course title	Mathematics
Course code	42300
Scientific sector	MATH/07
Degree	Bacherlor in Wood Engineering
Semester	1
Year	1
Academic year	2018/2019
Credits	6
Modular	No

Total lecturing hours	36
Total lab hours	
Total exercise hours	24
Attendance	recommended
Prerequisites	Solid basic knowledge of mathematics
Course page	

Specific educational objectives	o type of course: basic o scientific area: Mathematics o the course is part of a curriculum within the study programme The course aims at reinforcing the mathematical skills acquired by students in the high school, in particular the concepts of function and equation, which are indispensable for any study course in life. The contents of the course are also organized in coordination with the Physics course. For this reason, lessons start with the part about elementary differential and integral calculus. Next, a simple introduction to first order differential equations is given, seen as a natural application of calculus to real-world models. Finally, linear and quadratic fits are treated, as well as linear optimization problems in two variables.

Lecturer	Dr. Giovanni Modanese, Palazzo K, Ufficio K1.13, e-mail: giovanni.modanese@unibz.it, tel. +39 0471 017134
Scientific sector of the lecturer	MAT07
Teaching language	English
Office hours	
Teaching assistant	
Office hours	

List of topics covered	**Functions 1**: Definitions, notation y=f(x). Table and graph of a function. Domain and range, simple examples, recall of integer and fractional equations and inequalities of I, II degree. Injective functions. Polynomial functions of I and II degree. Functions xn, n-th root, sinx, cosx. Range of rational fractional functions. **Derivatives and integrals**: Derivative of a function, incremental ratio and tangent line. Numerical examples. Derivatives of the elementary functions, of products and ratios. Derivative of function of function. Physical notation "dy/dx", chain rule dy/dx=(dy/du)(du/dx). Maxima, minima and horizontal inflection points. Simplified scheme for studying the graph of a function (without asymptotes and convexity). Examples of functions containing roots and logarithms. Indefinite integrals. Elementary primitives. Integration rules. Applications to kinematics: uniform and accelerated motion. Definite integrals. Geometrical meaning. Application to dynamics: work of an elastic force. Fundamental theorem of the integral calculus. Integration by parts and by substitution. **Functions 2**: Taylor polynomial of second degree. Convexity, second derivatives. Inverse functions and their graphs. Inverse of the elementary functions. Restrictions of the domain. Relationship between the range of a function and the domain of its inverse. Derivative of the inverse function. Limits at finite and infinite. Limits of the elementary functions. Determinate and indeterminate forms. Elimination of the indetermination. Limits of rational functions. Horizontal and vertical asymptotes. Rule of de l'Hopital. **Differential equation, fits, optimization**: concept of differential equation of the I order. Direct verification of the solutions. Equations with separation of variables. Logistic equation. Linear equations of the I order. Linear and quadratic interpolation. Problems of forecasting. Linear optimization problems in two variables, with constraints.
Teaching format	Frontal lectures and exercises

Learning outcomes	**Knowledge and understanding** of concepts, symbolism and techniques of functions, differential and integral calculus. **Applying knowledge and understanding** in solving exercises and problems which require a formalization, tools and methods learned in the course.

	Making judgments in tackling with the right approach and convenient tools problems and questions suitable to be formulated mathematically. **Communication skills** in reporting on the calculations in a clear and effective way. This is also essential for the student to be able to check his/her own results and overcome deadlocks in the resolution procedure. **Learning skills** through the acquisition and assimilation of a symbolism, methods and tools which are necessary to understand the content of a consistent part of the courses in this academic curriculum.

Assessment	**Partial exam:** Written exam, 120 minutes, solving exercises. Scientifica calculator and one formula sheet allowed. No other support allowed.
Assessment language	English
Evaluation criteria and criteria for awarding marks	The final mark will be determined as the weighted average from the marks in mathematics. The main evaluation criteria are exactness of the results and correct documentation of the solving procedure.

Required readings	Exercises in the electronic reserve collection.
Supplementary readings	Any book of "Calculus" in the Library reserve collection.