Department of Mathematics

Course Profile

Course Number: MATH 201	**Course Title: Calculus III**
Required / Elective: Required	**Pre-requisites:** MATH 101
Catalog Description: Functions of several variables, limits and continuity. Partial derivatives, directional derivatives, Lagrange multipliers, Taylor's formula. Double integrals in Cartesian and polar coordinates, triple integrals in Cartesian, cylindrical and spherical coordinates, line integrals, Green's theorem, surface integrals, Stokes' theorem, divergence theorem.	**Textbook / Required Material:** Thomas' Calculus Early Transcendentals 11th Edition / Weir, Hass, Giordano, Addison - Wesley Publishing Company, 2006
Course Structure / Schedule: (3+0+2) 4 / 8 ECTS	
Extended Description: Multivariable Functions, Limits and continuity, Partial derivatives, Implicit partial differential. Euler's method for mixed derivatives, Linearization, Differentials. Functions of more than one variable, Chain rule for differentiation, Implicit differentiation Partial derivative with constrained variable, Directional derivative, Gradient and tangent vectors, Equation of tangent plane, normal lines. Extreme values and saddle points, Absolute maxima-minima, Local maxima-minima. Lagrange multipliers, Lagrange multipliers with two constraints. Taylor's formula, Derivation of second derivative test, Multiple integrals, Fubini's theorem for double integral. Finding the limits of integration, Areas, moments and center of mass. Double integrals in polar form, Triple integrals in Cartesian coordinates, Triple integrals in cylindrical and spherical coordinates, Substitution in multiple integrals. Line integrals, Vector fields, Work, circulation and flux, Path independence of integrals Green's theorem in plane, Extending Green's theorem to multiply connected regions Surface integrals, Parametrized surface integrals. Stokes' theorem, Divergence Theorem.	
Design content: None	**Computer usage:** No particular computer usage required

Course Outcomes: By the end of the course, the students should be able to

1. Demonstrate the abilities for solving mathematical problems that depend on more than one variables **[1, 2, 3, 6],**
2. Solve various engineering problems which require knowledge of multivariable functions **[1, 2, 3, 6, 7],**
3. Understand some engineering subjects like the mathematical theory of elasticity, mathematical theory of fluids and electromagnetic theory **[1, 2, 3, 6].**

[1] Demonstrate the ability of solving problems by using techniques from calculus, linear algebra, differential equations, probability and statistics,

[2] Demonstrate knowledge of mathematics to construct, analyze and interpret mathematical models,

[3] Demonstrate the ability to apply mathematics to the solutions of problems,

[6] Have a basic knowledge of the main fields of mathematics, including analysis, algebra, differential equations, differential geometry,

[7] Have an ability to function both independently and as a member of a multidisciplinary team,

Recommended reading: Any calculus book in the library

Teaching methods: Lectures, tutorials, presentation, assignments.

Assessment methods: Homework, quiz, midterm and final exams.

Student workload:

Pre-reading	55 hrs
Lectures ……	45 hrs
Preparatory reading ……..	45 hrs
Literature review for presentation……	35 hrs
Team work for presentation ……	20 hrs
TOTAL …… 200 hrs …… to match 25x8 ECTS	

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