Department of Mathematics

Course Profile

Course Number: MATH 313	**Course Title: Complex Analysis II**
Required / Elective: Elective	**Prerequisites:** MATH 212
Catalog Description: Mittag-Leffler formulas, the number of zeros of analytical functions; Rouches theorem, analyticity of functions defined as definite integrals. Fourier and Laplace transformations. Analytic continuation, entire functions, infinite products. Some applications in Physics and Engineering.	**Textbook / Required Material:** Complex Variables and Applications, Fourth Edition, By Ruel V. Churchill, Mc-Graw Hill. Inc., 2005.
Course Structure / Schedule: (3+0+0) 3 / 5 ECTS	
Extended Description: Partial fractions and factorization, Mittag-Leffler theorem for factorization. Infinite products, Canonical products, Gamma functions, Stirling's formula. Entire functions, Jessen's formula, Hadamard's theorem. Normal families, normality and compactness, Arzela's theorem, families of analytic functions, the classical definition. Zeros of analytical functions, zeros and poles. Fourier integral, Fourier sine and cosine transformations, general Fourier transformation, inverse Fourier transformations. Laplace transformation, properties of Laplace transformation, convolution, the use of Laplace transformation tables. The relation between the inverse Laplace transformation and Fourier transformation. Some applications in Physics and Engineering.	
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. learn complex variables, analytical functions, zeros of analytical functions, complex mapping, conformal mappings **[1, 6]**,
2. apply complex function theory to the solution of some engineering problems like plane elasticity theory, plane potential flows of an incompressible fluids and electromagnetic theory **[2, 3, 6, 7]**,
3. transform some regions into a unite circles and to solve boundary value problems for arbitrary geometries **[3, 6],**
4. solve some partial differential equations by use of the Fourier and Laplace transforms **[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 and mechanics to construct, analyze and interpret real world problems,

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

[6] have a basic knowledge of the main fields of mathematics and mechanics, including differential equations, elasticity theory, fluid mechanics,

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

Recommended reading:

1.Complex Analysis, Third Edition, by Lars V. Ahlfors, Mc-Graw Hill. Inc., 1979.

2. Schaum's Outline of Complex Variables, by Spiegel, Murray R.

Teaching methods: Lectures, tutorials, presentation, assignments.

Assessment methods:

Homework, quiz, midterm and final exams.

Student workload:

Pre-reading ....15 hrs

Lectures ……………………………………45 hrs

Preparatory reading ………………….. 30 hrs

Literature review for presentation………… 25 hrs

Team work for presentation ………………10 hrs

TOTAL ……………………………… 125 hrs …… to match 25x5 ECTS

Prepared by: Prof.Dr.Hilmi Demiray	Revision Date: 08.02.2010