Department of Mathematics

Course Profile

Course Number : MATH 441	**Course Title: Introduction to Modern Algebra**
Required / Elective: Elective	**Prerequisite:** None
Catalog Description: Algebra on sets; basic theory of groups, rings and fields, an introduction to Galois theory.	**Textbook / Required Material:** J. Gilbert and L. Gilbert, *Elements of Modern Algebra*, sixth Edition, Brooks/Cole, 2005.
Course Structure / Schedule: (3+0+0) 3 / 8 ECTS	
Extended Description : Fundamentals: Sets, Mappings, Binary Operations, Relations, Mathematical Induction. Integers: Divisibility, Prime Factors, the Greatest Common Divisor, Congruence of Integers and Congruence Classes. Groups: Definition of a Group, Subgroups; Cyclic Groups; Isomorphism; Homomorphism; Permutation Groups; Cayley's Theorem; Normal Subgroups; Finite Groups and Lagrange's Theorem; Quotient Groups. Rings, Integral Domains and Fields: Definition of a Ring Integral Domains and Fields; Ideals and Quotient Rings; Ring Homomorphism. Polynomials: Polynomials over a Ring; Divisibility of Polynomials.	
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. to identify, compare, classify, justify, operate and apply the fundamental algebraic structures **[6]**
2. prepare for high-level mathematical courses **[6]**
3. to argue, create and formulate mathematical arguments and mathematical reasoning **[2,3,6]**
4. recognize the impact of abstract algebra on coding, cryptology and science **[7,8]**
5. recognize professional and ethical responsibilities of scientific writing **[8]**

[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,

[8]communicate effectively both in written and oral formats,

Recommended reading: I.N. Herstein, *Abstract Algebra*, Prentice-Hall., 1996.

J.B. Fraleigh, *A First Course Abstract Algebra*, Addison-Wesley, 2002.

Teaching methods: Pre-readings, lecture and workshops, discussions, project, individual exercises.

Assessment methods: Homework, project, final

Student workload:

Preparatory reading……..40 hrs

Lectures and workshop, discussions….47 hrs

Homework…….70 hrs

Presentations……..15 hrs

Projects……...25 hrs

Final Exam ……..3 hrs

TOTAL …… 200 hrs … to match 25 x 8 ECTS

Prepared by : Türker Bıyıkoğlu	Revision Date: 08.02.2010