THE UNIVERSITY OF TEXAS AT EL PASO  
COLLEGE OF SCIENCE  
DEPARTMENT OF MATHEMATICAL SCIENCES

Course #: Math 5370  
Course Title: Seminar –Algebraic Structures. Arithmetical Properties  
Credit Hrs: 3  
Term: Fall 2009  
Course Meetings & Location: MW 6:00 – 7:20 p.m. in BH 143  
Prerequisite Courses:  
Instructor: Dr. Emil Schwab  
Office Location: BH 202  
Contact Info: Phone # 747-6758  
E-mail address: eschwab@utep.edu

Office Hrs: MW 4:30 pm – 5:50 pm  
Textbook(s), Materials: A textbook is not required.

Course Objectives: Students are expected to build a solid understanding of some abstract concepts, principles, theorems and proofs in Algebra, to develop the ability to think abstractly, and to be able to elaborate rigorous proofs.

Course Contents:  
1.) Arithmetical Properties of Commutative Rings  
1.1) Groups and Rings. Subgroups and Ideals. The subgroups of the group \((\mathbb{Z},+)\) and the ideals of the integral domain \((\mathbb{Z},+,-)\) (review).  
1.2) Divisibility in Integral Domains. g.c.d. and l.c.m. Prime Elements and Irreducible Elements.  
1.3) Euclidean Domain. Principal Ideal Domain. Unique Factorization Domain.  
1.4) Congruence on groups and rings. New techniques in proving Euler’s, Fermat’s and Wilson’s Theorems. The Chinese Remainder Theorem.  

2.) The Ring of Arithmetic Functions. Incidence Algebras.  
2.1) The Dirichlet group of multiplicative arithmetic functions. The unique factorization domain of arithmetic functions.  
2.2) The Möbius Function. The Möbius Inversion Formula  
2.3) Locally finite partially ordered set. Incidence functions. The convolution of incidence functions  
2.4) The Möbius Incidence Function. Applications
Exams and Assignments:  There will be two exams: Exam 1 (chapter 1) and Exam 2 (chapter 2). I will regularly assign homework. The homework will not be collected, but discussed in class. The exams will include problems from homework.

Course Schedule:  
- 09/07  Labor Day (no class)
- 10/14  Exam 1
- 10/30  Course Drop Deadline (with an automatic “W”)
- 12/9   Exam 2
(the dates for the exams may be changed)

Grading Policy:  Each exam (worth of 100 points) represents 50% of the final grade. The final grade will be determined by the average of the exam’s scores respecting the following grading scale:
- A 85-100; B 70-84; C 55-69; D 40-54; F below 40.
Extra credit will be given for class participation.

Make-up Policy:  Make-ups/retests will be given only under extraordinary circumstances documented by the student and at the discretion of the instructor.

Attendance:  I expect everyone to attend every class and to arrive on time.


Disability Statement:  If a student has a disability and needs an accommodation, he/she should contact the Disabled Student Services Office (DSSO) at 747-5148 or at <dss@utep.edu> or go to Room 106 Union East Building. The student is responsible for presenting to the instructor any DSS accommodation letters and instructions.

Military Statement:  If you are a military student with the potential of being called to military service and/or training during the course of the semester, you are encouraged to contact the instructor as soon as possible.