

5/2/09

## Math 4910-AlgFnd Syllabus \*\*Summer, 2009 Semester

Course Title: Foundations of Algebra

Credits: 3 semester

Prerequisites: Acceptance for Participation in UMEP and completion of a course in College Algebra (e.g., Math 1050 or Math 2910-AlgTrig)

Course Description: The epistemological foundations of mathematics are examined. Algebraic numbers are set-theoretically developed. Euclidean geometry is examined set-theoretically with an emphasis on its interplay with classical algebra. Algebraic and geometric models are built to address real-life problems.



Meeting Schedule: Second part of summer semester, Mondays and Wednesdays from 4:15 p.m. to 7:15 p.m. at USU distance delivery sites throughout Utah (class meetings originate from USU's Logan Campus in Engr 401)

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 Office hours: By appointment

Math 4910-AlgFind is organized into the following 3 overlapping units:

1. **Epistemological Foundations of Mathematics, Set Theory, and Relations**

The goal of Unit 1 is for you to deepen your insights about the epistemological foundations of mathematics, build upon your talent for proving theorems within an axiomatic structure, and use set theory to organize your understanding of mathematical concepts, relations, and algorithms.

Topics to be studied include the philosophical and historical foundations of mathematics, symbolic logic, proofs within an axiomatic system, sets, and relations with emphases on equivalences and functions (with emphases on binary operations, sequences, and strings).

2. **Set-Theoretic Development of Algebraic Numbers and the Arithmetic of Algebraic Numbers and Transfinite Arithmetic**

The goal of Unit 2 is for you to deepen your understanding of polynomials, examine the

intricacies of algebraic numbers and binary operations on {rationals}, and delve into the strange world of transfinite arithmetic.

Topics to be studied include polynomials, polynomial equations, whole numbers, integers, rationals, non-transcendental irrationals, algebraic imaginary numbers, cardinality of finite sets, set theoretic-based fundamental operations on {rationals}, cardinality of infinite sets (both countable and uncountable ), and paradoxes of set theory.

### 3. **Set-Theoretic Based Euclidean Geometry and Marriage of Classical Algebra to Euclidean Geometry**

The goal of Unit 3 is for you to deepen your understanding of Euclidean geometry and your talent for applying the interplay between Euclidean geometry and classical algebra to address real-life problems.

Topics to be studied include Euclidean space, relations among subsets of Euclidean space, relations between subsets of Euclidean space and subsets of {reals}, and applying our geometric and algebraic insights to generate problem-solving models.

You will be provided with three opportunities to demonstrate how well you are achieving the goals of the three units. These opportunities are tentatively scheduled between our 5<sup>th</sup> and 6<sup>th</sup> class meeting, our 10<sup>th</sup> and 11<sup>th</sup> class meeting, and during our 14<sup>th</sup> class meeting and will influence the final course grades as follows:

Oppor- tunity	Tentative Dates	Units Involved	Relative Influence on Final Grade
#1	7/06 – 7/08	1	20%
#2	7/22 – 7/27	1 & 2	30%
#3	8/05 – 8/07	1, 2, & 3	50%

Two days prior to each class meeting, a detailed agenda for that meeting will be posted on *Blackboard Vista* for you to download and use during that class meeting. The agendas will provide an advanced organizer for note-taking and other in-class activities as well as homework assignments. *Blackboard Vista* is our primary mechanism for exchanging documents.

Following is a tentative schedule of very broadly expressed (not detailed like the individual agendas) topics for class meetings:

Mtg#(date)	Tentative Topics
1 (6/22/09)	1. Orientation to Math 4910-AlgFnd 2. Philosophical and historical foundations of mathematics
2 (6/24/09)	1. Philosophical and historical foundations of mathematics 2. Propositions and truth values 3. Symbolic logic
3 (6/29/09)	1. Symbolic logic 2. Language of mathematics 3. Set theory
4 (7/01/09)	1. Set theory 2. Relations (especially functions)
5 (7/06/09)	1. Set theory 2. Relations (with an emphasis on functions) 3. Opportunity #1
6 (7/08/09)	1. Functions 2. Cardinality 3. Set-theoretic development of whole numbers
7 (7/13/09)	Transfinite arithmetic
8 (7/15/09)	1. A little bit of number theory 2. Polynomials 3. Set-theoretic development of algebraic numbers
9 (7/20/09)	1. Functions (with an emphasis on binary operations. 2. Set-theoretic development of arithmetic and classical algebra
10 (7/22/09)	1. Set-theoretic development of arithmetic and classical algebra 2. Opportunity #2
11 (7/27/09)	Set-theoretic development of Euclidean geometry
12 (7/29/09)	Marrying classical algebra to Euclidean geometry
13 (8/03/09)	Taking advantage of the marriage of Euclidean geometry and classical algebra to model and attack real-life problems
14 (8/05/09)	Opportunity #3

Note: In coordination with the Disability Resource Center, reasonable accommodations will be provided for qualified students with exceptionalities. If you need accommodations because of such exceptionalities, please contact Jim during the first week of the semester to make arrangements. Accommodations and alternative format print materials (e.g., large print, audio, diskette or Braille) are available through the Disability Resource Center, located in Taggart Student Center room 104, phone number 435-797-2444.