

University of Northern Colorado, School of Mathematical Sciences
General Syllabus – MATH 124

Course: Math 124 – College Algebra

Credit: 4 units

Course Description: Prerequisite is high school Algebra II, or intermediate algebra with a grade of “C” or better and ACT-Math at an appropriate level, or the equivalent. Topics include linear, quadratic, exponential and logarithmic functions; matrices; theory of equations.

Course Objectives: The primary objective of the course is to develop understanding of the techniques involved in algebraic problem solving. The course is designed to fulfill the liberal arts core mathematics requirement and to prepare students to take calculus (note that a pre-calculus or trigonometry course may also be necessary before calculus, depending on the calculus course) and/or statistics, should they decide to continue to study mathematics. Liberal Arts Core, Area 2, expectations met by Math 124:

- The student will demonstrate proficiency in the use of algebra to structure their understanding of and investigate questions in the world around them.
- The student will demonstrate proficiency in treating algebraic content at an appropriate level.
- The student will demonstrate competence in the use of numerical, graphical, and functional representations of algebra topics.
- The student will demonstrate the ability to interpret data, analyze graphical information, and communicate solutions in written and oral form.
- The student will demonstrate proficiency in the use of algebra to formulate and solve problems.
- The student will demonstrate proficiency in using technology such as handheld calculators and computers to support their use of algebra.

Special Needs: Students who believe they may need accommodations in this class are encouraged to contact the Disability Support Services, (970) 351-2289, as soon as possible to ensure that accommodations are implemented in a timely fashion.

Course Content

Major Study Units (not necessarily taught in the order given):

- Set theory: notation, subsets of real numbers and properties of real numbers; summation and series notation and use.
- Algebraic manipulations: including working with exponents, radicals, polynomial operations, factoring and algebraic fractions.
- Solving equations and systems of equations: linear, quadratic, equations involving radicals, equations in quadratic form and equations involving absolute value.
- Formulas: including formula evaluation and solving for any variable in multivariate representations.
- Problem analysis: word problem applications and generating solutions using equations.
- Inequalities: first-degree inequalities, higher degree inequalities and inequalities involving absolute value.
- Functions: recognize, graph, model, and apply: linear, rational, absolute value, polynomial, exponential, and logarithmic functions; inequalities in two variables; inverse functions.
- Representation: work with function notation, graphical, and tabular representations; graphical, tabular, verbal, and formulaic representations of inverse functions.

Instructional Strategies: There are three major instructional strategies in teaching the course – an emphasis on effective writing about mathematics, appropriate use of technology, and the rule of three:

- *Written assignments* in the course will result in at least 1100 words of prose writing related to mathematical situations. These written assignments may have one (or more) of the following

forms:

- one or more project reports,
 - homework assignments that include short essay answer explanatory responses in addition to brief written justification for application and exploration problems,
 - exam questions that require explanation and/or justification, in full sentences, of solutions.
- *Technology*, in particular a scientific or graphing calculator along with its manual (or an equivalent computer or web-based program), are used to help each student think about and analyze mathematics. In addition to the traditional use as a simple calculational tool, students may also master the graphing and basic programming capabilities of calculators in order to better visualize models and estimate solutions.
- *The semiotic "rule of three"* means that concepts, symbols, and words are investigated for each topic. The most common interpretation of the rule of three in algebra is to have students explore the geometric/graphical, numeric/tabular, and functional views for topics.

Methods of Evaluation: Assessment of student learning is accomplished through at least two in-class examinations, regular homework or quizzes on which substantive feedback is given to students, and a comprehensive final exam. Additional in-class or web-based activities are likely to be included in formative or summative assessments of student progress. One or two projects that result in summative reports can take the place of some, but not all, home, class, and quiz work. Lab sessions on a computer or using graphing calculators that illustrate the topics discussed in class are necessary. Assessment of technological mastery will be made through quizzes, class activities, projects, or short essay assignments.

Bibliography

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