

## **Courses for Secondary Mathematics Teachers**

### **UNL Center for Science, Mathematics & Computer Education**

#### **MATH 804T – Experimentation, Conjecture & Reasoning**

This course focuses on problem solving, reasoning and proof and communicating mathematics.

#### **MATH 805T – Discrete Mathematics**

Designed to deepen knowledge of discrete mathematics as it relates to topics covered in middle through high school grades curricula. Course topics (such as graph theory and counting techniques) are introduced through "hands-on" explorations through which various problem-solving strategies are emphasized.

#### **MATH 806T – Number Theory and Cryptology for Secondary Teachers**

This course focuses on basic number theory results which are needed to understand the number theoretic RSA cryptography algorithm (an encryption algorithm which is in use today to secure information sent via the internet). The course emphasizes connections to school mathematics and promotes a deep understanding of the integers and their properties. Elementary methods for encoding and decoding are introduced to elucidate the nature of cryptology. These methods are readily adaptable as enrichment activities for students.

#### **MATH 808T – Concepts of Calculus**

Develops a fundamental understanding of the key mathematical ideas of calculus in order to broaden teachers' mathematical perspective and gain insight into concepts contained in school curriculum which are related and foundational to the development of calculus. Topics include limits, differentiation, integration, applications and the Fundamental Theorem of Calculus.

#### **MATH 807 – Mathematics for High School Teachers Capstone I**

This workshop style course will analyze the connections between college-level calculus and abstract algebra and high school mathematics. It will emphasize the development of skills necessary to recognize these connections and then use them to help high school students explore and deepen their understanding of math concepts. Prerequisites: undergraduate calculus and abstract algebra.

#### **MATH 808 – Mathematics for High School Teachers Capstone II**

Participants in this course will analyze the connections between college mathematics and high school algebra and geometry. Prerequisites: undergraduate abstract algebra and concepts in geometry.

#### **MATH 809 – Mathematical Modeling for High School Teachers**

This course is designed around a series of projects in which students examine the mathematics underlying several socially-relevant questions which arise in a variety of academic disciplines (i.e. real-world problems, such as how to use mathematics to understand the spread of a disease). Students learn to extract the mathematics out of the problem in order to construct models to describe them. The models are then analyzed using skills developed in this or previous mathematics courses.

### **MATH 810T – Algebra for Algebra Teachers**

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The main goal of the course is to help Algebra I teachers better understand the conceptual underpinnings of school algebra, and how to leverage that understanding into improved classroom practice. Emphasis is placed on developing the habits of mind of a mathematical thinker.

### **MATH 811T – Functions for High School Teachers**

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A study of functions in the pre-calculus, high school mathematics curriculum from an advanced viewpoint. Functions will be investigated by examining their utility in more advanced courses and applications, enabling teachers to better understand the important aspects and appropriate emphasis of a concept. Content will include polynomial, circular (trig), and exponential functions, and their connections to calculus.

### **MATH 812T – Geometry for Geometry Teachers**

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The main goals of the course are to strengthen your mathematical background for teaching Geometry. We will focus on fundamental concepts of Euclidean geometry, with explorations of non-Euclidean geometry for contrast. We will make extensive use of manipulatives and the dynamic geometry software GeoGebra.

### **MATH 814T – Matrix Algebra for Teachers**

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The main goals of the course are to strengthen mathematical background for teaching mathematics. The course will focus on fundamental concepts of and explorations in matrix algebra, making connections to high school mathematics curricula.

### **STAT 892 – Statistics for High School Teachers**

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This course will cover the statistical concepts typically taught in a high school Statistics class. These include: linear regression, two-way tables, sampling distributions, statistical inference for means and proportions, chi-square tests, and inference for regression. Some experience with basic statistical concepts (mean, standard deviation, elementary probability) is necessary. The course will be inquiry-based, and will emphasize applications and statistical thinking. Software and calculators will be used for most analyses.