

**Department:** Science

**Course Name:** Honors Research Methods

**Course Description:**

This honors-level, inquiry-driven science course is designed for students prepared for advanced independent research and intensive scientific writing. Students investigate a self-selected topic in science or technology, develop a research question, and design, plan, and implement a sustained scientific investigation while learning research methodology, experimental design, ethical research practices, and data analysis tools, with opportunities for collaboration with research institutions when available. The course is writing-intensive and emphasizes scientific writing as distinct from traditional English composition. Students complete four evidence-based opinion papers on controversial scientific topics of their choice, engage in structured discussion board conversations, and participate in Socratic seminars to analyze and defend their positions using scientific literature. The class also includes a contemporary book study focused on genetic editing and its scientific and ethical implications, providing a foundation for discussion and critical analysis. The course culminates in a formal research paper and oral defense presentation. **Prerequisite:** Biology. **Co-requisite:** Chemistry and teacher approval.

**Content:**

Scientific Methods

Literature Review and Search

Types of Investigations

Research Design

Data Types and Data Collection Techniques

Quantitative and Qualitative Methods and Data Analysis

Statistical Methods

Laboratory Techniques

Ethical Issues

APA Writing Style

**Skills:**

Understand different scientific research designs and methods

Learn how to set up a research study

Understand correct ways to refer to and cite from scientific literature

Perform literature reviews

Formulate a research plan

Measurements

Problem Solving

Use of laboratory technology and tools- PCR, Spin-column and Chemical DNA extraction, Gel Electrophoresis, CRISPR, Cell Culture, PCR purification, Custom Primers, Bacteriophage Isolation, Bacterial Transformation, Protein purification, SDS-PAGE gels, and many others.

Utilizing the features of the Learning Management System

**Text and Materials**

Will be provided by the teacher

**Methods of Instructions**

Direct Instruction

Inquiry-Based Learning  
Cooperative Learning  
Demonstrations

**Methods of Evaluation:**

Scientific Lab Journal  
Team Collaboration  
Literature Review  
Research Project  
Written Progress Reports  
Scientific Paper

