

GCHS New Course Proposals 2019-2020



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**Third Year
Scientific Research**



Third Year Scientific Research

Objectives

This course will allow students who have taken the Second Year Scientific Research Course to continue to work on their individual independent research projects. Students will present a research progress report during the fall semester, and write a draft of their research paper in the spring semester. They continue to participate in a variety of individual and team projects, contests, and lab activities that will hone their problem-solving and research skills, and which may be submitted to science competitions e.g.: *Long Island Science and Engineering Fair (LISEF)*, *Long Island Science Congress (LISC)*.

Expectations

Only students with developed research projects or established outside mentors from the Second Year Scientific Research class should register for the class.

Students are expected to dedicate the summer between their junior and senior year to working full-time as a volunteer on their research project.

Third Year Scientific Research

New York State Science Learning Standards



New York State Science Learning Standards

Cross Cutting Concepts

1. Patterns
2. Cause and Effect
3. Scale, Proportion, and Quantity
4. Systems and System Models
5. Energy and Matter
6. Structure and Function
7. Stability and Change

Science and Engineering Principles

1. Asking Questions and Defining Problems.
2. Developing and Using Models.
3. Planning and Carrying Out Investigations.
4. Analyzing and Interpreting Data.
5. Using Mathematics and Computational Thinking.
6. Constructing Explanations and Designing Solutions.
7. Engaging in Argument from Evidence.
8. Obtaining, Evaluating, And Communicating Information



Chemical Explorations



Chemical Explorations

Objectives

Chemical Explorations, is meant to offer students the opportunity to take an introductory chemistry course that connects the general chemistry curriculum to hands-on **project-based-learning** that makes evident connections to students' daily lives.

Expectations

This is a one-year course that gives an introduction to fundamental **chemical concepts** and problems, with an emphasis placed on the **application** of chemical principles to **real-life situations**. **Demonstrations** and **laboratory experiments** will be performed to illustrate the variety of chemistry applications that can be used for problems in the home, environment, marketplace, industry, medicine, nutrition and basic daily life. The course involves some **chemical mathematics**, and students should have basic algebra skills.

Chemical Explorations

New York State Science Learning Standards

Cross Cutting Concepts

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New York State Science Learning Standards

Science and Engineering Principles

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Project-based learning (PBL)

A strategy that encourages **projects**, which promote **continual learning**.

These projects center on **driving questions** that **promote meaningful inquiry**.

[Wicked Soap](#)



National Science Foundation-Backed Research Study Confirms that Project-Based Inquiry Curriculum Has a Positive Effect on How Students Learn Science



Participants monitored in this study included approximately 100 sixth-grade teachers and more than 3,000 sixth-grade students of various ethnicities and nationalities, across 42 middle schools in a district with a high percentage of low income families underrepresented in science, technology, engineering, and math (STEM) fields.



Curriculum Materials Make a Difference for Next Generation Science Learning: Results from Year 1 of a Randomized Control Trial, Christopher J. Harris, William R. Penuel, Angela Haydel DeBarger, Cynthia D'Angelo, Lawrence P. Gallagher, Technical Report | May 2014

1. **Success:** Students taught using the Project-Based Learning (PBL) curriculum materials outperformed students who were taught using traditional science curriculum materials.
2. **The Great Equalizer:** Project-Based Learning (PBL) curriculum can help close the learning gaps among students of underrepresented demographics in STEM courses and level the field between girls and boys.
3. **Teacher/Student Engagement Increases:** The study also demonstrated that teachers in the study (who were all new to the curriculum) were more likely to engage their students in the following four science practices than non-PBL teachers: **constructing explanations, developing and using models, planning and carrying out investigations and asking questions.** The research data also indicates that the difference in teacher/student engagement between PBL and traditional science classes **increased significantly over time.**



AP PSYCHOLOGY



AP PSYCHOLOGY

Objective:

The AP Psychology course introduces students to the systematic and scientific study of human behavior and mental processes. While considering the psychologists and studies that have shaped the field, students explore and apply psychological theories, key concepts, and phenomena associated with such topics as the biological bases of behavior, sensation and perception, learning and cognition, motivation, developmental psychology, testing and individual differences, treatment of abnormal behavior, and social psychology. Throughout the course, students employ psychological research methods, including ethical considerations, as they use the scientific method, evaluate claims and evidence, and effectively communicate ideas.

Purpose:

Creating this AP course will allow students to take a course that is academically rigorous and supports their growing interest in social sciences. Students can receive credit for two subject areas (Science & Social Studies) and they will have the opportunity to learn in two classroom environments that will support the New York State Science Learning Standards, Social Studies Framework and the AP Psychology curriculum.



Interdisciplinary Curriculum (Science & Social Studies)

Science Standards/Curriculum

Structure and Function:

Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis

Inheritance and Variation of Traits:

Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, (3) mutations caused by environmental factors and/or (4) genetic engineering.

Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.

Social Studies Standards/Curriculum

New Social Studies Framework: The College, Career, and Civic Life (C3) Framework and the Inquiry Arc:

Developing questions and planning inquiries

Applying disciplinary concepts and tools

Evaluating sources and using evidence

Communicating conclusions and taking informed action

Social Studies Practices

Gathering, Interpreting and Using Evidence, Chronological Reasoning and Causation, Comparison and Contextualization, Geographic Reasoning, Economics and Economic Systems, Civic Participation



**AP HUMAN
GEOGRAPHY**



AP HUMAN GEOGRAPHY

Objective:

The course introduces students to the systematic study of patterns and processes that have shaped human understanding, use, and alteration of Earth's surface. Students employ spatial concepts and landscape analysis to examine socioeconomic organization and its environmental consequences. They also learn about the methods and tools geographers use in their research and applications. The curriculum reflects the goals of the National Geography Standards.

Purpose:

This course will complement the new Social Studies Framework's historical thinking skills. Creating this AP course will allow students to take a course that is academically rigorous and supports their growing interest in Human Geography. Implementing such course at the 9th grade level will support a vertical alignment as the students progress in their Social Studies career.

Historical thinking skills that will be developed

Social Studies Practices

Gathering, Interpreting and Using Evidence

Chronological Reasoning and Causation

Comparison and Contextualization

Geographic Reasoning

Economics and Economic Systems

Civic Participation

Geographic Knowledge **The 18 geographic knowledge standards are grouped by 6 Essential Elements:**

The world in Spatial Terms

Places and Regions

Physical Systems

Human Systems

Environment and Society

The Uses of Geography.

Geographic Skills

Asking Geographic Questions

Acquiring Geographic Information

Organizing Geographic Information

Analyzing Geographic Information

Answering Geographic Questions.

**Latin American
History through
American Experience
&
Latin American
History through
World Experience**

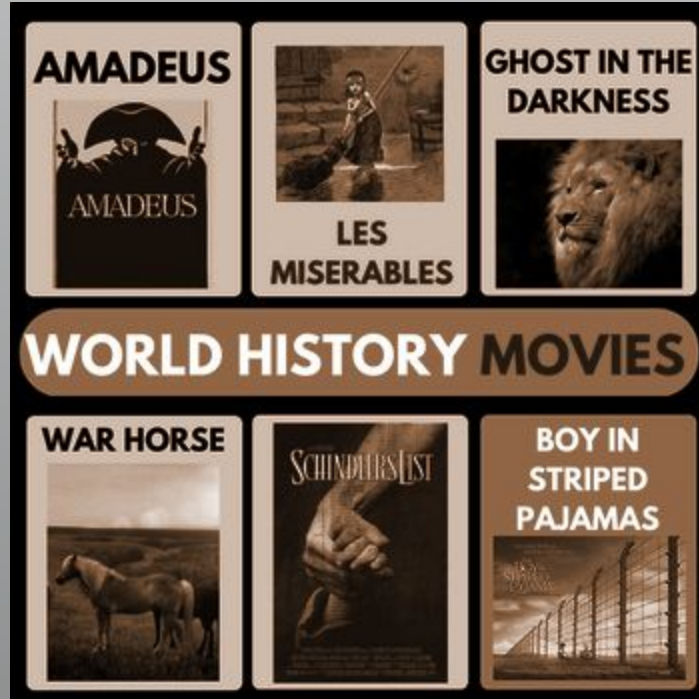


Objectives/Expectations



This course delves into Latin American history and impact on the Latin American immigrant experiences and major contributions to American life. This course will serve a complement to the new Social Studies Framework's historical thinking skills and research. It will serve to strengthen the skill set for students taking ICT, ENL, Regents, Honors and AP classes.

American History
through Film
&
World History
through Film



Objectives/Expectations



Mass media, like film, is often a major influencer of popular perceptions about history. This course seeks to have students critically analyze film through the lens of a historian, with a focus on both historical accuracy and historiography in film. It will complement the new Social Studies Framework's historical thinking skills and it will strengthen and broaden the skill-sets available to students who are taking ICT, ENL, Regents, Honors and AP classes.



**World at War &
Holocaust Studies**



World at War & Holocaust Studies

World at War:

This course will deal with the origins and impact of WWI, WWII, and the Cold War. We will look at these conflicts from differing perspectives and compare the experiences of people around the world. Students will do independent research using primary and secondary sources. We will examine the roles of technology, nationalism, and propaganda as well as look at the human impact of these conflicts. This course will serve to strengthen the skill set for students taking ICT, ENL, Regents, and advanced level courses.

Holocaust Studies:

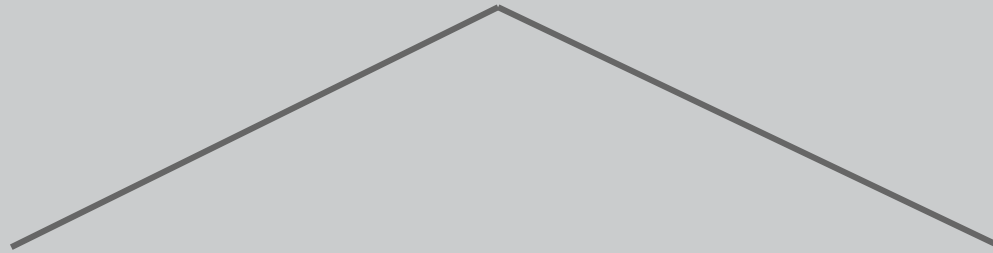
This course will examine the origins of the ideologies and events that led to the Nazi Holocaust of World War II. Students will examine primary and secondary accounts and conduct research on topics of their own choosing. In addition, students will compare and contrast the Holocaust to other atrocities of the 20th century. Finally, the students will interact with the Holocaust center in Glen Cove. This course will serve to strengthen the skill set for students taking ICT, ENL, Regents, and advanced level courses.

Latin American History through American & World Experience

American & World History through Film

World at War

Holocaust Studies



Historical Thinking Skills

1. Gathering, Interpreting and Using Evidence
2. Chronological Reasoning and Causation
3. Comparison and Contextualization
4. Geographic Reasoning
5. Economics and Economic Systems
6. Civic Participation

New Social Studies Framework: The College, Career, and Civic Life (C3) Framework and the Inquiry Arc

1. Developing questions and planning inquiries
2. Applying disciplinary concepts and tools
3. Evaluating sources and using evidence
4. Communicating conclusions and taking informed action

$$\begin{cases} 2x_1 + x_2 = 7 \\ x_1 + x_2 - 3x_3 = -10 \\ 6x_2 - 2x_3 + x_4 = 7 \\ 2x_3 - 3x_4 = 13 \end{cases}$$

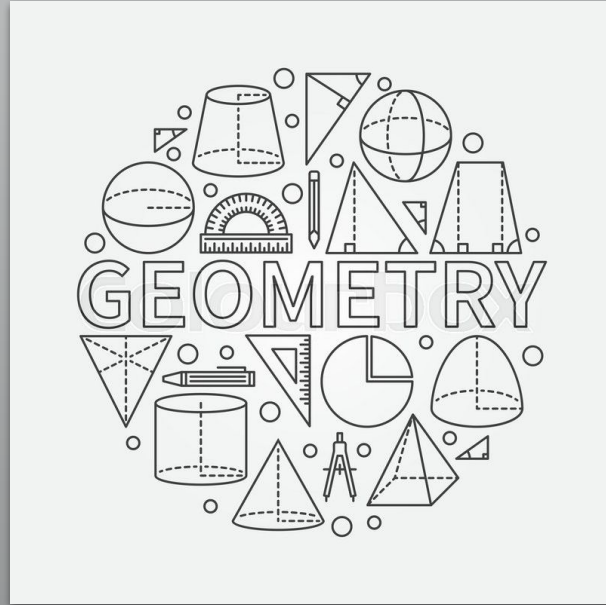
Algebra Explorations

Objective/Expectations

Students will explore how concepts learned in Algebra I can be applied to real world settings.

Next Generation Math Standards for Algebra I (Alignment & Support)

- Algebraic Expressions
- Linear Equations and Inequalities
- Statistics
- Sequences
- Functions & Graphs
- Transformation of Functions
- Quadratic Equations
- Modeling with Functions



Geometry Explorations

Objective/Expectations

Students will explore how concepts learned in Geometry can be applied to real world settings.

Next Generation Math Standards for Geometry (Alignment & Support)

- Construction
- Transformation and Rigid Motions
- Congruence
- Geometric Proofs
- Similarity
- Trigonometry
- Area and Volume
- Coordinate Geometry
- Circles

$$E = \frac{dq}{dp} \cdot \frac{p}{q}$$

$$E = \frac{dq}{dp} \cdot \frac{p}{q} \quad -\ln\left(\frac{I}{I_0}\right) = \int_0^L \mu(x) dx \quad E = \frac{m_0 c^2}{\sqrt{1 - \frac{v^2}{c^2}}}$$

$$\frac{dS}{dt} = (a - e)S - bSM \quad \frac{dS}{dt} = (a - e)S - bSM$$

$$\frac{dM}{dt} = -(c + e)M + dSM \quad \frac{dM}{dt} = -(c + e)M + dSM$$

$$E = \frac{m_0 c^2}{\sqrt{1 - \frac{v^2}{c^2}}}$$

$$Pr(a \leq X \leq b) = \int_a^b f(x) dx \quad -\ln\left(\frac{I}{I_0}\right) = \int_0^L \mu(x) dx$$

$$\frac{dS}{dt} = (a - e)S - bSM \quad \frac{dM}{dt} = -(c + e)M + dSM$$

College Pre-Calculus/Calculus Honors

Objective/Expectations

The new course will be in partnership with LIU Post. Students will learn Pre-Calculus in the Fall and Calculus in the Spring. Interested students can earn college credit for either of these courses. (Tuition is \$290 for each 4-credit class)

Pre-Calculus Topics Include

- Basic concepts of Algebra
- Equations & Inequalities
- Functions & Graphs
- Exponential & Logarithmic Functions and Equations
- Trigonometric Functions and Equations
- Systems of Linear Equations

Calculus Topics Include

- Limits
- Derivatives
- Applications & Derivatives
- Maximum/Minimum Value of Functions
- Related Rates



Computer Science Principles
Project Lead the Way

Objective/Expectations

This course will be offered in conjunction with the **Project Lead the Way** Computer Science program and will follow *Computer Science Essentials*. Students will create apps for mobile devices, automate tasks in variety of languages, find patterns in data, and interpret simulations. This course will prepare students to take College Board's new Advanced Placement Exam in Computer Science.

Major Units of Study

Unit 1: Algorithms, Graphics, and Graphical User Interface

Unit 2: The Internet

Unit 3: Raining Reigning Data

Unit 4: Intelligence Behavior



Music in a Digital Age

Objective/Expectations

This course will provide world-class music education for all students, and would serve the growing need for technology-base course offerings. The course will increase the variety of available Music courses for all students of various learning styles, and would provide students with an introduction to skills necessary for career paths in audio engineering, recording, editing, and production. The objective of the course is to approach basic musicianship and music history in a new way through hands-on interaction with music media equipment such as Itunes, Garageband, and digital synthesizers.

MIDA students would develop a working knowledge of basic keyboard theory, as well as instrumental and vocal musicianship as part of their digital projects.



BEAT COOK UP

