02 Research Topic Development and Review of Research Methods

Content Area: **Science**
Course(s):
Time Period: **Full Year**
Length: **Type Length of Unit**
Status: **Published**

General Overview, Course Description or Course Philosophy

Intermediate Science Research Methods Honors is the second course in a three year sequence of courses. Students learn research methodology in the natural sciences by accessing scientific databases, using online bibliographic search techniques, learning how to analyze and create scientific presentations to be shared in class and during the end of year Symposium. There will be an emphasis for students to secure a mentor by this year to develop an authentic scientific research project. Students will have the opportunity to apply basic research methods in the area of Molecular Biology and Bioinformatics.

OBJECTIVES, ESSENTIAL QUESTIONS, ENDURING UNDERSTANDINGS

Students will understand that personal interest and intellectual curiosity inspire investigation of a unique research topic within science, may not be clearly defined. A well crafted investigation explores the complexity of an issue or topic. This topic is explored using basic research methods and various sources (written and communication with industry or academia to inform topic choice). These topics will exclude any focus on social sciences as indicated by SUNY Albany University in High School Science Research Program.

CONTENT AREA STANDARDS

LA.W.11-12.2	Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.
LA.W.11-12.5	Develop and strengthen writing as needed by planning, revising, editing, rewriting, trying a new approach, or consulting a style manual (such as MLA or APA Style), focusing on addressing what is most significant for a specific purpose and audience.
LA.W.11-12.7	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
VHEL.9-12.9.4.12.H.5	Select and employ appropriate reading and communication strategies to learn and use technical concepts and vocabulary in practice.
VHEL.9-12.9.4.12.H.16	Employ critical thinking skills (e.g., analyze, synthesize, and evaluate) independently and in teams to solve problems and make decisions.
VHEL.9-12.9.4.12.H.42	Conduct and participate in meetings to accomplish tasks.

RELATED STANDARDS (Technology, 21st Century Life & Careers, ELA Companion Standards are Required)

TECH.9.4.12.TL.1	Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.).
TECH.9.4.12.TL.3	Analyze the effectiveness of the process and quality of collaborative environments.

STUDENT LEARNING TARGETS

Declarative Knowledge

Students will know:

1. Topics of inquiry may come from personal interest, passion for a discipline/field, desire to better understand a topic, or desire to address an issue in the world.
2. Inquiry begins by narrowing the scope of an interest, identifying the problem within its scope and situating it within a larger context.
3. A research question/goal emerges from the scholar's purpose.
4. A research question often requires multiple revisions to ensure that it is appropriate in terms of scope and feasibility (time, resources).
5. Online databases(EBSCO, JSTOR, ProQUEST) house many primary sources.
6. Advanced search tools, Boolean logic, and keywords allow scholars to refine, focus, and limit their searches based on a variety of factors (date, peer-reviewed status, type of publication)
7. Consulting the bibliographies of other sources may provide additional ideas and resources.
8. Software and online tools are used by Scholars to manage and catalog sources and produce bibliographies.
9. The scope and purpose of one's research and credibility of sources affects the generalizability and the reliability of the conclusions.
10. The way the problem is posed will guide the inquiry process.
11. The method data is collected in an inquiry should be aligned with the research question or goal.
12. Scholars have ethical and moral responsibilities when conducting research.

Procedural Knowledge

Students will be able to:

1. Develop and revise a focused research question/project goal.
2. Retrieve, question, organize and use prior knowledge about a topic.
3. Access and manage information using effective strategies.
4. Evaluate the relevance and credibility of the source of information and data in relation to the inquiry.
5. Identify the information necessary for the context of the inquiry.
6. Design, plan, and implement a scholarly inquiry/research project.
7. Extende an idea, question, process, or product to innovate or create new understandings.

8. Offer resolutions, conclusions, and/or solutions based on evidence considering limitations and implications.
9. Demonstrate perseverance through setting goals, manage time, and work independently on a long-term project.
10. Employ ethical research practices.

EVIDENCE OF LEARNING

Formative Assessments

Scientific journal summaries

Scientific Journal -annotations

Journal Presentations

Group discussions

Summative Assessments

- Benchmarks – departmental benchmark given at the end of MP1, MP2, or MP3 & MP4 b(Semester Based Course)
- Alternative Assessments
    - Lab inquiries and investigations
    - Lab Practicals
    - Exploratory activities based on phenomenon
    - Gallery walks of student work
    - Creative Extension Projects
    - Build a model of a proposed solution
    - Let students design their own flashcards to test each other
    - Keynote presentations made by students on a topic

- Portfolio

Lab binders evaluation

Biweekly assessment

Lab notebook assessment

RESOURCES (Instructional, Supplemental, Intervention Materials)

http://www.albany.edu/uhs/src.php

http://www.albany.edu/scienceresearch/

http://static.nsta.org/files/PB297Xweb.pdf

www.Sciencebuddies.com

INTERDISCIPLINARY CONNECTIONS

Statistics

Presentation Skills/Public Speaking

ACCOMMODATIONS & MODIFICATIONS FOR SUBGROUPS

See link to Accommodations & Modifications document in course folder.