02 Research Topic Exploration and Research Methods

Content Area: **Science**
Course(s):
Time Period: **Full Year**
Length: **4 weeks**
Status: **Published**

General Overview, Course Description or Course Philosophy

Introduction to Science Research Methods CP is the first 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 obtain a mentor by the end of school year to help further their research studies. Students will have the opportunity to apply basic research methods in the area of Molecular Biology and Bioinformatics.

OBJECTIVES, ESSENTIAL QUESTIONS, ENDURING UNDERSTANDINGS

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.

ESSENTIAL QUESTIONS

How does the context of a problem or issue affect how it is interpreted or presented?

How might others see the problem or issue differently?

What questions have yet to be asked?

What voices or perspectives are missing from my research?

What do I want to know, learn, or understand?

How does my research question shape how I go about trying to answer it?

What information do I need to answer my question?

What keywords should I use to search for information about this topic?

CONTENT AREA STANDARDS

LA.RL.9-10.1	Cite strong and thorough textual evidence and make relevant connections to support analysis of what the text says explicitly as well as inferentially, including determining where the text leaves matters uncertain.
LA.RI.9-10.2	Determine a central idea of a text and analyze how it is developed and refined by specific details; provide an objective summary of the text.
LA.RI.9-10.4	Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the cumulative impact of specific word choices on meaning and tone (e.g., how the language of a court opinion differs from that of a newspaper).
LA.SL.9-10.4	Present information, findings, and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.
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:

- 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.
- Inquiry begins by narrowing the scope of an interest, identifying the problem within its scope and situating it within a larger context.
- A research question/goal emerges from the scholar's purpose.
- A research question often requires multiple revisions to ensure that it is appropriate in terms of scope and feasibility (time, resources).
- Online databases (EBSCO, JSTOR, ProQUEST) house many primary sources.
- 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)

- Software and online tools are used by Scholars to manage and catalog sources and produce bibliographies.
- The scope and purpose of one's research and credibility of sources affects the generalizability and the reliability of the conclusions.
- The way the problem is posed will guide the inquiry process.
- Examining the perspectives and ideas of others often leads to questions for further investigation.
- Inquiry begins with narrowing scope of interest, identifying a problem or issue and its origins within that scope, and situating the problem or issue in a larger context.
- The method data is collected in an inquiry should be aligned with the research question or goal.
- Scholars have ethical and moral responsibilities when conducting research.

Procedural Knowledge

Students will be able to:

- Identify a topic of inquiry.
- Articulate the purpose and significance of the scholarly inquiry.
- Contextualizing and identifying the complexities of a problem or issue.
- Develop and revise a focused research question/project goal.
- Retrieve, question, organize and use prior knowledge about a topic.
- Access and manage information using effective strategies.
- Evaluate the relevance and credibility of the source of information and data in relation to the inquiry.
- Identify the information necessary for the context of the inquiry.
- Design, plan, and implement a scholarly inquiry.
- Posing questions and seeking out answers that reflect multiple, divergent, or contradictory perspectives.
- Demonstrate perseverance through setting goals, manage time, and work independently on a long-term project.
- 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)
    - Lab binders evaluation
    - Biweekly assessment
    - Lab notebook assessment
- 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

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

Technical writing

Technology/software use

Statistics

Different sciences

Engineering

ACCOMMODATIONS & MODIFICATIONS FOR SUBGROUPS

See link to Accommodations & Modifications document in course folder.