

UK Core Intellectual Inquiry in the Natural, Physical, and Mathematical Sciences

UK Core Learning Outcome 1: *Students will demonstrate an understanding of and ability to employ the processes of intellectual inquiry.*

Outcomes and Assessment Framework: Students will: (A) be able to identify multiple dimensions of a good question; determine when additional information is needed, find credible information efficiently using a variety of reference sources, and judge the quality of information as informed by rigorously developed evidence; (B) explore multiple and complex answers to questions/issues/problems within and across the four broad knowledge areas: arts and creativity, humanities, social and behavioral sciences, and natural/physical/mathematical sciences; (C) evaluate theses and conclusions in light of credible evidence; (D) explore the ethical implications of differing approaches, methodologies or conclusions; (E) and develop potential solutions to problems based on sound evidence and reasoning.

Specific Learning Outcomes for Inquiry in the Natural, Physical, and Mathematical Sciences

By the end of the course, students should be able to:

1. Describe methods of inquiry that lead to scientific knowledge and distinguish scientific fact from pseudoscience.
2. Explain fundamental principles in a branch of science.
3. Apply fundamental principles to interpret and make predictions in a branch of science.
4. Demonstrate an understanding of at least one scientific discovery that changed the way scientists understand the world.
5. Give examples of how science interacts with society.
6. Conduct a hands-on project using scientific methods to include design, data collection, analysis, summary of the results, conclusions, alternative approaches, and future studies.
7. Recognize when information is needed and demonstrate the ability to find, evaluate and use effectively sources of scientific information.

* A required student product (paper, laboratory report, presentation, etc.) based on the hands-on project. This requirement is the curriculum-embedded performance based assessable product.

	Exceeds Expectations	Meets Expectations	Does Not Meet Expectations
Explore multiple and complex answers to questions/issues within the natural, physical and/or mathematical sciences by identifying the dimensions of a good question	<p>The question is described clearly, completely, fully and in great detail.</p> <p>The question is answerable by experiment or observation.</p> <p>The experimental design is appropriate and described in detail.</p>	<p>The question is described but some detail is missing.</p> <p>The question is answerable by experiment or observation but lacks clarity.</p> <p>The experimental design is appropriate but lacks detail.</p>	<p>The question is inadequate or incompletely described.</p> <p>The question is not answerable by experiment or observation.</p> <p>The experimental design is missing.</p>

	Exceeds Expectations	Meets Expectations	Does Not Meet Expectations
Explore multiple and complex answers to questions/issues within the natural, physical and/or mathematical sciences by evaluating theses and conclusions in light of credible evidence; and judging the quality of information as informed by rigorously developed evidence	<p>Provides a well-developed evaluation and analysis of the data and questions its accuracy, relevance, and completeness.</p> <p>Justifies key results and procedures, explains assumptions and reasons.</p>	<p>Evaluation and analysis of data contains minor errors/omissions.</p> <p>Justifies some results or procedures, explains reasons.</p>	<p>Evaluation and analysis of data contains major errors/omissions.</p> <p>No justification of results.</p>
Explore multiple and complex answers to questions/issues within the natural, physical and/or mathematical sciences by exploring alternative approaches and/or future study of the question	<p>Critically evaluates major alternative points of view/ approaches.</p> <p>(and/or)</p> <p>Provides a detailed description of future studies.</p> <p>Makes suggestions related to the improvement of the existing experimental design.</p>	<p>Offers evaluations of obvious alternative points of view/approaches.</p> <p>(and/or)</p> <p>Makes suggestions for future research studies, which have minor flaws.</p> <p>Makes some suggestions for improvement of the existing experimental design, which are incomplete or have minor flaws.</p>	<p>Superficially evaluates obvious alternative points of view/ approaches.</p> <p>(and/or)</p> <p>Does not make suggestions for future research studies, or for the redesigning of the existing procedure.</p>