

IINSPIRE LSAMP

Overview of Undergraduate Research Certificate Requirements

Conducting STEM Research

Scientific research involves the generation of ideas and information leading to new and substantially improved scientific insights with relevance to the needs of society. Creativity and critical thinking are important elements of the research process.

Course-based Requirement:

Introduction to Research in STEM (1 cr.)

Competency-based Requirement (select any applicable):

1. Understanding of the scientific research process, including the ability to identify the research problem, construct and implement research strategy, evaluate and justify conclusions and recommendations, etc.
2. Ability to critically evaluate available evidence, such as through literature review
3. Ability to display emotional resilience by persisting in information searching despite challenges

Four terms of inquiry-based research or co-curricular experience in laboratory or field setting under faculty mentorship (Note: summer experiences can be counted as 2 terms, while course-based research experience can be counted as ½-term)

Research Methods

In the academic and subsequent professional careers, students will be called upon quite frequently to collect and interpret data and act on quantitative/qualitative data from a variety of sources. For a successful career, students need to understand the process of science and how knowledge is constructed through scientific theory and evidence.

Course-based Requirement (6 cr. or 2 courses):

Examples of applicable courses at ISU
PSYCH 301, PSYCH 302, BBMB 411

Competency-based Requirement (select any or all applicable):

1. Ability to plan and design experiments, develop and test hypotheses, evaluate and interpret experimental evidence, and develop problem-solving strategies and critical thinking skills
2. Knowledge of the interdisciplinary nature of science
3. Understanding scientific concepts and processes through hands-on experiences in authentic scientific research

Quantitative Methods in STEM Research

The current and emerging scientific workforce requires basic skills in programming, simulation modeling, and implementing computational algorithms to describe both simple and complex natural-human systems.

Course-based Requirement (6 cr. or 2 courses):

Examples of applicable courses at ISU
MATH 165, MATH 166, STATS 201, STATS 401

Competency-based Requirement (select any or all applicable):

1. Ability to effectively apply methods of quantitative analysis and mathematical reasoning
2. Ability to understand and appreciate the impact of mathematical approaches on interpretations of science and scientific research
3. Ability to collect, manage, interpret and present research data to scientist and non-scientists audience

Science and Society

Undergraduate students are next-generation scientists and decision-makers. As scientists, they must understand and evaluate the impact of scientific discoveries on society and the ethical implications of the scientific discoveries.

Course-based Requirement (3 cr. or 1 course):

Examples of applicable courses at ISU:

HIST 280, PHIL 330, PHIL 380, RCR workshop

Competency-based Requirement (select any or all applicable):

1. Ability to understand and evaluate the ethical dimensions of scientific research
2. Ability to develop transformative research to address pressing global problems that impact society
3. Ability to explore and define the extent to which scientific and technological advances benefits and/or impacts human beings and the environment
4. Ability to explore science and scientific research in a social context through real-world case studies embedded in summer/academic-year research and coursework.

Scientific and Technical Writing

Writing is the most important means of communication scientific research as well as a basic skill required in the STEM workplace. Effective scientific writing can improve students' perception and confidence of their abilities to read scientific literature and communicate science.

Course-based Requirement (3 cr. or 1 course):

Examples of applicable courses at ISU:

ENGL 314, JLMC 347

Competency-based Requirement:

1. Ability to explain, describe, and communicate the significance of the scientific research, the nature of the research, the doing of science, and the content of science

Communicating STEM Research

An authentic communication experience can serve the dual purpose of educating the public about a specific topic of societal importance and enhancing student's ability to speak to a diverse audience who may be limited in scientific knowledge.

General Requirement: Written report and/or oral (including poster) presentation of research

Competency-based Requirement:

1. Ability to explain complex scientific concepts, data and interpretations not just to scientists and science enthusiasts but also to a general non-scientist audience