

Research & Discovery – Course Development Guide

Overview

“Research” looks very different from discipline to discipline, from bench science to creative performance. The goal of the “Research and Discovery” requirement in the IDEAs in Action curriculum is to teach students about the process of research in at least one specific discipline, giving them hands-on experience in the process of creating knowledge. This guide is for instructors designing or adjusting a course to allow students to conduct research in a way that meets the criteria of the Research & Discovery requirement.

What is the Research & Discovery requirement?

The Research & Discovery requirement allows students to immerse themselves in a research project, incorporating reflection and revision to produce and disseminate original scholarship or creative work. This experience will help them reflect upon, deepen, and connect knowledge and capacities. Research & Discovery courses should devote at least 1/3 of the course activities and/or semester grade to open-ended research addressing novel questions/hypotheses.

Five Learning Outcomes

These are the learning outcomes that are expected of students after completing a Research and Discovery course, as listed in the Undergraduate Catalog:

1. Frame a topic, develop an original research question or creative goal, and establish a point of view, creative approach, or hypothesis.
2. Obtain a procedural understanding of how conclusions can be reached in a field and gather appropriate evidence.
3. Evaluate the quality of the arguments and/or evidence in support of the emerging product.
4. Communicate findings in a clear and compelling ways.
5. Critique and identify the limits of the conclusions of the project and generate ideas for future work.

What does this mean in practice?

Students in your class will conduct research that is novel, relevant, and evidence-based. They will pose research questions to which neither you nor they yet have answers. Thus, in some way, they will add to our knowledge by developing a research question appropriate to your discipline, seeking out relevant data or sources, and providing some original analysis. Although they likely won't produce results they could publish in an academic journal, they'll be using methods similar to scholars who do—and they'll be doing more than compiling a literature

review, writing a term paper based on a single prompt, or conducting a lab experiment with predictable results.

[What does a Research & Discovery course look like in my discipline?](#)

You can see a full list of Research & Discovery courses [here](#), and you can talk to faculty in your department or discipline who have already developed a course to learn more about how they structured their course. Here are a few examples to get you started:

Fine Arts and Humanities

- FOLK/JWST 380. Traditions in Transition: Jewish Folklore and Ethnography. This seminar examines Jewish stories, humor, ritual, custom, belief, architecture, dress, and food as forms of creative expression that have complex relationships to Jewish experience, representation, identity, memory, and tradition. What makes these forms of folklore Jewish, how do source communities interpret them, and how do ethnographers document them? Students learn ethnographic skills to conduct a community-based fieldwork project. They produce this project in multiple phases, first submitting a Fieldnotes and Observations paper, then a brief annotated bibliography and proposal, then an original Interview paper and transcript, and finally, incorporating it all to produce a final ethnographic project. Multimedia components are welcome! Students also give a final oral presentation to the class, open to their collaborators in the field.
- PHIL 211, Perspectives on Gender, Race, and Marginality in Ancient Greek Philosophy, Science, and Medicine. This course studies through the examination of several infamous, ignored, or otherwise uncharted Ancient Greek texts the views about gender and race as presented in ancient Greek philosophy, medicine, and science. Our aims are to generate a new understanding of how the male elite used such views to further promote or justify (or perhaps challenge) the existing marginalization and silencing of women, foreigners, and less privileged men. Through a series of collaborative exercises, student presentations, and class discussions, students develop their own research projects over the course of a semester. These culminate in a research paper that is representative of ancient philosophical scholarship, written by individual students, and also in a more public-facing digital project, composed by students in teams of three, in which students communicate their main ideas about the ancient period and how these relate to contemporary forms of marginalization.

Natural Sciences and Mathematics

- CHEM 550L, Advanced Inorganic Chemistry Lab. Chem 550L is a capstone synthesis lab, predominantly populated by senior chemistry majors. The research project begins by introducing the students to a topic that most would have not been exposed to. Over the course of multiple weeks (and while we introduce new techniques during the lab phase), we introduce the basic principles underlying this chemistry. These presentations outline what a research question might look like in the context of the project. Once the basics are established, we then break them into small groups of 2-3 students, and more

individualized instruction seeks to stimulate new research questions that could be asked, with the constraints in mind of what can be done in the lab. With the guidance of TAs, the student groups brainstorm ideas and research questions, then design experiments that could be used to answer the questions being asked. The project culminates in a comprehensive lab report detailing findings and an oral presentation on the outcome.

- EXSS 273, Research in Exercise and Sport Science. This course introduces the principles of research in exercise and sport science and related disciplines. In addition to fostering an understanding of the research process, research design, and statistics, students will gain the skills necessary to read and evaluate exercise and sport science research. The course will use examples from peer-reviewed research and mass media. The Group Research Project is comprised of multiple three main components, each of which will include its own assignments. Students will work in groups of 4 (randomly assigned on the first day of class). In this first component, students will investigate an original research question related to EXSS and propose a study. The second research component will help students get comfortable with the analysis and presentation of quantitative data. The third research component will expose students to qualitative data collection and synthesis. Students present findings in writing assignments focused on data presentation, data analysis, and synthesis, as well as reflection on their progress and journeys as novice scientists.

Social Sciences and Global Programs

- ECON 580, Advanced Labor Economics. The course is designed to equip students with a variety of theoretical and empirical tools commonly used in the labor field. The course covers the advanced theory and empirical models of labor supply, human capital, income inequality, and COVID-19-related policies. Using real-world survey data, students conduct independent research. They learn how researchers evaluate policies affecting labor markets, including tax and welfare reforms, education programs, minimum wage and labor regulation, unemployment insurance, etc. Throughout this course, students gain substantial data management skills as well as improve their programming skills in Stata. Students write a research paper that addresses important issues of the U.S. labor market using data from the Current Population Survey, American Community Survey, or another reputable micro-level survey of households. Students estimate an empirical model that addresses the causality and demonstrate at least two new research methods learned during the course. Part of the research project is written in a group of 2-3 students, but each research project also has an individual component. Students present their research during class.
- GEOG 392. Research Methods in Geography. How do we know what we know? On what basis do we distinguish true from false? By what means do we learn about the social and natural world we inhabit? These questions are relevant to geographic inquiry, to professional development, and to enriching our lives as critically informed, thinking people. Grounded in evidence-based reasoning, GEOG 392 introduces research methods and skills to conduct independent research in geography. We start by overviewing themes that will animate the semester-long course: knowledge production, spatial

analysis, epistemology, theory and evidence, and constructing an informed argument. We then work through five research methods ranging from gathering secondary data and doing survey research; to formal and informal interviews; to ethnographic participation and historical inquiry. Students gain hands-on experience generating original data, using quantitative and qualitative methods, and bringing concepts into dialog with evidence. We conclude with a mixed-methods research project that requires each student to submit a written proposal, a public presentation, and a report of approximately 7-8 pages. The assignment also requires students to collaborate on thematic panels, presenting their work conference-style before a class audience.

What best practices should I consider?

Begin with teaching students what the word research means in your discipline and why *you* do research.

Many students don't understand what research is. Consider a first day activity around the question "What is research?" Work with your students to develop a nuanced understanding the multiple facets of research in your discipline. As an instructor, share how you first came to be interested in topics you research; how you develop research questions; how you find and analyze data or sources; and how you've encountered and overcome challenges along the way. Project the excitement and joy of being the first person to ask a question in a new way and to use a unique set of sources to answer that question. Students benefit from your expertise and authenticity.

Recognize that students *can* conduct meaningful, novel research even without prior experience. The key is scaffolding their learning.

Many students are intimidated by the idea of conducting their own research. Students don't realize that they, too, can create new knowledge, with your guidance. You'll be helping your students conduct their own research by explaining, modeling, and facilitating practice of different stages in the research process. Consider an analogy of teaching students to ballroom dance. We wouldn't just talk about dancing, draw diagrams, and then expect students to perform waltzes for a final project worth 30% of their grade. We have to break the dances into smaller steps and give students time to practice those smaller steps with us before we send them on their own.

To teach students how to do research, we should dedicate significant class time to scaffolding and use small assignments to practice parts of the research process or project with students. For example, you might use individual class periods to let students practice asking novel questions, practice analyzing the kind of data or primary sources they will collect, practice providing peer review feedback, etc. By breaking down the parts of research and practicing these steps together, students get the benefit of your immediate, expert feedback as well as interactions with peers. In the end, more students will produce final projects that are higher quality because everyone had equitable access to instruction, rather than relying on what they might already know about research.

Consider what can be accomplished in a semester to balance structure and ownership. Ideally, we might want to give students ownership to develop a novel question, design their own methods for answering their questions, decide how to present the findings, and so on. Realistically, we have only a semester! In some disciplines there will also be real constraints such as safety, equipment, IRB approval, or financial resources. You will have to make some decisions to provide sufficient structure while still giving students opportunities to make decisions and feel ownership over their projects. Over time, you will likely iterate on your own course design and find the right balance to design a transformational experience.

Decide whether individual or group projects are more appropriate for your discipline and your course aims.

Many faculty find that it is most efficient to have students work in groups, because they can share their expert guidance on a smaller set of research questions, analysis methods, and so on. Group work comes with some challenges, particularly around preventing free riders and ensuring equitable grading. Consider using a team contract and rubrics that include contributions to the team.

If you want to have students work on individual projects, consider how to make the workload manageable. You can set bounds on the kinds of questions students can answer by limiting them to a specific data/source base, topic, or set of methods. You might also want to apply for funding for a [Graduate Research Consultant](#), a graduate student with relevant knowledge and training who can support your students' learning for up to 30 hours during the semester.

Design your course around five characteristics of research.

Despite the diversity of research in various disciplines, the framework below—five characteristics of research—can be helpful to faculty in many disciplines. Imagine pitching your Research & Discovery course to a bunch of students you wanted to take your course. How would you describe the ways the research project in your course will hit these five characteristics? For each of these characteristics, what kind of class activities or assignments would help students understand your aims? Your answers here might be useful to share with students in your syllabus.

Five Characteristics of Research

Characteristic	Definition	Questions
Discovery/Novelty	The outcomes of the research should be unknown to both the students and the instructor. Students must make decisions such as how to interpret their data, when to track down an anomaly and when to ignore it as “noise” or when results are sufficiently convincing to draw conclusions. Students’ findings offer some new insight into how the world works.	What might the students discover in this course, and how is it novel? What kinds of activities or assignments would help students appreciate the novelty of the project?
Broadly Relevant	Research provides opportunities for students to build on and contribute to current knowledge; they also present opportunities for impact and action beyond the classroom. In some courses, this may manifest as authorship or acknowledgement in a research publication or students may develop reports/recommendations of interest to the local community.	Why might a broader community beyond the classroom be interested in this research? What kinds of activities or assignments would help students understand the relevance of this research and communicate it to others?
Evidence-Based	Asking questions, building and evaluating models, proposing hypotheses, designing studies, selecting methods, using technical tools of inquiry/investigation, gathering and analyzing data, identifying meaningful variation, navigating the messiness of real-world data, developing and critiquing interpretations and arguments, and communicating findings.	What kind of skills or techniques are students learning? How will you help students learn these skills, perhaps through specific activities or assignments?
Collaboration	Through collaboration, students can improve their work in response to peer feedback. Collaboration also develops important intellectual and communication skills as students verbalize their thinking and practice communicating ideas and interpretation either to fellow	How does the research/learning benefit from student collaboration? Even if students are doing individual projects, how will they help each other through the process?

Characteristic	Definition	Questions
	students in the same discipline or to students in other disciplines.	
Iteration	Students learn by trying, failing, and trying again, and by critiquing one another's work, especially the extent to which claims can be supported by evidence. Students may design, conduct, and interpret an investigation and based on their results, repeat or revise aspects of their work to address problems or inconsistencies, rule out alternative explanations, or gather additional data to support assertions. Students may also build on or revise aspects of other students' investigations, whether within a single course to accumulate a sufficiently large data set for analysis or across successive offerings of the course to measure and manage variation, further test preliminary hypotheses, or increase confidence in previous findings.	How will you provide enough space for students to fail and try again? At what parts of the process will there be this space? How will you help students see iteration as a normal part of research and not a reason to give up?
Adapted from UNC QEP's "About CUREs," which is adapted from <i>CBE Life Sci Educ.</i> 2014 Spring; 13(1):29-40.		

Consider the sustainability of your course.

What will this course look like the first semester you teach it, and will that design be sustainable for the next three times you teach? Will the course need to evolve based on what students in one semester discover, or are there enough new questions to be answered in the structure you have set? Can your students "collaborate" across semesters by building on previous findings, while still asking novel questions?

Recognize that setbacks and failures are part of the research process.

First, know that course still meets the Research & Discovery requirement even if students don't ultimately discover or create something novel. They are still engaging in the research process. Second, help the students prepare for potential setbacks by sharing your own experiences of challenges in answering a research question. Finally, give them an opportunity near the end of the semester to reflect: what worked well about their research process, and what would they change? What further research do they suggest?

Celebrate your students' successes.

Your students should be proud of their work and understand how they have contributed to conversations in your discipline and beyond. The final step in them claiming ownership of their work is having an opportunity to share it with classmates or with the campus community. Ask them to practice explaining the broader relevance of their research as a class exercise. Encourage them to present at the annual Celebration of Undergraduate Research or events within your department.

[Where else can I get help?](#)

The Center for Faculty Excellence is available for [one-on-one consultations](#). Anna Krome-Lukens, Director of Research Curricula in the Office for Undergraduate Research, is also available. You might also find it helpful to talk to colleagues, both in your department and outside, who have developed a course (the full list of Research & Discovery courses is [here](#)).

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