

CURE: Course-Embedded Undergraduate Research Experiences Online

As part of the Faculty Learning Community, eight faculty members designed course-embedded undergraduate research experiences for online or hybrid courses. Each member has summarized their experience below by describing the course, CURE plan and goals, and their own faculty learning reflection.

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DSGN 380 (Hands-On Materials) | Thomas Cline

Course

This is an upper-level elective course fulfilling degree requirements of the School of Architecture and Design in the College of the Arts. The course provides for student investigations into the character, properties, and use of materials in architecture, design, and the arts.

CURE Plan and Goals

Hands-on Materials is an elective course that allows students to explore the material characteristics of various materials and the possibilities of fabrication associated with those materials. As an undergraduate research/scholarship/creative activity experience, we are focusing our efforts on plywood and processes of subtractive manufacture.

We begin the course with discussions of the properties of materials, their typical usages, and the typical means of fabrication. For example, we discuss the manufacture of plywood and explore how that manufacture makes it good for certain things and really inappropriate for others. We discuss plywood from the standpoint of construction, of cabinet making, and of furniture fabrication. I then introduce aspects of digital modeling and fabrication (CNC) and students take this knowledge, supplement it with research, and then design and fabricate a design object based upon the materiality and the process of CNC.

The goals of the course include:

- Employ basic analytic design research methodologies.
- Produce rapid visualizations in multiple iterations on paper.
- Produce digital rapid visualizations in multiple iterations.
- Manipulate three-dimensional form to communicate intentions.
- Synthesize design development into clearly articulated objects.

Faculty Learning

- We need an effective way to ensure that scholarship and creative activity are recognized as valid forms of undergraduate experiences.
- Like research, our student's scholarship and creative activities can be highly effective learning opportunities at the undergraduate level.
- Sometimes, students seem fearful in approaching assessments that have unknown outcomes, i.e., students find that creative expression is much more difficult than organizing and memorizing facts.
- It appears to be quite easy to incorporate CUREs based teaching and learning in a design-based course; it is essentially what designers always do.

EECE 447 (Electrical Machines and Power) | Farzad Ferdowsi

Course

This 400-level class is a required course for Electrical and Computer Engineering students. The class covers fundamentals of electric machines, transformers, converters, three-phase power systems, and power flow analysis.

CURE Plan and Goals

The penetration of distributed generation (DG) sources in power grids is increasing year by year leading to a global competition to develop microgrids in order to enhance the security, reliability, and resilience in electric power systems. Additionally, decarbonization efforts have to accelerate due to the recent aggressive environmental goals (zero emission). In the form of CURE group projects, we conduct research on modern power grids from different aspects. Four groups work on different sub-topics including:

- Develop a unified energy availability/equity in a small community.
- To what extent V2X can bring opportunities and improvements
- The role of AC/DC microgrids in energy availability
- Impacts of hydrogen-based source/storage on the energy delivery and management

The proposed solutions and metrics must be quantifiable and proved in an engineering way.

Faculty Learning

- CURE can really make undergraduate research more inclusive and high impact.
- Evaluating CURE-related deliverables are more challenging than traditional assignments
- It would be awesome to evaluate/measure the impacts of CURE on certain important factors such as students' engagement, students learning, retention, graduation, finding internships/jobs as a direct result of CURE, etc.
- Should it be optional or obligatory. That is a good research question.
- How to motivate both faculty and students to incorporate CURE into curriculum still remains unanswered.

ENGL 334 (Digital Folklore and Culture) | John Laudun

Course

This is an upper-level course that meets the university's general education requirements. While the focus of the course is online behaviors, the course itself meets in person. The course is both an introduction to the study of culture as well as a immersion on the scholarship and science of information flows and social networks.

CURE Plan and Goals

In the course, students work together in groups based on overlapping or mutual research interests. These groups are established in the initial activity of making a research proposal. Students then work collaboratively to produce individual annotation bibliographies, collection descriptions, and drafts of papers and presentations. Final presentations are graded both by the instructor as well as by the entire class, with the grade being averaged across the two factors. Group assignments are dynamic, reflecting the fact that research foci change in response to opportunities, as well as gaps, in data acquisition and/or literature review. The goals include:

- Demonstrate an understanding of the scope of a research project
- Communicate the outcome of a research program, including an appropriately scaled collection of examples (data), clearly presented within the scope of the essay and the presentation.
- Work through the relevant strategies for successful writing: drafting, revising, and proofreading iteratively (and reiteratively).
- Present the research outcomes detailed in the essay in a presentation that focuses on the needs of the audience to want to understand.

Faculty Learning

- CUREs, like other active learning methods, requires more class and course time be dedicated to process: faculty need to gauge what is critical content for the scope of a course and how best to deliver it.
- CUREs are not unlike other kinds of research assignments, but the “results not guaranteed” nature of their exercise require faculty to be willing to be less in control of all facets of their course and to have a framework in place for students who are not prepared to fail (successfully).
- The loss of content may seem irredeemable, but getting students to understand the research process is more important than ever: anecdotes are not the basis for an argument in scholarship and science.
- This may require more coordination at the department level so that not all courses are necessarily “doing” CUREs but that majors are getting at least one CURE-based course in their curriculum (if not multiple).
- There should probably be an effort at the university-level to coordinate CURE-based courses such that all students will enjoy at least one.

HLTH 452 (Introduction to Epidemiology) | Ismatara Reena

Course

This is an upper-level course in the Health Promotion and Wellness (HPW) program in the College of Education and Human Development. The program is fully online. The course provides basic understanding of epidemiology, methods, and study designs with emphasis of critical thinking, use of analytic skills and application of critical research and practice.

CURE Plan and Goals

In the course, students work together in groups (5 student per group) on selected topic related to health and epidemiology provide by the instructor at the beginning of the semester. To ensure success of the groups, they begin the process by creating a common space for collaborative work. The groups will first complete a literature review on their assigned topic. Each student will find three article no older than 10 years and annotate them. Then, they will write a literature review using all 15 articles collectively from all group members. Based on the literature review, group create a research question/s and use data from the resources provided by the instructor to analyze and answer the research question/s. Student will complete method, result, discussion based on the data.

The goals include:

- Work cohesively as a group to complete the literature review. Learn to work collaboratively in the virtual world.
- Develop research question/s based on literature review.
- Collect data, analyze, and write results and discussion/conclusion based on that (Expected). Most group completed literature review and write method, results, discussion/conclusion based on that.
- Create a poster as final deliverable.
- Present the poster to the COEHD Symposium or Undergraduate Research Showcase.

Faculty Learning

- CUREs is a great approach to add research to undergraduate courses.
- Most are already doing some sort of research (individual) in the courses we teach.
- Students hate group work (especially in the online environment) and that is OKAY. Let them hate it and let them figure it out on their OWN. IT was CHALLENGING to motivate students in collaboration.
- It is okay that the outcome of my CURE is not the same as I expected.
- Was interested about CUREs in Non-STEM discipline and keeping it in my priorities to implement in another course using my ADVANCE's Course Improvement Grant!

HSA 410 (Strategic Management in Health Care) | Rachel Ellison

Course

This is an upper-level course in the Health Services Administration program in the College of Nursing and Health Sciences. The program is fully online. The course is an overview of strategic planning in health care organizations with an emphasis on operational level implementation and control.

CURE Plan and Goals:

In the course, students work together in groups to create a strategic plan for a healthcare organization. They begin the process from composing the mission, vision, and value statements to providing data on current trends, benchmarks and measures set by the organization and government agencies. To ensure success of the groups will first complete a literature review on mission, vision, and values of successful (success is determined by data) healthcare organizations in the country. Trends and comparisons will be analyzed. The goals include:

- Work cohesively as a group to complete the literature review.
- Create a mission, vision and values statement based on the literature review.
- Complete a strategic plan for the healthcare organization.
- Present the strategic plans to the department of health sciences.

Faculty Learning

- CUREs is a great approach to add research to undergraduate courses.
- Not as difficult as it may seem to implement. Most are already doing some sort of research in the courses we teach.
- It is okay to not know what the outcome of the CURE will be.
- Students hate group work (especially in the online environment) and that is OKAY. Let them hate it and let them figure it out on their OWN.
- Was skeptical about CUREs but now I am sold!

LCHI 478 (Data Analytics in Healthcare Lab) | Scott Sittig

Course

This is a senior level course in the Health Information Management program in the College of Nursing and Health Sciences. This is a face-to-face lab course that also has an attached lecture course. The course is a hands-on learning lab where students learn various health data analytics techniques and methods.

CURE Plan and Goals

In the course, students work together in groups (4 students per group) to evaluate the persuasiveness of publicly available mobile health applications. They begin the process by completing surveys to evaluate their own self-efficacy, health consciousness, health motivation and big 5 personality. Next, they will review and study Persuasive System Design (I provide lectures on this). Each group will then download a mobile health app and write up an initial hypothesis on the level of persuasiveness of the mobile health app as it relates to engagement. Next, each student will utilize the mobile health app for one week and then document the Persuasive System Design features they find in the app and will complete a perceived persuasiveness questionnaire that I will provide to them. Finally, they will evaluate their perceived persuasiveness score from the questionnaire to determine if their hypothesis is correct. In addition, I will walk through their self-efficacy score, health consciousness, health motivation and big 5 personality scores to show them how individual attributes can impact one's utilization and engagement in mobile health apps. The goals include:

- Individually complete self-efficacy, health consciousness, health motivation and big 5 personality surveys.
- Work cohesively as a group to select a mobile health app for review.
- Establish an initial hypothesis on the persuasiveness of the mobile health app.
- Utilize the mobile health app for one week to review for Persuasive System Design features.
- Evaluate the perceived persuasiveness of the mobile health app to determine the outcome of their initial hypothesis.
- Present the findings to the department of health sciences.

Faculty Learning

- CURE is a great methodology to introduce undergraduate research.
- Most of us are doing various components of a CURE in our existing, so we just need to add a couple more components to meet a full CURE!
- I feel this is a great way to engage students in research while also teaching them the necessary components of the course.
- CURE will also provide a mechanism for our students to share their research with faculty from the college and department.

MGMT 380 (Leadership) | Tammy Hall

Course

This course is an upper-level, elective course in the Management Department in the B.I. Moody College of Business Administration. This course is taught both in face to face and in an asynchronous, online format. The course focuses on the nature and theories of leadership with emphasis on leadership skills and effective leadership behavior.

CURE Plan and Goals

Students will be required to “Explore the significance of crucible experiences in the shaping and development of leaders”. This is a broad topic, but not so broad that student will be disoriented. The instructor will allow the student to choose subtopics and even how crucible experiences influence leaders in subgroups (women, people of color, LGBTQ+, ministry leaders, etc.) This will be a learning process for students to choose a topic that is the right size and also meaningful. The students’ analysis may suggest that crucible experiences play a part in who a leader is (character). Additionally, student could explore whether crucibles tell the whole story of a leader’s development.

Research questions to consider:

- What enable the leader to develop through the crucible moment?
- What was the meaning of the experience to the leader?
- How life experiences impact a leader’s development?

Top of Form

- Students will work in groups of 3 students to create a research project. Students will begin the process with the faculty member in a sort of Research 101 in collaboration with university library personnel. Students will be required to:
- Identify and study a group agreed upon national/international leader who has faced a personal, staff, local or global crisis moment—a transformative experiences through which the individual came to a new or an altered sense of identity.
- Work cohesively as a group to complete a literature review.
- Engage in iterative work meaning that they must trouble-shoot, problem-solve, and repeat aspects of their work for the research to progress.
- Develop a comprehensive research analysis report.
- Communicate their research to a group of stakeholders at a leadership symposium hosted by the College of Business, Management Dept.

Faculty Learning

- CUREs will allow me as a faculty member to accomplish some of my research goals too.
- Relatively easy to implement. I found that in my already existing courses, I gave students many unique opportunities to engage in research more formally.
- I should not be afraid to be more creative in what I assign and how I assess students. There is significant value in the research process in place of objective testing. CUREs are a great way to achieve my intended course goals.
- I did not think this was possible outside of hard/science-based disciplines.

PSYC 200 (Psychological Science) | Erika Caramillo-Hatch

Course

This lower-level course introduces the application of the scientific method to psychology with a focus on critical thinking, research methods, and APA-style writing. It also includes an introduction to professional issues in psychology, including ethics, graduate school, and career paths. The course is taught in-person.

CURE Plan and Goals

In the course, students work together in groups to create a written research proposal about a psychological topic assigned in class. The proposal will include an introduction (with hypothesis), methods, expected results, discussion, and references section. The students will then collect their data and analyze the data with the help of the professor.

- Work cohesively as a group (40 per class, 8 groups) to complete the research proposal and data collection.
- Learn APA style writing and presentation techniques.
- Learn how the IRB works (and receive approval)
- Analyze data using programs such as JMP.
- Present their research at an event like the Psychology Research Showcase.

Faculty Learning

- CUREs is invaluable in the training of future researchers and allows for the hands-on learning required to be successful in their career/graduate school.
- CUREs allows the students to take ownership over their ideas as well as allows them to see the scientific method in action rather than as an abstract concept.
- Group work is hard, doing a CURE in a lower-level course is hard, but I think doing this together will give students the confidence they need to succeed. Different students have different strengths, and they can learn to mentor each other.