Request for Institutional Proposals

CUR Transformations Project

The Council on Undergraduate Research (CUR), with funding from the National Science Foundation, invites proposals from colleges and universities to participate in a four-year project to create cohesive, research-based undergraduate curricula in four science disciplines: biology, chemistry, physics, and psychology.

Undergraduate research is a high-impact practice that benefits students across all demographic groups and disciplines, and it provides even greater gains for students traditionally underserved by higher education. Undergraduate research is a compelling way to meld the interests of faculty to engage in scholarly work with the needs of students for challenging experiences that lead to substantial impacts on their cognitive and affective development.

Yet, with all the progress that has been made, undergraduate research opportunities—including the broader vision of ubiquitous discovery-based curricula—are still often optional and highly selective, missing the very students who could benefit most. Some reasons for this are the high cost of traditional one-on-one and small group apprenticeship models, especially in terms of faculty workload, persistent beliefs that not all undergraduate students are suited for conducting research, and enduring teaching and research cultural constructs that are barriers to change.

To provide *all students* with more equitable access to the benefits of undergraduate research, we will work intensively with 12 institutions and two departments/disciplines from each institution over a sustained four-year period to achieve departmental transformations in both student learning and the overall learning environment at the selected institutions. The CUR Transformations project will assist the selected institutions and departments to integrate research-based curricula into student and faculty cultures as well as into faculty workload and reward systems and to develop expanded undergraduate research assessments.

Over the past two decades, CUR's work with over 600 institutions has led participating institutional teams to generate action plans outlining strategic goals to institutionalize undergraduate research. Significant and large-scale gains in building undergraduate research-supportive practices have been achieved at many institutions, state systems, and public and private consortia. However, it is has become clear that many of the goals included within institutional action plans have been easier to achieve than others.

Almost without exception, one key goal described in each campus plan has been to create a more research-rich, connected, and scaffolded curriculum. However, institutional teams invariably discover that curricular reform requires a long time arc and poses significant challenges, including such barriers as gaining an understanding of the different disciplinary cultures among STEM departments and programs; rethinking faculty workload and reward systems for both tenure-line and non-tenure-line faculty; developing sustainable faculty leadership structures, particularly against a backdrop of administrative/faculty turnover; establishing strong partnerships among faculty, students, and administrators; expanding student participation; scaffolding curricular elements linked to student learning outcomes; and partnering with students to fundamentally change the learning process.

> **Research Questions Driving the CUR Transformations Project**
>
> **1) What effect do student characteristics (e.g., preexisting academic preparation) have on scaffolded integration of undergraduate research into the curriculum and student learning outcomes?**
> - To what extent are students receptive to a research-based curriculum emphasizing discovery, inquiry, and analysis? Does receptivity vary with student characteristics? Do all students value this approach?
> - How do student-learning experiences and outcomes in the scaffolded undergraduate research curriculum vary by student characteristics? Do all students benefit equally from this approach?
> - What is the relationship between students' experiences in an inquiry-driven curriculum and the extent to which departments have integrated the components and outcomes of high-quality undergraduate research?
>
> **2) How do different disciplines/departments effectively integrate the components and outcomes of high-quality undergraduate research to reach more students?**
> - What aspects of different STEM cultures and disciplines/departments support the integration of undergraduate research elements into the undergraduate curriculum? What are the most effective strategies to catalyze a more rapid and enduring transformative change process?
> - What are the best approaches to research-based curricular redesign and faculty support for creating an inclusive change process, particularly for departments that include both tenure/tenure track and non-tenure track faculty?
> - How do faculty members teaching in a scaffolded research-based curriculum monitor the impact of the transformation on student learning?

Through participation in this CUR Transformations project, the selected institutions and departments will directly tackle these challenges within their own institutional and departmental contexts.

Participants will also directly engage in novel research to study the student, faculty, departmental, and disciplinary influences on the process of integrating and scaffolding undergraduate research experiences throughout the curriculum. In particular, we will study two fundamental and interconnected research questions about the effects of integrating the elements of undergraduate research into the curriculum on (a) the student learning experience and (b) departmental culture/change (see side bar).

By engaging in this research, institutions and departmental teams will gain formative feedback for their own work on curricular transformation; develop a better understanding of their student, faculty, and disciplinary cultures; and build the infrastructure needed to sustain their transformative gains over the long-term and to continue building their capacity and mindset for such efforts.

Why Should Your Institution Apply?

Institutions and departments with a strong commitment to undergraduate research who aspire to comprehensively integrate research-based curricula into their student and faculty cultures are the key focus of the CUR Transformations project. If your institution and two of your science departments/ disciplines (biology, chemistry, physics, psychology) share this vision and aspiration, then you should apply. In particular, participating departments and institutions in this CUR Transformation project will achieve the three overarching objectives highlighted below.

Department-wide evidence-based transformations in student learning and the learning environment. The benefits of undergraduate research as a high-impact practice are well documented. As a consequence, departments may seek to provide more equitable access to undergraduate research opportunities and/or to extend the impact of the pedagogy of undergraduate research to a four-year curriculum in their discipline. This project will achieve both objectives by assisting faculty in departments of biology, chemistry, physics, and psychology in designing and implementing a cohesive undergraduate curriculum that initiates students into a culture of inquiry and research in the discipline. Two expert consultants will be matched with each department and will provide oversight and guidance via annual on-site visits and development of annual action plans, ongoing and frequent communication, and annual collaboration meetings of all project participants. These practices will assure a successful and sustainable curricular transformation process.

Pioneering leadership in curricular reform. Departments participating in this project will be key change agents on their campus as well as national and international leaders in the development of a knowledge base on research-infused curricular reform. In particular, each participating department will create a backward-designed curriculum that vertically integrates research experiences through the degree program that intentionally create connections, build on past learning, and achieve outcomes developmentally. Departmental efforts will provide key insights into the effects of curricular transformation on student achievement and organizational and cultural change. By sharing both the successes and challenges experienced during the implementation of curricular reform and the restructuring of faculty workload and leadership models, these departments will serve as exemplars for the broader educational community.

An opportunity for departments and institutions to obtain a deep understanding of student learning in their own contexts. Participants will contribute directly to the creation of new knowledge on fundamental scholarly questions on the effects of integrating the elements of undergraduate research into the curriculum. The CUR Transformations project will examine the effect of student characteristics and disciplinary cultures on student learning, and participants will be able to compare their assessment data with that obtained and benchmarked with nationally validated instruments, including questions on the National Survey of Student Engagement (NSSE) and the Faculty Survey of Student Engagement (FSSE). These surveys will allow for comparison of the institutions involved in this project with national results.

Departments will be assisted in establishing a baseline set of indicators to create a "dashboard" to measure the curricular change process and in collecting on-the-ground evidence of curricular and cultural change within their own institutional and departmental contexts.

Is Your Institution Eligible?

The CUR Transformation project seeks to achieve a well-balanced and diverse group of participating institutions (e.g., public/private, geography, size, mission/Carnegie classification, student demographic served, etc.).

Our target cohort of participant institutions and departments includes those that have already made a clear commitment to undergraduate research (i.e., have existing infrastructure and faculty/administrative buy-in) and have significant capacity for transformative change. However, the departments will not yet have a mature, research-rich curriculum in place but will be committed to comprehensive curricular change and poised to move towards this goal.

Necessary qualifications*.* This call for participation is open to all U.S. institutions of higher education that offer accredited degree programs at the baccalaureate level in at least two of the following disciplines/departments: biology, chemistry, physics, or psychology.

Preferred qualifications. To be competitive for selection, the institution and two departments (chosen by the institution) should have:
- A demonstrated need and readiness of the two departments and the institution for participation in this integrated curriculum, workload, and leadership project;
- A commitment for sustained engagement in this four-year project;
- A clear statement of the current state and future goals for institutionalizing undergraduate research within the two departments and across the entire institution, including an environmental scan/self-assessment. Using the self-assessment tool associated with CUR's *Characteristics of Excellence in Undergraduate Research* document (http://www.cur.org/assets/1/7/CUR-COEUR-2014_Checklist.pdf), the majority of self-responses should be at the "A" or "B" level;
- A deep commitment to, and history of, significant change;
- A strong commitment to equity, inclusion, access, and support for students historically underrepresented in STEM disciplines;
- Aspirations to create program outcomes supported by "backward design" to connect a progression of curricular elements with these outcomes;
- A strong interest in and commitment to transforming degree program curricula to integrate and scaffold undergraduate research experiences throughout the curricula;
- Strong administrative support through the direct participation of deans and/or provosts (i.e., those with resource allocation responsibility);
- Strong faculty support and direct participation of chairs, course coordinators, and curriculum committee members;
- Identification of the departmental team leaders and team members, with a clear commitment to multiple layers of "nested leaders" involved in the planning and implementation stages;
- A strong interest in and commitment to undertaking fundamental research over a sustained four-year period on student, faculty, departmental, and disciplinary influences on the process of integrating and scaffolding undergraduate research experiences throughout the curricula; and
- A commitment to sustaining curricula and policy adaptations developed within departments and institution over the long-term, including after the project activities are completed.

What are the Expectations for Your Participation?

Project participants must be genuinely interested in the aims and research questions driving this project, find relevance of the project focus to their work, value learning from departmental assessment and

research projects that inquire about student learning and faculty culture, and be willing to work collaboratively to transform undergraduate education. Accordingly, participating institutions and departments are expected to commit and deeply engage in the five core components of the project summarized below.

Sustained four-year commitment. This CUR Transformations project will engage institutions and departments for four years in an intensive, consultative process to integrate and scaffold undergraduate research experiences throughout the curriculum to achieve needed transformations in student learning, the curriculum, and departmental culture. The nature of this work demands collaboration throughout the four-year project timeline with: (a) project leadership, including principal investigators and assigned consultants; (b) most importantly, your institutional team of faculty, staff, and administrators across departments; and (c) other participating institutions and departments during annual collaboration meetings.

Teamwork. Participating institutions will establish several leadership groups, including (a) an institutional-level coordinating leadership team, and (b) a departmental leadership team from each department. This type of leadership structure, with multiple–or nested–layers of project history and understanding, is an important project element for ensuring long-term sustained change.

- The *institutional coordinating leadership team* should be composed of (a) a member from each departmental leadership team, (b) the relevant academic dean(s) and/or provost, and, if appropriate given the institutional context, (c) other individuals related to the project's scope (e.g., director of institutional research, director of an undergraduate research office, etc.).
- Each *departmental leadership team* should be composed of between 4-6 members, including those faculty members with relevant roles in the department. At least one member should have resource allocation responsibility (e.g., department chair/head, curriculum committee chair, etc.). Each team should also include either someone with educational expertise (e.g., a departmental faculty member who engages in disciplined-based education research [DBER] or a colleague from an education department, etc.) or someone with assessment expertise. Whereas the entire faculty of each participating department will be deeply involved in the work of curricular and cultural reform, the leadership team will be central to providing the foundation for ongoing department-level change.
- For official project communication, an institutional contact should be identified as well as a designated contact from each departmental team to serve as department leads.

Consultant interaction. CUR has a long history of consultancy-based programs as an effective approach for facilitating institutional progress on action plans and a proven strategy for facilitating transformational change. Each departmental team will be matched with two expert consultants. Consultants will facilitate multi-day departmental site-visits to gather information and conduct interactive workshops focused on developing annual action plans and achieving the project's objectives and goals. Participating institutions and departments are expected to collaborate on the creation of visit agendas, participate fully in meetings and sessions, and take into account and act on consultant feedback. A commitment to teamwork and sustained contact between consultants and departments, and between the two departments at the project institution, are critical expectations of participation.

Scholarly engagement. A central goal of this project is to study two fundamental and interconnected research questions about the effects of integrating the elements of undergraduate research into the curriculum on (a) the student learning experience and (b) departmental culture and change. To this end, participating institutions and departments are expected to fully engage in research activities including: completing readiness inventories and assessments, student and faculty surveys; participating in interviews, focus groups, and so forth; and providing evidence-based data about the effects of undergraduate research-focused curricular transformation on students learning and departments. Departments are expected to facilitate institutional data management, participate in data collection activities, and collaborate on the overall research outcomes, including project deliverables.

Maintaining momentum. To ensure the sustainability of changes in undergraduate research experiences, it is expected that institutions will strive to integrate research-based curricula into student and faculty cultures and reward systems and allocate resources to involve more faculty in the transformation, support scholarly teaching, and sustain and expand the work. A formal sustainability plan will be expected in the submission of the full proposal.

What Support will be Provided to Participating Institutions?

Based on each department's custom needs, we will assign two expert consultants to work with each department over the entire four-year project period. In total, four consultants will be matched to each participating institution.

The consultants and departmental teams will begin their sustained work together at an initial kickoff meeting, which we anticipate will take place in October 2017. Travel support funding will be provided to two (2) representatives from each departmental team to attend this meeting.

Following the October 2017 kickoff meeting, the consultants will make annual, on-site visits to the campuses for four consecutive years (2017-2018, 2018-2019, 2019-2020, 2020-2021). Each departmental site visit will have a two- to three-day duration, and, when possible, we will schedule the two departmental visits for a given institution to occur at the same time in order to achieve maximum synergy. Moreover, to help catalyze departmental activities, we will provide modest funding ($2,000 per department per year) to support each department's strategic innovations. For example, funds could help pilot a new curricular module, support a visiting speaker on the most effective ways to teach undergraduate science, or support the curriculum committee chair to attend a conference on discipline-based education research (DBER). Following each site visit, the consultants will prepare progress reports to be shared with the departmental leadership teams, deans, and provosts of the institutions.

In years 2 through 4 (2018-2019, 2019-2020, 2020-2021), all departmental/institutional teams will participate in an annual collaboration meeting where each team will share their progress, challenges, strategies, initiatives, and outcomes. Travel funding will be provided to support two (2) members of each departmental leadership team to attend these meetings.

What is the Timeline for Selection of Institutions?

Twelve institutions (and two departments/disciplines from each institution) will be selected to participate in the CUR Transformation project. The recruitment and application process includes four stages: (1) an open, national call for proposals to participate, (2) an open pre-proposal stage, (3) an invited full-proposal stage (not all institutions will be invited to submit full-proposals), and (4) an invited interview stage. Key dates are summarized below.

Rolling – Optional expression of interest to apply (https://members.cur.org/members_online/members/surveys.asp) – announcement in early January 2017 electronic newsletter
February 10, 2017 – Informational Webinar for institutions interested in submitting a proposal to participate
March 1, 2017 – Pre-proposal due date
March 15, 2017 – Institutions invited to submit full proposals
May 1, 2017 – Full proposal due date
May 15, 2017 – Institutions invited for video interviews
June 1, 2017 – Institutions selected
October 2017 – Kickoff meeting

What are the Proposal Requirements?

We are excited that you are considering submitting a pre-proposal to participate. We are looking forward to receiving your application and, if you are selected, working with you on this cutting-edge project. In order to help us learn about your institution and departments, please follow the pre-proposal requirements below in providing us with answers to six prompts.

Pre-proposal requirements. The designated institutional contact should submit the institution's pre-proposal electronically through the CUR website by **5:00 pm local time, Wednesday, March 1, 2017** to https://members.cur.org/members_online/submissions/subpayment.asp?cid=211.

Complete applications include two elements: (a) an online form with institutional and demographic information and (b) a narrative statement, which should be uploaded with all elements combined into a single PDF file.

The *online form* will request the following institutional and demographic information:
> Name of institution
> Primary point of contact name, title, address, and email/phone contact information of the institutional representative for this pre-proposal
> Carnegie Classification of the institution (http://carnegieclassifications.iu.edu/)
> Total enrollment (FTES, Headcount) at the institution (undergraduate, graduate)

The *narrative statement* must not exceed 3 pages in length (single spaced, 1" margins, no smaller than 11 point font size), and it should address the following prompts:
1. You have chosen two departments for involvement with this project. Describe why these departments were selected and the process you went through to identify them. What specific activities have you already undertaken to discuss this proposal within each department and more broadly on campus?
2. Help us understand your departmental and institutional demographics. On the student side, how many FTE students are enrolled on campus and approximately how many majors do you graduate in each of the two selected departments each year? For the faculty, describe the number of faculty members in the department and the percentage of courses taught by tenured/tenure-track faculty members and by non-tenure-line faculty members (e.g., adjuncts, lecturers, etc.).
3. Describe your commitment to undergraduate research and how it is manifested in the two departments that you have chosen. You may want to refer to the section in the preamble on Institutional Eligibility/preferred qualifications, where some of the characteristics associated with undergraduate research are listed.
4. Describe your commitment to curricular change. You may want to give an example of a recently achieved curriculum change in each department and how the change was accomplished.
5. This project is driven by the research questions presented in the preamble to this document. Why are these research questions of interest to your departments?
6. Assessment is a large component of this project. Describe your willingness and the capacity you have in place (this could be found within the departments or more broadly on campus) to engage in thoughtful assessment and collect the data expected in this project. Specifically refer to your ability to focus on student success and learning areas.

Full-proposal requirements. The detailed requirements for the full-proposal will be sent to institutions invited to submit full proposals on March 15, 2017. In order to engage your departmental and institutional colleagues in the needed planning conversations for submission of the full-proposal, an outline of key questions that will be included in the full-proposal is as follows:
1. You will be asked to expand on your responses to the six prompts included in the pre-proposal.
2. You will be asked to describe your:
    a. Departmental curricula, your goals for curricular change related to this project, and the departmental and institutional structures/policies related to making these changes.

b. Departmental and institutional faculty workload model, reappointment, tenure, & promotion processes, and the structures/policies related to making changes to these.

c. Departmental and institutional cultures and how these connect with your capacity for making changes to curricula, faculty workload and leadership models, and faculty recognition and reward structures.

d. Departmental and institutional capacity for exploring project research questions and for assuming expectations for assessment and improvement of student learning.

e. Departmental and institutional commitment to long-term, sustained engagement in the project and via a formal sustainability plan.

3. You will be asked to perform an environmental scan/self-assessment benchmarked against CUR's *Characteristics of Excellence in Undergraduate Research* document (http://www.cur.org/assets/1/7/CUR-COEUR-2014_Checklist.pdf).

4. You will be asked to identify the members of the coordinating institutional leadership team and each departmental leadership team. In particular, the departmental team leaders and team members should be named and rationale provided about why these individuals were chosen. You will be asked to describe your clear commitment to multiple layers of "nested leaders" involved in the planning and implementation stages, including provision for non-tenure-track faculty leadership and participation.

The deadline for submission of full-proposals will be May 1, 2017.

Acknowledgements

The CUR Transformations Project is led by Elizabeth L. Ambos (CUR), Kerry K. Karukstis (Harvey Mudd College), Jillian Kinzie (Indiana University), Mitchell R. Malachowski (University of San Diego), and Jeffrey M. Osborn (The College of New Jersey).