CUREs and other Experiential Courses at PUIs

As part of the NISE Program for Undergraduate Students

Background & Context

The following is an excerpt from our successful proposal:

Course-based undergraduate research experiences (CUREs) are an effective way to expose students to authentic research early in their academic careers (e.g. Brownell et al., 2015, Elgin et al., 2016). CUREs have been shown to have a variety of positive impacts, including STEM interest, motivation, persistence and retention of diversity in STEM (e.g. Shuster et al., 2019, Auchincloss et al., 2014, Duboue et al., 2022, Bangera and Brownell, 2014), and may lay the groundwork for more successful mentored research experiences (Fendos et al., 2022). NM-INBRE has a wealth of expertise with CUREs in our network, including expertise with the Tiny Earth program (Hurley et al., 2021), iGEM (iGEM, n.d.) SEA-PHAGES (SEA-PHAGES, n.d.), Fly-CURE (Merkle et al., 2023) and various faculty- and student-driven CUREs (e.g. Shuster et al., 2019). We are also familiar with other CURE models that we would support, e.g. PARE (Genne-Bacon and Bascom-Slack, 2018; Fuhrmeister et al., 2021), and Small World initiative (Davis et al., 2017). These latter two are of particular interest for our network, as they (like Tiny Earth) address pressing, real-world problems that may be particularly engaging for Native American and Hispanic students (e.g. Chow-Garcia et al., 2022, Estrada et al., 2011). We are thus well-positioned to support the expansion of CUREs throughout the network. In addition to CUREs, we would support the development and implementation of other experiential courses by PUI partners, including e.g. service-learning courses that may focus on socio-scientific issues of local concern (e.g. water and water quality in New Mexico), or on some form of STEM outreach to schools or local communities.

ELP Application 2024

A. **Planning Projects:** Funds may be requested to develop (plan) a new CURE or other research-related or experiential course/curricular activities

B. **Implementation Awards:** Funds may be requested to implement a CURE or other research-related or experiential course/curricular activity

General Expectations:

- These are for degree-seeking undergraduate students. Courses for graduate students are not allowed in this mechanism
- The experience is in the form of a STEM-related course, with the expectation that the course will be taken for credit to enhance accessibility of the research/related experience to all students
- Ideally, the entire course will be designed to provide students with an authentic research or related experience. Minimally, the research/related experience will be a substantial component of the course

- The experience is intended to stimulate interest in research, enhance intention to persist and retention in STEM, and contribute to a sense of belongingness in STEM
- Tangible outcomes and/or products will be available and reported on. These include, but are not limited to: Number of participating students, gender, race/ethnicity, students' plans after graduation
- Participating students will be tracked for persistence through their undergraduate career (year-to year retention, graduation, major (STEM or non-STEM) on an annual basis as part of each institutional annual report
- Reflection on the course/curricular activity by the instructor (what worked, what didn't work, what changes need to be made, perceived impact on students)
- Assessment of the extent to which students met the intended course outcomes, e.g. research skills, communication skills etc.
- Evaluation of the course activity in terms of stimulating interest in research, intention to persist, sense of belonging by participating students beyond standard end-of-semester student evaluations of course satisfaction

Survey Questions in RedCap

Have you discussed the request for ELP funding with your institutional liason? Complete list of liaisons can be found on the NM-INBRE website

Contact Information

- Your First Name
- Your Last Name
- Email Address
- Because only PUI partners are eligible to apply for a Planning Project or Implementation Award, please select the institution that you are associated with:
- What is the name of your department at your institution?
- What is your position?

Application Information

- What type of INBRE support are you seeking (planning or implementation)?

A: Requesting a Planning Project

- Course name/discipline area:
- Course level: Intro, Lower Division, Upper Division
- Is this course required? If yes, for whom? Explain
- Does this course satisfy a degree requirement? If yes, which degrees?
- What is the course delivery format? In-person, Hybrid, Other
- If other, please explain
- Anticipated enrollment (number of students)
- What will be the frequency of offering the course?
- In which semester will the course be offered for the first time?
- Please provide a brief description of the planned course/curricular activities and how they meet the general INBRE expectations described above
- Are you committed to teach the course at least two times in the INBRE-5 cycle (April 1, 2024-March 31, 2029)?
- Are you committed to carrying out an evaluation of the course activity in terms of stimulating interest in research, intention to persist, sense of belonging by participating students beyond standard end-of semester student evaluations of course satisfactions? Yes/No
- Please provide an itemized estimate of the budget to plan the course (e.g. instructor release time or summer salary). Please download the example below.

  Allowable budget categories:
  - Salary and wages (for faculty, staff, or students)
  - Faculty course release time or reallocation of effort for the development of the activity
  - Supplies
  - Sequencing and/or other research services
  - Poster printing for students to present research (in-house or at a local/regional symposium)
  - Travel for students to present at the NM-INBRE symposium or other scientific conference
  - Capitalized equipment (must discuss first with Shelley Lusetti, this generally requires advanced approval from NIH)

NIH Detailed Budget Justification Example

Detailed Budget For Initial Budget Period

Please re-upload the completed Detailed Budget form

- Please provide a letter of support from the Department Chair that indicates their willingness to offer the course and detail any conditions which must be met.

B: Requesting an Implementation Award

- Course name/discipline:
- Course level: Intro, Lower Division, Upper Division
- Is this course required? If yes, for whom? Explain
- Does this course satisfy a degree requirement? If yes, which degrees?
- What is the course delivery format? In-person, Hybrid, Other
- If other, please explain
- Anticipated enrollment (number of students)
- When will the course first be offered (term and year)? Example: Spring 2025
- How many times will the course be offered in the next 3 years (reporting will be required at the end of each term)?
- What will be the anticipated learning outcome for the course/curricular activity? E.g. students will be able to learn….
- Please provide a brief description of the course activities:
    - How the activities are consistent with authentic research and/or related engagement
    - How the activities will support students to meet the learning outcomes
    - How the activities will support students to meet the NISE expectations of interest in research, persistence, retention and sense of belonging in STEM
- Please provide an assessment plan to demonstrate to what extent students will meet the learning outcomes e.g. plans for projects, presentations, assignments and accompanying assessment rubrics to capture meaningful learning).You may upload rubrics or other assessment instruments
- Optional file upload for any rubrics or other assessment instruments
- Please provide an evaluation plan to determine how the course/activity will promote student interest in research, a sense of belonging in STEM, intention to persist and retention through the course and beyond. This will include a plan for tracking students
- Please provide an itemized estimated budget for a single course offering (e.g. instructor release time or summer salary). Please download the example below.

  Allowable budget categories:
    - Salary and wages (for faculty, staff, or students)
    - Faculty course release time or reallocation of effort for development of the activity
    - Supplies
    - Sequencing and/or other research services
    - Poster printing for students to present research (in-house or at local/regional symposium)
    - Travel for students to present at the NM-INBRE symposium or other scientific conference

- Capitalized equipment (must discuss first with Shelley Lusetti, this genrally requires advanced approval from NIH)

NIH Detailed Budget Justification Example

Detailed Budget For Initial Budget Period

- Please provide a letter of support from the Department Chair that explains how the course fits into the department goals and includes their willingness to offer the course.

References:

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Hurley, A. et al. Tiny Earth: A Big Idea for STEM Education and Antibiotic Discovery. mBio 12, doi:10.1128/mBio.03432-20 (2021).

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