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Request For Proposals (RFP): Resources for Evidence-based Laboratory Experience Development (REED) – Fall 2014

Overview – This is a Request for Proposals (RFP) funded by a CUNY Office of Academic Affairs Student Success grant. This RFP is soliciting proposals from one or more full-time faculty for funding to support development of new laboratory experiences, incorporating evidence-based pedagogy such as guided inquiry and/or authentic research experiences. The goal is to create/modify laboratory exercises to enhance student learning and engagement and evaluate the effectiveness of the new materials. A focus on introductory laboratory courses is encouraged.

One promising approach for improving laboratory content and pedagogy is through incorporation of authentic research experiences. The Council on Undergraduate Research (CUR) defines undergraduate research as, “An inquiry or investigation conducted by an undergraduate student that makes an original intellectual or creative contribution to the discipline (www.cur.org).” City Tech actively affirms the importance of undergraduate research as highly effective pedagogy with many educational benefits to students, faculty and the wider research community. Such merits include retention in undergraduate education, development of career interests and the advancement of faculty scholarship. Widely accepted as a high-impact pedagogical practice, the integration of research and education is designated as one of the three core strategies guiding the priorities of the National Science Foundation and was highlighted throughout the work of the Innovation through Institutional Integration (aka I3) grant at City Tech.

Studies have also shown that students who learn in an inquiry-based environment, with the essential components being, (1) question, (2) explain, (3) connect and (4) communicate, develop positive attitudes toward science and are often motivated to learn about science (Kubicek 2005, Brown 2000). One possible approach for introducing inquiry-based pedagogy is through the Advancing Science by Enhancing Laboratory Learning (ASELL) model. The ASELL model encourages faculty to work in teams with students in a professional development capacity to revise laboratory activities to include the essential features of inquiry learning. An inquiry-based approach to learning has been described by the National Resource Council as a means for students to acquire skills to critically evaluate scientific data and models and to understand what it means to participate in the scientific community (NRC 2000, 2001). The essential features of inquiry detailed in *Inquiry and the National Science Education Standards* have been used to operationally define inquiry as follows (NRC 2000):

1. The material engages learners in scientifically oriented questions.
2. The material asks learners to give priority to evidence.
3. The material encourages learners to formulate explanations from evidence.
4. The material compels learners to evaluate their explanations in light of alternative explanations.
5. The material expects learners to communicate and justify their proposed explanations.

The timetable for funded activities includes curricular development in fall 2014 with implementation and evaluation in spring 2015.

Goals – The overall goal of the project is to promote student learning and engagement in laboratory courses through introduction of evidence-based pedagogy and new activities, ideally reflecting current practices in the workforce. Awards will support the development of several new laboratories that employ evidence-based practices. Specifically, the RFP aspires to:

1. Support and enable faculty to design, implement and sustain new laboratory exercises that incorporate evidence-based practices such as inquiry-based laboratories that incorporate authentic research.
2. Utilize student laboratory work as a platform for broadening participation in research.
3. Increase the vibrancy of the research culture at the college by the creation of research-supportive curricula.
4. Establish a community of practice of laboratory educators at City Tech.
5. Move students from teacher-and-material-directed learning to a more self-directed learning model.

Eligibility – Full-time faculty, who will be teaching a laboratory course in spring 2015, are eligible to apply. One or more sections should implement the new materials by spring 2015

Budgetary Information – Funding up to \$10,000 is available. Funds must be encumbered by March 1, 2015 and used before June 1, 2015. Allowable expenses include student stipends, equipment, supplies, and travel for activities such as conference attendance or consultation.

Proposal Preparation and Submissions – Proposals may be up to 6 pages, single-spaced, 12 font, and address the following:

1. Describe the current laboratory course, and where the new laboratory exercises will fit into the curriculum.
2. Describe the current laboratory exercises to be replaced. Provide the rationale and the need for an update. Describe the planned new activities and anticipated assignments. Explain how the new laboratory will meet the RFP goals, ie clearly indicate how the new labs will incorporate evidence-based learning and teaching methodologies. Include a table showing the current labs, the proposed labs and the current and proposed learning outcomes.
3. Explain how students will be prepared for the new format.
4. Discuss how activities will be coordinated.
5. Discuss needed resources.
6. Describe the related previous and current activities (research, mentoring, etc.) of the proposer(s) and how this work will build on prior scholarship and professional development.
7. Describe the implementation plan for incorporation of the new labs. Faculty should plan on incorporating all new labs into their laboratory courses by spring 2015. Provide a timeline for implementation and include specific deadlines and deliverables for the project.
8. Describe the evaluation plan. What are your goals and how will you know what you are doing is working? Possible instruments include: “Motivated Strategies of Learning Questionnaire (MSLQ)” to evaluate student attitudes or metacognition; “Student Assessment of Learning Gains (SALG)” to evaluate student attitudes.
9. How will you disseminate the results of your work? Possible examples include presentation at a departmental meeting, conference, etc.

10. Provide a budget and justification for proposed expenses.

Additional Requirements – Letter of support from the departmental chair indicating that the department’s Curriculum Committee supports the development of new, inquiry-based, laboratory exercises and that there are plans for the faculty member(s) submitting the proposal to teach the laboratory course in spring 2015. Application for IRB exemption/approval, if needed. Final report due June 25, 2014 (three pages maximum). summarizing activities and any outcomes.

Review Process: Sub-committees of the Undergraduate Research Committee will be formed for preliminary review. The full committee will vote on recommendations, which will require a majority of those voting. Review criteria includes the enhancement of learning outcomes of the proposed activities, the completeness of the project management plan, the likelihood of achieving the stated goals with the available resources, the qualifications of the proposer(s), including the quality of prior work; and the potential value of the proposed activities to the larger City Tech community.

Possible Resources: Advancing Science by Enhancing Learning in the Laboratory (ASELL) website: www.asell.org. Council of Undergraduate Research website: www.cur.org.

Deadline and Notification: Full proposals are due Monday, September 29, 2014, at 5 pm. Proposers will be notified by October 10, 2014. Please submit applications to Associate Provost Pamela Brown: pbrown@citytech.cuny.edu. Subject: REED

¹Council of Undergraduate Research “About” website, http://www.cur.org/about_cur (accessed 11/3/13)

²National Science Foundation, Proposal and Award Policies and Proposal Preparation Guidelines, Part 1. <http://www.nsf.gov/pubs/policydocs/pappguide/nsf13001/gpgprint.pdf> (accessed 11/3/13)

³Council of Undergraduate Research homepage, <http://www.cur.org> (accessed 11/3/13)