APPLICATION FOR TRESTLE SCHOLARS PROGRAM

TRANSFORMING EDUCATION, SUPPORTING TEACHING AND LEARNING EXCELLENCE

Date: March 30, 2016
To: Department Chairs and Science Education Initiative points of contact
From: Stephanie Chasteen, Science Education Initiative (SEI) & Center for STEM Learning (CSL)
Contact: chasteen@colorado.edu.
Proposal Deadline: June 1, 2016
Program duration: Fall 2016, with option to continue for Spring 2017
Topics: Course transformation, learning goals and curricular design, or activity design and facilitation.
TRESTLE Website: https://www.colorado.edu/csl/TRESTLE

SUMMARY
The TRESTLE Scholar program is for departments and faculty who have not previously engaged deeply in course transformation or teaching with active learning, though is open to all STEM instructors with an interest. This is intended to be an opportunity to "get your feet wet" with evidence-based teaching practices. As a TRESTLE Scholar, you will engage in community-based learning experiences for 1-2 semesters. With the support and resources of the project and the sanction of the department, faculty can more successfully incorporate new teaching strategies; enhancing student learning, supporting career and tenure, and impacting departmental approaches to teaching and learning. This type of work can prepare you for more intensive course design projects, such as a Chancellor's Award, use of Learning Assistants, or a TRESTLE Type II proposal.

We welcome applications from individual faculty, groups of faculty, or departmental cohorts interested in the following topics:

- Learning goals and curricular design
- Course transformation
- Activity design and facilitation

TRESTLE Scholar communities will be facilitated by Jenny Knight (MCDB), Amanda McAndrew (ASSETT), and/or Joanna Weidler-Lewis (EDUC).

The TRESTLE Scholar Award is for a period of one year, beginning August 15, 2016. The deadline for submissions is June 1, 2016.
BACKGROUND

There is a substantial and growing body of research, both from cognitive psychology and from college-level STEM classrooms, that has identified several pedagogical approaches that are significantly more effective than the traditional lecture-based format used in most STEM teaching today\textsuperscript{1,2,3,4}. The STEM pedagogies that have been shown to be effective emphasize student-centric practices that stress active learning, with much more interaction among students, and between students and instructors, than in the traditional lecture-based format. These methods emphasize building a course backwards from carefully articulated learning goals for the course as a whole, and incorporating fine-grained, real-time assessment of student learning in relation to the learning goals. Active-learning in particular has been shown to dramatically decrease student failure rates in STEM courses, as well as to improve student learning outcomes and conceptual understanding.

Motivated by this research, recent national reports\textsuperscript{2,5} have called on universities and colleges to respond to the enormous opportunity that exists to improve college-level STEM teaching. Here at the University of Colorado, we have engaged in major initiatives to improve undergraduate STEM education – the Science Education Initiative (SEI) (initiated by Dr. Carl Wieman, funded postdoctoral fellows in 7 STEM departments over 8 years, including APS, PHYS, EBIO, IPHY, GEOL, MCDB and CHEM), and the Association of American Universities (AAU) STEM Initiative (currently active on campus). These campus initiatives have led to many improvements in our STEM undergraduate courses\textsuperscript{6} and institutional structures.

However, there is much more to be done. We have an opportunity at CU-Boulder, if we act now, to leverage this national interest and our growing local expertise to develop high-quality course experiences for our students, increasing learning and outcomes for all students. Furthermore, the Chancellor has recently identified persistence and retention as a campus priority – a challenge well-aligned with curricular improvements.

The current grant (TRESTLE) is a project of the Center for STEM Learning (CSL), and was developed as part of a multi-institution consortium (the Bay View Alliance) interested in improving teaching and learning at their respective campuses, with the Science Education Initiative as one strong model for how this might be accomplished. The TRESTLE grant is intended to build on the expertise on CU Boulder’s campus to support further STEM course development work and educational scholarship.

The TRESTLE project supports the transformation of courses to include evidence-based teaching practice, such as active learning and assessment-driven instruction. The intent of the project is to build on prior gains in teaching excellence, and help initiate additional departments and faculty into STEM educational scholarship at CU Boulder. We support the TRESTLE Scholars Program, as well as Type II grants for more experienced faculty leaders, supporting development of a transformed course. More information on the TRESTLE website.

\textsuperscript{3} Freeman et al., (2014) "Active learning increases student performance...", PNAS, 222, 8410-8415.
\textsuperscript{4} For more detail, see the reference above and \url{http://www.cwsei.ubc.ca/resources/course_transformation.htm}.
\textsuperscript{5} President’s Council of Advisors on Science and Technology (PCAST)
What is the TRESTLE Scholars Program?

TRESTLE Scholars will engage in a 1-2 semester Faculty Learning Community (FLC), where they will be given opportunity to learn about evidence-based teaching practices, observe them in action, be observed as they try out these techniques, and receive real-time feedback. Each FLC will be designed to suit the needs of the participants. In a supportive community, members can experiment with new approaches to teaching and learning. All instructors of record are welcome to participate. There is no financial incentive for participation, but we encourage Chairs to offer appropriate rewards for participation.

For example, a department may wish to initiate a reform of a core introductory course by encouraging faculty teaching those courses to engage in a learning community aimed at course redesign. A department engaging in a redesign of the major may wish to request that faculty teaching the core required courses collaborate on developing a set of learning outcomes for those courses. Or, a curious individual faculty member may wish to learn about and experiment with active learning through developing a single “teachable unit,” which is implemented at the end of the semester. These are just potential examples.

If you are submitting a proposal as a department, we strongly recommend setting up an appointment with Stephanie Chasteen discuss the proposal, and/or inviting Dr. Chasteen to introduce the project at a faculty meeting.

Expectations of TRESTLE Scholars

1. **Attend active learning boot-camp.** We will offer an intensive “boot camp” experience (a half- or full-day of workshops and activities around active learning) in August (either the first week of August, the first week of classes, or the weekend of August 27th) to provide an introduction to evidence-based teaching practices and generate ideas for the learning community activities.

2. **Participate in TRESTLE Scholars learning community.** The main support provided will be a faculty learning community, which will meet every two weeks for at least one semester, with option to continue for an additional semester, supporting participants in exploring and implementing active learning techniques. Regular attendance and participation is expected, including collaboration with other participants.

3. **Share work arising from the learning community.** Participants in a faculty learning community will collectively decide on the output or outcomes of that community – which may be collaborative (e.g., a project or report) or individual (e.g., an active learning unit for the course). This work must be made public in some way, through sharing locally with the department and faculty, presenting at an appropriate campus symposium, as well as posting on the CSL website.

4. **Submit annual report and attend annual gathering.** Participants will attend an annual gathering of all TRESTLE project participants, and submit a short report on their experiences.

5. **Participate in evaluation measures.** Participants will complete a survey about their teaching practices before and after the course transformation. Classroom practices may be observed using a structured observational tool, and faculty will be asked to submit their syllabus and report on basic statistics relevant to any affected courses. The department as a whole will be requested to complete a survey about departmental teaching climate (it is recommended that this be encouraged by the Chair).
APPLICATION (1-3 PAGES)

Submit your proposals online at https://www.colorado.edu/csl/TRESTLE by June 1, 2016. Notifications will be made by June 30, 2016. Proposal acceptance is dependent upon scheduling and staffing constraints (i.e., whether we have personnel able to address the particular needs described, and finding a common meeting time).

1. **Person submitting.** Provide name, title, contact info, and department of person submitting the proposal.
2. **Experience.** Have you attempted course redesign in the past, or experimented with different techniques?
3. **Rationale for involvement.** What is the reason for the departmental (or faculty) interest in exploring evidence-based teaching practices?
4. **Your needs.** What specific challenge(s) would you like to address in your courses? In what way do you think the learning community could help?
5. **Scheduling constraints.** List all the times when you are regularly available during each week of the Spring 2016 semester. If availability depends on the week (i.e., only 1st and 3rd Mondays) please indicate. When would you be available for a boot camp? (First week of August, first week of classes, weekend of Aug. 27th?)
6. **Agreement to expectations.** Do you agree to fulfill the "expectations of successful applicants," above?
7. **Departmental recognition.** Will the department publicly recognize your commitment to teaching scholarship and excellence that serves the campus commitment to educational effectiveness, through merit, tenure and promotion, or other appropriate venues?
8. **Departmental support (optional).** Departmental submissions are encouraged (e.g., a proposal from the Department Chair on behalf of a group of faculty). However, proposals should be faculty-driven (i.e., arising from true interest on part of the faculty, rather than a departmental mandate). Individual faculty members are also welcome to apply. For departments requesting that a group of faculty participate in a learning community, we request that the department fund some modest refreshments for those meetings, and/or consider any appropriate incentives for faculty participants.
9. **Topic(s) of interest.** Which of the following topics are you MOST interested in exploring as a TRESTLE Scholar (you may choose multiple topics; we will create a community that best suits the needs of the applicants).

  - **Learning goals and curricular design**
    How can my department create clear course learning goals which encompass our vision for student learning, and make sure students build these skills across a coherent curriculum? This learning community will guide curricular designers through the process of backwards design at the curricular level, and is most appropriate for departmentally-backed cohorts of faculty.

  - **Course transformation**
    How do I develop clear learning goals from my students, and how do I develop learning activities that stem from those goals? What assessment measures can I use to measure student learning? This learning community will provide structured experience with backwards course design, assessment-driven instruction, and active learning, focused at the course level.

  - **Activity design and facilitation**
    I know that I want to design group activities for lecture or recitation, but I don’t know how to make it successful. What learning goals are best served by such activities? How do I make a great worksheet? How do I facilitate group learning? How do I make sure students understand what is expected of them? This learning community will focus on this specific instructional technique.

  - **Other:**

    ![Center for STEM Learning](image_url)

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