UTMOST: Undergraduate Teaching of Mathematics with Open Software and Textbooks

Call for Participation

October 2017

The UTMOST Project investigates the affordances and challenges of integrating powerful open source software for mathematics into open source textbooks and course materials that are available in a variety of formats. The project seeks to understand the ways in which these tools change instruction in undergraduate mathematics courses and create new learning opportunities.

We are proposing a four-year research project to the National Science Foundation's Improving Undergraduate STEM Education (IUSE) program and are looking for the participation of faculty who teach undergraduate mathematics. We are looking for faculty interested in teaching using these textbooks and materials as part of the research study.

Activities   Interested faculty will

- Teach an undergraduate course in first-semester calculus, linear algebra, or abstract algebra, using the online versions of the open source textbooks *Active Calculus*, *A First Course in Linear Algebra*, or *Abstract Algebra: Theory and Applications*, initially during the 2019 calendar year.

- Use the open source Sage system (linear or abstract algebra) or the WeB-WorK exercises (calculus). The textbooks contain abundant resources to assist with this. A handful of courses will use PDF versions of the textbooks, without incorporating Sage, and will act as "control" sections for the study.

- Participate in data collection, specifically: administer student surveys and tests of student knowledge; log course activities and take part in interviews; help with recruitment for student focus groups, and help secure some relevant student data. In addition we seek sections of these courses to conduct more intensive data collection on lesson-planning and instruction via direct observation through visits to your campus by members of the UTMOST team.

- Attend an annual workshop that will be scheduled for early summer each year of the project.

Stipends and Benefits   Participating faculty will receive

- A $1,000 stipend per-course, and up to $2,500 for sites with more intensive data collection.

- CoCalc (`cocalc.com`) course subscriptions for courses using Sage extensively, along with a 12-month personal faculty subscription.

- Transportation, lodging, and a per-diem to attend the early summer workshops.

Application

- Review the corresponding textbook carefully to be certain it is compatible with your institution's course.

  - Active Calculus is an active learning approach to calculus, with embedded WeBWorK exercises. A first-semester course might be Chapters 1—4.
  - A First Course in Linear Algebra is an introductory course designed for mathematics majors, with a significant emphasis on theorems and proofs, and with extensive material on the use of Sage.
  - Abstract Algebra: Theory and Applications is an upper-division "proofs-first" approach, sufficient for a two-semester course, or could be sampled for a one-semester course. It has extensive material on the use of Sage, along with extensive Sage exercises.

- Provide a short statement that describes

  - which course(s) you could teach with these textbooks and exactly which semester(s) or quarter(s) you would be able to participate. Indicate whether you are interested in using the online version and/or the PDF version of the textbook
  - your experience teaching these courses
  - your experience using mathematical software in courses (e.g., names of software systems and courses)
  - in particular, your experience with Sage, CoCalc, and/or WeBWorK.

  We are looking to have as wide a variety as possible of experience levels, so these are not meant to be viewed as qualifications.

- Include a description of your college or university, and of the student population for the relevant courses (e.g. public/private, undergraduate enrollment, 2-year/4-year, liberal arts/engineering/technical, etc.). We are especially interested in having faculty who teach at minority serving institutions included in the study. If your institution is listed on the US Department of Education list of Accredited Postsecondary Minority Institutions, please make explicit mention of that.

- It will be possible, and in some cases desirable, to have several courses at the same institution, taught by the same individual faculty or by more than one faculty member. These can be combined into a single application.

- We are only able to work with faculty teaching at US institutions.

- Provide a short letter on letterhead from your department chair (or similar head officer) addressing the following:

  - The department is aware of the program activities and requirements.
  - The department is aware the course might be conducted differently from other sections at your institution.

- That every effort will be made to schedule the necessary courses during the terms described.

- That enrollment patterns suggest the course is highly unlikely to be canceled for low enrollment.

- Email your application and chair's letter as two PDF attachments to Rob Beezer, `beezer@pugetsound.edu`, on or before October 31, 2017. Faculty and institutions selected will be notified and included in our proposal, but participation will be subject to the level of funding (decision expected Summer 2018).

Inquiries should be addressed *together to both* Rob Beezer, `beezer@pugetsound.edu` and Vilma Mesa, `vmesa@umich.edu`.