

## UTMOST STATEMENT - TOM EDGAR

I am an associate professor at Pacific Lutheran University, a small, private, comprehensive university in Tacoma, Washington. We graduate approximately 20-25 mathematics majors per year. We have many first generation college students and a large population of nontraditional students, with many coming from the army or air force due to our proximity to Joint Base Lewis-McChord.

I am interested in participating in the UTMOST project by teaching abstract algebra. I have taught our algebra course, Math 433, four times during my six years at PLU, and I will teach the class during Fall 2016 again. We almost always offer only one section of this course each fall with about 20-25 students. During Fall 2009 and Fall 2010, I used Fraleigh's textbook as a primary source, Goodman and Gallian as secondary sources, and supplemented heavily with my own inquiry-based activities. During Fall 2012, I replaced a sick professor early in the semester so I used her preliminary version of a textbook. I was generally not happy with any of these texts and so the most recent time I taught the course, Fall 2013, I used the open-source "Abstract Algebra: Theory and Applications" by Judson, which is to be used for this proposal. I enjoyed using this text; my students particularly enjoyed the section on cryptography; we implemented some of the ideas in that chapter using Sage. I still make heavy use of my inquiry activities, and I have often thought about using Sage more extensively in this class to enhance and improve my activities.

I have had experience using Maple, Mathematica, Matlab, and Sage in calculus-level courses. In particular as an undergraduate and graduate student, I was a TA or instructor for calculus labs using Mathematica, Maple and Matlab. During my time at PLU, I have used Sage regularly in Calculus I, Calculus II and Calculus III, especially using the single-cell Sage server and the interact feature. Moreover, I have used Sage extensively in Math 331: Linear Algebra. I received a Teaching and Learning with Technology grant from PLU in 2011 to develop Sage projects and online tutorial videos for using Sage in my linear algebra class. I have continued to use and improve those activities in my classes. My linear algebra students generally enjoy working with Sage and SageMathCloud, and in these classes nearly all of the software work is done outside of class time.

Due to my success using Sage in linear algebra courses, I have introduced the use of Sage in a variety of other courses as well. During our January term in 2014 and 2015, I taught a "mathematics for the liberal arts" class (Math 107) where we discussed the mathematics of secure communication. I made extensive use of SageMathCloud and the single-cell Sage server in order for non-math majors to learn some basic computer science and its relation to cryptography. I developed approximately seven Sage "software sheets" for explorations including the Euclidean Algorithm, simple substitution ciphers, the Vigenère cipher, the Hill Cipher, and the RSA method of encryption. Most recently, I wrote and used Sage projects in Math 245: Discrete Mathematics. These projects helped students learn Sage and Python while exploring elementary ideas in number theory, combinatorics, graph theory, and set theory as well as in general mathematical and logical foundations. I have only used Sage for about a week in abstract algebra, as mentioned above, but I look forward to the opportunity to further incorporate the software for exploring groups and rings. I will likely attempt this during Fall of 2016 regardless of the outcome of this proposal. Finally, I have never used the course tools now provided in SageMathCloud, but I look forward to learning more about them.

As a final note, I also have used Sage substantially for my own research as well as research with undergraduates. I regularly contribute programs written in Sage to the Online Encyclopedia of Integer Sequences, for which I am an associate editor. I used Sage in summer 2012 and SageMathCloud during Summer 2014 while working with undergraduates on projects about partial orders on the natural numbers. Helping students learn to program in the Sage environment is a major part of my undergraduate research projects, and I plan to continue this during two NSF-funded REU projects in summers 2017 and summer 2018.



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Robert Beezer  
University of Puget Sound  
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Dear Dr. Beezer,

I write to notify you that the Department of Mathematics at Pacific Lutheran University, which I currently chair, is aware of Professor Tom Edgar's intent to partake in the UTMOST Project if he is selected to participate as part of your proposal. If Tom is selected, we commit to scheduling him to teach M433: Abstract Algebra during either Fall 2017 or Fall 2018. Tom has the freedom to choose the book for that course, so using the open source text will not be a problem, and we will make sure that Tom is assigned a classroom which is equipped with computers so that students may access SageMathCloud.

I have shared this information with our chair for 2016–2017, Daniel J. Heath, to make sure there are no scheduling mistakes (I will again be department chair during 2017–18). If you have any questions, please feel free to contact me at [sklarjk@plu.edu](mailto:sklarjk@plu.edu).

Sincerely,

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