

# Application the UTMOST Project

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## Scheduling

We would like to teach and help collect data for a Linear Algebra and Abstract Algebra course. The schedule would be as follows:

Semester	Course	Control Course?
Fall 2017	One section of Abstract Algebra	No
Spring 2018	Two sections of Linear Algebra	No
Fall 2018	One section of Linear Algebra	Yes

## Experience Teaching Linear Algebra

### Keir Lockridge

- Taught linear algebra at Gettysburg (two concurrent sections) and at the University of Washington (one section).
- At Gettysburg, Sage was used a good bit, including three projects: sports ranking, fractal geometry, and Google's PageRank. Students were also required to do a few homework problems with Sage.
- At UW, no technology was used.

### **Ricardo Conceição**

- Taught linear algebra twice at Oxford College.
- Sage was used in lectures and three projects: Geometry of matrix transformations on the plane, Curve fitting, Dynamical Systems.

## **Experience Teaching Abstract Algebra**

### **Keir Lockridge**

- Taught abstract algebra 3 times, twice at Wake Forest and once at Gettysburg.
- Sage was never used, except as a lecturing tool.

### **Ricardo Conceição**

- Will teach Abstract Algebra for the first time next semester (Spring 2015).
- Have adopted Judson's textbook and plan to use some of the included Sage homework.

## **Experience using mathematical software in courses**

### **Keir Lockridge**

- Maple (Calculus), GeoGebra (Geometry), WebAssign (Calculus), ALEKS (Calculus), Mediawiki (all courses), WordPress (Abstract Algebra, Excursions in Mathematics), and Sage (Number Theory, Linear Algebra).

### **Ricardo Conceição**

- WolframAlpha (Pre-Calculus, Calculus), WebAssign (Calculus), Latex (Differential Equations), Desmos Graphing Calculator (Pre-Calculus), Microsoft Excel (Calculus w/ Bus. Application) and Sage (Linear Algebra, Differential Equations).

## **Experience with Sage and SageMathCloud**

### **Keir Lockridge**

- No experience with SageMathCloud.
- Used Sage extensively in Number Theory and Linear Algebra.
- Helped a student use it while working on her capstone project (this led to a publication in *Involve*).
- Helped a student use it while working on her Independent Study project (Number Theory/Computer Science).
- Installed the Sage server on the math department cloud computer.
- Used it in on research (Recently submitted a paper where Sage helped illuminate various aspects of the proof of the main theorem, though no Sage code or results actually made it into the paper itself).

### **Ricardo Conceição**

- Very little experience with SageMathCloud.
- Used Sage in Linear Algebra and Differential Equations.
- Uses Sage regularly “to latex” class notes and solutions to problems in Calculus, Pre-Calculus, and Linear Algebra.
- Uses Sage as an illustration tool during lectures.
- Uses Sage regularly on research as an experimentation tool. The last submitted paper contain pseudo-code that was implemented in Sage.

## College Description

- Gettysburg College is a private, four-year liberal arts college.
- Students in Linear Algebra come from a diverse population, including students in Mathematics, Economics, Computer Science, and some of the natural sciences (Environmental Studies, Chemistry, Physics, etc.).
- Abstract Algebra attracts mostly students in the Mathematics, Computer Science and Math/Econ majors.