

Proposal for 2017 AALAC Collaborative Workshop
*Strategic Optimization: Focusing Undergraduate Research to
Maximize Scholarship in Applied Mathematics*

Workshop Liaison

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Rationale and Intended Audience

Faculty at primarily undergraduate liberal arts colleges must fit well within the scholar-teacher mold. Within this framework, it is expected that undergraduate students will have opportunities to engage in research. Mathematics faculty at these institutions are often responsible for determining topics and designing projects that are well suited for student research. In addition, they are responsible for providing the student researcher with resources that help bridge the gap between their mathematics coursework and the fundamentals of the chosen research topic. The associated challenges in mentoring undergraduate research in applied mathematics can be addressed by two central questions:

1. How can we meaningfully advance our scholarship through undergraduate research?
2. What tools are necessary to provide the essential applied mathematics background to our undergraduate researchers, and how might we organize them for repeated future use by our faculty community?

We propose to organize a two-day workshop to answer these questions for faculty with research interests and/or ongoing projects in applied mathematics. We anticipate that the workshop will be held at Bryn Mawr College during the 2017 calendar year.

Goals and Intended Impact

The goals of the proposed workshop are therefore

1. to help participants strategically create a portfolio of accessible and structured undergraduate research projects that can also advance current faculty research;
2. to develop a repository of commonly needed foundational resources/modules that faculty may use to provide their undergraduate researchers with important background knowledge.

We envision this workshop to be a tool to help faculty create projects for undergraduates that synergistically support their own research, and to facilitate the initial steps in the research process by providing background materials. We intend for this workshop to provide liberal arts faculty the time and space to develop an undergraduate research plan that will be beneficial in the contributions it makes to their scholarship, while giving undergraduates a meaningful independent research experience. We further intend to collectively develop a common repository from which participants may access fundamental resources to initiate undergraduate research, thereby reducing the time spent looking for these resources when beginning work with a new student.

Schedule and Format

The proposed schedule for the two-day workshop is as follows.

Day 1 Participants will give 5-minute introductions of their research to all other workshop participants. Participants will engage in a discussion of successes, pitfalls, and concerns surrounding undergraduate research, whether experiential or hypothetical.

Participants will then be divided into dyads to discuss their respective research topics in further detail. In these paired meetings, participants will collaborate, by giving and receiving strategic feedback, to deconstruct their current research project(s) into a series of undergraduate projects, which can then be put into a portfolio for future use. Individuals without ongoing research projects in applied math can focus on identifying possible projects that are both well suited for undergraduate research and in line with their current research interests.

Additional time will be allowed for participants to begin developing personalized research project portfolios based on the input from the paired meetings. Updates may then be presented to the entire group for additional input.

Day 2 The group will collectively develop a list of topics that undergraduate researchers need to know in order to make substantial progress on the projects developed. These can include common topics such as parameter estimation or an introduction to a programming language.

Participants will then be separated into groups of three or four with 1–2 assigned items. These groups will determine the information necessary to provide a comprehensive overview of the topic to a student. The group will also brainstorm the most effective ways to deliver/provide such an overview. Then the group will develop a compilation of resources, or create an original resource, that can serve as a primary tool to bring students up to speed on the relevant background topic(s).

Follow-up Activities

Prior to the conclusion of the workshop, the collective group will discuss plans for ongoing updating of the repository/database of topics and how feedback may be provided, to report on the utility of individual resources. Within one year, we will schedule a virtual meeting to report on the overall successes and challenges that were met along the way and to discuss modifications and additions to the database.