Mathematics

The following is a list of resources compiled by UROP that relate to mathematics undergraduate research or mentoring topics. While this is not an exhaustive list of resources available regarding mathematical research, these do give a variety of different perspectives in undergraduate research. They are available from the UROP library, GT Library, or on-line. UROP library materials can be checked out by coming to the UROP office. Please contact UROP for availability.

* Adler, Jeffrey D., et al. "**Reading Encrypted Diplomatic Correspondence: An Undergraduate Research Project**." Cryptologia Vol. 32 Iss. 1 (2008): pp. 1-12.

> We describe the cryptanalysis of a collection of sixteenth-century Spanish diplomatic correspondence, performed by undergraduates who did not know Spanish.
>
> http://www.library.gatech.edu:2048/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=a9h&AN=28332682&site=ehost-live

* Brown, D., and Yurekli, O. "**Undergraduate Research in Mathematics as a Curricular Option**." International Journal of Mathematical Education in Science and Technology Vol. 38 Iss. 5 (2007): pp. 571-580.

> In this paper, a model is outlined for integrating research activities with undergraduates within the mathematics curriculum. Introducing a sequence of courses designed to engage students in research projects has brought about a change in the mathematical culture of students. The history and challenges associated with the creation of this program are discussed, indicating the positive outcomes it has had on student learning. Also discussed is the shift in departmental thoughts on student capabilities. Specific examples of student work are cited.
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> http://www.library.gatech.edu:2048/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=a9h&AN=25902198&site=ehost-live

* Gordon, Gary. "**Undergraduate Research in Mathematics: Lafayette College's REU**." Council on Undergraduate Research Quarterly Vol. 28 Iss. 1 (2007): pp. 6-11.

> The author details how he has organized a NSF Summer REU program in mathematics research at Lafayette College, PA. He describes how participants were chosen, how project topics emerged, what mentors considered a successful project, how the undergraduates were assigned or chosen for specific research projects, logistics and evaluation of the program. Lafayette College has had a NSF Summer REU program for mathematics since the early 1990's through 2010 (when current funding ends).
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> Available From: UROP Office

* Johnson Jr, Robert A., Mack, Kelly M., and Seaton, Daniel M. "**Developing a Complete Research Cycle (CRC) in Science, Technology, Engineering, and Mathematics (STEM)**." Council on Undergraduate Research Quarterly Vol. 26 Iss. 1 (2005): pp. 28-33.

> Professional literature consistently reflects student interest as a key influence affecting the choice of science, technology, engineering, and mathematics (STEM) disciplines as a major field of study among underrepresented groups. Additionally, many institutions experience the phenomenon whereby minority students are entering into scientific and technical disciplines at the same rate as others, but, in general, are matriculating much more slowly and

are less involved in extra or co-curricula activities. As a means of addressing these concerns, colleges and universities are implementing structured undergraduate research programs to enhance student involvement. More interestingly, community and collaboration applied to undergraduate programs enhance appreciation, use, and interest in science, mathematics and technology among underrepresented minorities, including women (Johnson & Parrott, 1992).The University of Maryland Eastern Shore (UMES), a Historically Black College and University (HBCU), is a campus of approximately 3,500 students (950 in STEM disciplines) and has implemented undergraduate research programs through grants from the U.S. Department of Education and the National Science Foundation (NSF). The programs give junior and senior students an opportunity to work with faculty members on projects that not only utilize knowledge and techniques learned through traditional coursework, but also expose students to current trends and practices in their disciplines. The programs serve as the basis of a Complete Research Cycle (CRC) that emphasizes development and maintenance of research interest, inquiry-based activities, formulation of proposed activities to attract support, sustained periods of investigation, and presentation of results. The primary objective of the Complete Research Cycle is to provide STEM students, along with their faculty mentors, a complete exposure to the common aspects associated with sponsored research. This article discusses this program at UMES.

Available From: UROP Office

* McKemie, Jean, and Naples, David. "**Including Undergraduate Research in the Mathematics Curriculum**." Council on Undergraduate Research Quarterly Vol. 26 Iss. 3 (2006): pp. 128-132.

This article describes St. Edward's University's method of including research in the mathematics curriculum. The incorporate research through a four-semester sequence of one credit hour courses: Research Methods, Undergraduate Research (take twice) and Senior Seminar. The sequence typically begins in the fall semester of the junior year and ends in the spring semester of the senior year. Students work with one faculty member (faculty mentor) throughout the entire sequence which they believe is a key feature for maximum student gain.

Available From: UROP Office

* Wolfson, Jane L., and O'Leary, Mike. "**Undergraduate Research and Civic Engagement: Tale of Two Programs**." Council on Undergraduate Research Quarterly Vol. 26 Iss. 2 (2005): pp. 70-73.

Projects that engage students with the community can be successfully developed and executed at larger institutions. Students completing our courses consider them wonderful learning opportunities as well as very demanding courses. There are challenges that have to be overcome in providing these courses; clearly there needs to be a good match between the instructor(s) and the class/project. Similarly, the personality dynamics of the class itself can alter the success of a particular project. It is our belief that in spite of these difficulties the courses should be continued and supported. We find that they effectively serve to transition our students from school into a work environment in which they will be responsible for the quality of the work they produce. Our academic undergraduate research activities also involve the students working with the local community in substantial and significant ways; we present two examples here. First is the Applied Mathematics Laboratory, which looks to local companies and government agencies for applied mathematics undergraduate research projects and then selects a team of students to study the problem, usually for a full year. Second is the Senior Seminar, a capstone course in the Environmental Science and Studies program. This is a one-semester, required course, where the entire class works on one project of importance to the local community

http://www.cur.org/Quarterly/Dec05/Dec05Towson.pdf