Computer Sciences & Engineering

The following is a list of resources compiled by UROP that relate to computer science and engineering undergraduate research and mentoring. While this is not an exhaustive list of resources available, they give a variety of different perspectives in undergraduate research in the computing fields. 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.

Further specific relevant materials may also be found at the Association for Computing Machinery (ACM) website by searching through the ACM Digital Library: http://portal.acm.org.www.library.gatech.edu:2048/portal.cfm?coll=GUIDE&dl=GUIDE&CFID=49974845&CFTOKEN=65483914 .

* Abdel-Qader, Ikhlas. "**An Undergraduate Research Mentoring Model in Digital Signal and Image Processing**." International Journal of Electrical Engineering Education Vol. 41 (2004): pp. 146-302.

  This work presents a research-mentoring framework to train undergraduate students in a hands-on setting in the area of digital signal and image processing (DSIP). It is intended to encourage undergraduate students to pursue research and to add to their knowledge in information technology and enhance their active-learning and problem-solving skills.

  http://www.library.gatech.edu:2048/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=a9h&AN=14860816&site=ehost-live

* Barker, L. "**Student and Faculty Perceptions of Undergraduate Research Experiences in Computing**." ACM Transactions on Computing Education Vol. 19 Iss. 1 (2009): pp. 1-28.

  Undergraduate research experiences are promoted and funded for their potential in increasing students' likelihood of pursuing graduate degrees, increasing their confidence, and expanding their awareness of their discipline and career opportunities. These outcomes, however, depend on the social, organizational, and intellectual conditions under which students conduct research. Large-scale comparative studies suggest that computer science undergraduate researchers participate in fewer of the activities that lead to membership in a "culture of research." This interview-based study illuminates the experiences of both undergraduates and their faculty research mentors in computer science summer and academic year programs. Twenty-five undergraduates and 31 faculty mentors, the majority women, were interviewed. Their stories reveal best and worst case research conditions for students, the special benefits to women who have experienced harassment in their classes, unconscious biases of faculty, the wisdom of faculty who guide undergraduates to successful research outcomes, and faculty's perceptions of benefits for themselves, their departments, and the students they mentor.

  http://doi.acm.org.www.library.gatech.edu:2048/10.1145/1513593.1513598

* Beck, Jon, Buckner, Brent, and Nikolova, Olga. "**Using Interdisciplinary Bioinformatics Undergraduate Research to Recruit and Retain Computer Science Students.**" Proceedings of the 38th SIGCSE Technical Symposium on Computer Science Education. ACM.

  An interdisciplinary undergraduate research project in bioinformatics, jointly mentored by faculty in computer science and biology, has been developed and is being used to provide top-quality instruction to biology and computer science students. This paper explains the benefits of such collaboration to computer science students and to the computer science discipline. Specific goals of the project include increased recruitment of students into computer science and increased retention within the discipline. The project is also intended to be particularly attractive to women students.

  http://doi.acm.org.www.library.gatech.edu:2048/10.1145/1227310.1227436

* Becker, Katrin. "**Cutting-Edge Research by Undergraduates on a Shoestring?**" J. Comput. Small Coll. Vol. 21 Iss. 1 (2005): pp. 160-168.

  This paper outlines an approach to helping mid-program undergraduates conduct cutting-edge research that can be incorporated into almost any program with no additional resource requirements. A key feature of this approach is a mechanism that allows for a thorough assessment of students' work, while still permitting what is typically classified as failure with respect to the production of research results. A brief review of some of the literature along with its benefits and concerns is presented first, followed by an outline of a model for implementing a student-centered research project that can be offered within the context of most traditional courses, at no extra costs in terms of manpower or funds. The focus of this approach is on helping students learn to be researchers, rather than furthering faculty members' research agendas.

  http://delivery.acm.org.www.library.gatech.edu:2048/10.1145/1090000/1088819/p160-becker.pdf?key1=1088819&key2=1052426521&coll=GUIDE&dl=GUIDE&CFID=49974845&CFTOKEN=65483914

* Bernick, Jonathan P. "**The Flo-and-Mac Problem: A Tool for Encouraging Undergraduate Research**." SIGCSE Bull. Vol. 35 Iss. 2 (2003): pp. 103-106.

  It has historically been difficult to persuade undergraduates to become involved in research, in part due to the difficulty of making meaningful research problems accessible to such students. This paper describes the Flo-and-Mac problem, an open-ended research problem specifically designed to be accessible to undergraduates, and to enable them to make a meaningful contribution to a scientifically interesting investigation. Perspectives from which the Flo-and-Mac problem can be investigated are examined, and the use of the problem as a pedagogical tool and tournament problem is discussed. It is concluded that Flo-and-Mac problem is a viable tool for these purposes, and further investigation is recommended.

  http://doi.acm.org.www.library.gatech.edu:2048/10.1145/782941.782991

* Bowles, John B., Eastman, Caroline M., and Farkas, Csilla. "**Engaging Undergraduates in Computer Security Research.**" InfoSecCD Conference'06. Proceedings of the 3rd annual conference on Information Security Curriculum Development ACM.

  Involving undergraduates in research projects in information assurance and computer security can provide valuable experiences complementing their more formal coursework. We have used several mechanisms, such as regular semester courses, directed studies, and summer programs, at the University of South Carolina to engage undergraduates in ongoing research projects and to support them in their own research efforts. Here we describe some of the mechanisms we have used and our experiences working with students in these various modes.

  http://doi.acm.org.www.library.gatech.edu:2048/10.1145/1231047.1231061

* Cunningham, Sally Jo "**An Introduction to Research and the Cs/Is Professional Literature for Undergraduates**." SIGCSE Bulletin Vol. 27 Iss. 4 (1995): pp. 5-8.

  One of the more difficult aspects of computing to incorporate into the undergraduate curriculum is an authentic research experience. This paper describes a successful third year project in which computing students designed, conducted, and wrote up bibliometric experiments. This project gives students a flavor of the scientific method, and has the added benefit of encouraging familiarity with the scientific publishing process and with the computing and information systems professional literature.

  http://doi.acm.org.www.library.gatech.edu:2048/10.1145/216511.216514

* Fong, Philip W.L. "**Reading a Computer Science Research Paper**." SIGCSE Bulletin Vol. 41 Iss. 2 (2009): pp. 138-140.

This tutorial article highlights some points that a graduate or senior undergraduate student should bear in mind when reading a computer science research paper. Specifically, the reading process is divided into three tasks: comprehension, evaluation and synthesis. The genre of paper review is then introduced as a vehicle for critical reading of research papers. Lastly, guidelines on how to be initiated into the trade of conference and/or journal paper review are given. Designed to be used in a graduate course setting, this tutorial comes with a suggested marking scheme for grading paper reviews with a summary-critique-synthesis structure.

http://doi.acm.org.www.library.gatech.edu:2048/10.1145/1595453.1595493

* Pastel, Robert. "**Integrating Science and Research in a HCI Design Course.**" Proceedings of the 36th SIGCSE Technical Symposium on Computer Science Education. ACM.

Undergraduate computer science students have few opportunities to experience scientific investigation and computer science research. A human-computer interaction (HCI) course can offer many opportunities for research that are accessible to undergraduate students, and because of the similarity between the design and research processes, a design project based HCI course is particularly suited to introducing undergraduate computer science students to the research process. In this paper, we describe and discuss the challenges of integrating research projects into a design HCI course. We also present example research projects and discuss the feedback from students attending the course.

http://doi.acm.org.www.library.gatech.edu:2048/10.1145/1047344.1047371

* Ward, Karen. "**Research with Undergraduates: A Survey of Best Practices**." J. Comput. Small Coll. Vol. 21 Iss. 1 (2005): pp. 169-176.

This paper surveys best practices for building an academic research program that relies on the contributions of undergraduate research assistants from a computing perspective.

http://delivery.acm.org.www.library.gatech.edu:2048/10.1145/1090000/1088820/p169-ward.pdf?key1=1088820&key2=2275426521&coll=GUIDE&dl=GUIDE&CFID=49974845&CFTOKEN=65483914