SURA Institute for Graduate Education

Strategic activities (suggested by Abebe Kebede, NC A&T)
(Draft May 3, 2005)

Education and Research Experience for Undergraduates (EREU) based Model to Integrate research and undergraduate Education in Physical Science

Rational

Educators, scholars and government agencies all agree that the future of science and engineering rests on how well students trained at all levels. It is also agreed that the training must be relevant in reinforcing and strengthening the scientific knowledge base and infrastructure. Scientific and engineering research demand the use of highly specialized machinery to develop materials that would be used in the latest computer processor, micro-machines to regulate bodily functions, or detecting the smallest signals from the outer-reaches of the universe. Teaching methods and the content of the subject matter are constantly evaluated to meet these demands. Research based courses and senior undergraduate projects are becoming useful media to prepare students for graduate schools and for industrial workforce. HBCU faculty members are also encouraged to participate in workshops, conferences, seminars, colloquia and summer research opportunities to bring themselves up to speed to the current technological and scientific progress. Among the efforts to increase the participation of underrepresented groups (students and faculty) in basic and applied research is the summer programs where faculty members and students spend 8 to 10 weeks at research institutions. It is hoped that such participation will have impact on the preparation of the student for graduate school on the ability of faculty to enhance the curriculum, and possibly begin own research by collaborating with the host institution. However this period is too short and puts the participants under time pressure. This in turn severely limit productivity of the faculty in terms data acquisition, conference presentations and publications. For students time is not the only limitation. The disconnect between the expectations of the REU directors, the student's personal experience at REU sites during the summer months and his/her experience during the academic year are reducing the effectiveness of the programs. It will not be surprising to find students who are not satisfied with their REU experience.

REU admissions are very competitive. The students entering these programs are among the top 5% of their class. The experience at NC A&T shows that many these students don't pursue PhD in Physics after completing their undergraduate program. Many go into other fields or go to work. At NC A&T every physics major with a GPA 3.00 and above goes through at least two REU's during his/her academic career. But less than 10% of these students continue to get a PhD in Physics. In the last 10 years only three students got PhD in physics. The success of the three PhD's can be attributed to the networking and close collaboration of members of the faculty with research institutions.

EREU system

The main motivation of the EREU system is to strengthen existing pipeline programs by retaining the students already enrolled in HBCU physics department. This requires a proactive approach that will ensure quality and broad training of students. A very significant contribution to this experience will be to engage students in education and research activities early during their college years.
EREU involves course offering and research. This can be achieved by developing strong linkages between remote EREU sites and the student's home base. The linkage features faculty-faculty and institutional collaborations in recruiting and preparing students for the programs. This in turn will lead to 1) development of EREU projects at student's home base, 2) sharing resources related to the EREU activity, 3) development of EREU sites at home base institutions that are intimately tied with current trends in science frontiers and development of processes for faculty and student exchanges. Each of these concepts requires the constant interaction between faculty members and EREU remote sites to facilitate the recruitment and the preparation of students.

Our model involves two vital elements; to launch a local EREU site and to network this site with EREU site based at research Universities (PhD granting) and National Laboratories (ORNL, JLAB).

Target

Two sets of students will be served. The first group consists of students who will be recruited directly into the EREU program and those who are taking research and special topics courses at home base. This will increase the recruitment pool for SURA Institute and other REU sites. Both set of students will be mentored and advised via a virtual network of mentors, graduate students, postdocs and faculty members of SEIGE. Such network will become a vehicle to develop and/or share educational resources such as modules, lectures, simulations, and demonstration materials that can easily be integrated in to the regular curriculum.

SEIGE Education and Research activities

Research: List the research activities that the SEIGE will perform

Education: List the courses that SEIGE will offer