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Computer Engineering Course for K-12 Teachers Assisted by First-Year ECE Undergrads

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Final Report for Period: 09/2003 - 08/2004**Submitted on:** 07/16/2007**Principal Investigator:** Patton, James B.**Award ID:** 0211207**Organization:** University of Maine**Title:**

Computer Engineering Course for K-12 Teachers Assisted by First-Year ECE Undergrads

Project Participants**Senior Personnel****Name:** Patton, James**Worked for more than 160 Hours:** No**Contribution to Project:****Name:** Eason, Richard**Worked for more than 160 Hours:** Yes**Contribution to Project:**

Dr. Eason is a co-instructor of ECE105 and ECE198, the courses that are being developed using resources obtained with the grant funding.

Name: Sheaff, Andrew**Worked for more than 160 Hours:** Yes**Contribution to Project:**

Mr. Sheaff is a co-instructor of ECE105 and ECE198, the courses that are being developed using resources obtained with the grant funding.

Post-doc**Graduate Student****Undergraduate Student****Technician, Programmer****Other Participant****Research Experience for Undergraduates****Organizational Partners****Maine Mathematics and Science Alliance****Other Collaborators or Contacts**

A Model Program To Enhance Mathematics And Science Education, US

Department of Education, awarded to UMaine, \$1.23 M, @ years. We worked with this group to develop 'by inquiry' approaches to teaching physics using robotics.

The Maine Mathematics-Science Teacher Excellence Collaborative

(MMSTEC) NSF \$4 million, 5 years. The project involves collaboration

between mathematics and science educators at the Maine Mathematics and

Science Alliance (MMSA), University of Maine, University of Southern Maine,

and University of Maine at Farmington. We attended monthly meetings with K-12 pre- and in-service teachers, along with other UM faculty.

We made several on-site visits to high schools to train students and teachers.

Activities and Findings

Research and Education Activities:

In the year 2000 we created a new course, ECE 198, for first year honors level students to develop content for a second new course created in 2002, ECE 105, which was targeted towards pre-service secondary math and science education students. Students in ECE 198 created LEGO robots to demonstrate mathematics, engineering, and science principles that could be used in ECE 105. The students published their projects on the web.

These can be found at the ECE 105 <http://kakadu.eece.maine.edu/ece105>.

In addition to content created by ECE 198 students, two students, one an education graduate student with physics background, were hired in the summer of 2002 to investigate the 'by inquiry' approach to instruction.

Findings:

Our goal was to recruit future science teachers. We believed our course would attract College of Education sophomores toward this end. We have found that few College of Education majors know they want to teach math or science. Hence the 'market' appeared to be non-engineering students in general. We were surprised by the fact that most of the interest appeared to be coming from New Media majors. As a result we believe that our course is actually more in line with the goal of recruiting science teachers. The course is clearly directed toward teaching C programming and physics to high school students with some emphasis on mathematics.

We feel that the students enrolled in the course gained a better understanding and appreciation of engineering, math, and science and that the education majors among them were presented with ideas to carry with them to the classroom.

Content and materials generated were also used by graduate students participating in the NSF sponsored GK-12 Sensors! program. Graduate students in this program worked with in service teachers in their classroom at least once a week. The materials were used as a mechanism for introducing engineering ideas.

Training and Development:

Students are learning the 'by inquiry' approach to science instruction. In addition, they are developing multimedia curricular content for future students.

One goal is to enable instruction of in-service teachers using the web.

Much of the course material has been published on the web.

Outreach Activities:

We are participating with our collaborators - K-12 teachers and other UM faculty involved in K-12 outreach. Part of the responsibility of students taking ECE105 is to engage in some kind of teaching/coaching activity involving K-12 students. This activity is motivated by the observation that many teachers learn they want to enter the teaching field by being asked to actually teach at some point in their academic careers. Hence, the result of this activity is outreach to local schools to talk about and demonstrate robotics, physics, and programming. As part of the outreach, some students also served as volunteers for the state's First LEGO League competition.

Hands-on training was done by us with several area high school science teachers in their own classroom. The purpose of these visits was to train some of the in-service teachers in the use of tools and materials generated by the courses and to gain hands-on experience in their use in an actual classroom. The materials and methods were also tested on multiple occasions with area high school students who visited our department giving us further experience in generating content of an appropriate level.

Journal Publications

Books or Other One-time Publications

Web/Internet Site

URL(s):

<http://kakadu.eece.maine.edu/ece105>

Description:

Course website for ECE 105. The materials were created by first-year undergraduate students enrolled in ECE 198.

Other Specific Products

Contributions

Contributions within Discipline:

Contributions to Other Disciplines:

Contributions to Human Resource Development:

Contributions to Resources for Research and Education:

Contributions Beyond Science and Engineering:

Categories for which nothing is reported:

Any Journal

Any Book

Any Product

Contributions: To Any within Discipline

Contributions: To Any Other Disciplines

Contributions: To Any Human Resource Development

Contributions: To Any Resources for Research and Education

Contributions: To Any Beyond Science and Engineering