

## **BIRTH AND EVOLUTION OF NEW OPTICS DEGREE PROGRAMS**

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### **1. INTRODUCTION**

This paper addresses the birth and evolution of new optics degree programs by using the development of optics undergraduate and M.S. degree programs at Rose-Hulman Institute of Technology (RHIT) as an example. It points out some unique steps that were taken in making this program successful.

### **2. BACKGROUND ABOUT RHIT'S OPTICS PROGRAMS**

Rose-Hulman Institute of Technology is a private engineering and science college. Currently 1300 students are enrolled at RHIT, of which about 1250 are undergraduates and 50 are pursuing masters degrees. Among the undergraduate students, about 1 in 10 are national merit scholars. For more than 100 years, RHIT's mission has been to provide industrially-oriented education and research for young men. RHIT offers only B.S. and M.S. degrees in engineering and sciences.

The planning for RHIT's optics program was initiated in 1981, with the short-term goal: establish an Area Minor in Applied Optics at the undergraduate level; and the long-term goal: establish an M.S. (Applied Optics) degree program at the graduate level. The undergraduate program, the Area Minor in Applied Optics, was started in 1983. In 1985, the Indiana Corporation for Science and Technology (ICST) approved a proposal to provide partial support for establishing the Center for Applied Optics Studies (CAOS) at RHIT. This paved the way for the M.S. (Applied Optics) degree program which was started in the same year. During the period 1985-1988, six Visiting Lilly Fellows served as consultants. Partly because of their recommendations as well as our own evaluation, B.S. (Applied Optics) degree program was also initiated in 1987. As of August 1988, 25 sophomores and 6 juniors were enrolled in the B.S. (Applied Optics) degree program, and 12 graduate students were enrolled in the M.S. (Applied Optics) degree program. In addition, about 20 students, whose major was not Applied Optics, were pursuing the Area Minor in Applied Optics.

### **3. THE VISITING LILLY FELLOW PROGRAM**

We feel that the Visiting Lilly Fellow program played the single-most-important part in the development of our optics programs. This program provided support for two Fellows per year over a three-year period. Some of the Fellows represented academia, others represented industry. Each one of these Fellows spent about two days on our campus. Before their campus visit, they were provided with extensive information about our optics programs as well as about RHIT. During their campus visit, they met with Applied Optics faculty/students and others, and had detailed discussions regarding our plans for the future. After their visit they critiqued our programs through a written report. We used this input to make changes and improvements in our programs.

### **4. DEVELOPMENT OF OPTICS PROGRAMS**

In developing our optics program we researched optics curricula and courses at other colleges and universities. Based on these findings, we developed our own detailed outlines for each one of RHIT's optics courses. Resource materials for each of our optics courses were also identified. A master list of experiments for various optics lab courses was prepared. In preparing this master list, considerations such as coordination, overlap and sequence of experiments in different lab courses played

an important role. We also tried to get an indication of the demand and supply of optics graduates to meet present and future needs of the industry as well as of the graduate schools. This was accomplished by seeking input from the recruiters from the industry, by discussions with RHIT's National Board of Advisors which is a group of senior level executives from industry/government, and by discussions with representatives of graduate schools granting Ph.Ds in optics or optics related area.

## **5. CENTER FOR APPLIED OPTICS STUDIES (CAOS) AND INDIANA CORPORATION FOR SCIENCE AND TECHNOLOGY (ICST)**

ICST was established by the State Legislature in 1982 to help strengthen the economy of the State of Indiana through

- the development and application of science and technology, and
- a dynamic interactive partnership between the public, private and academic sectors.

ICST works with a broad range of universities, businesses, industries and entrepreneurs and is committed to the future of advanced technology in our State as well as to the long-term economic growth of our State. The financial support by ICST for research programs is expected to be paid back by royalties from the completed projects' gross revenues. These paybacks are then reinvested by the Corporation in new projects.

CAOS was established in 1985 with partial support from ICST. The four functions of CAOS are:

- \* Education
- \* Research & Development
- \* Technology Transfer
- \* Services.

The education function is intimately coupled, as explained in the next section, with the other three functions.

## **6. INTERACTION WITH BUSINESSES, INDUSTRY AND GOVERNMENT**

Through the support provided by ICST for equipment and faculty release-time, the development of the courses - specially the lab-oriented courses - of the M.S. (AO) degree program could be accelerated. By our design, the M.S. (Applied Optics) thesis projects are ones that have been identified as being of mutual interest to CAOS as well as to industry. Thus, opportunities arise continually for our M.S. as well as B.S. students to get involved in R&D projects of interest to businesses. This leads to excellent preparation for students, specially the ones who are planning to work in the industrial environment.

The funding for Applied Optics programs at RHIT has come from private foundations and businesses, as well as from state and federal government, besides the strong commitment that has been made by RHIT.

## **7. CONCLUSION**

This paper outlines an example and shows that by using the input from the industry and the academia, and by targeting the programs to the institution's mission and philosophy and to the regional or local needs, the success of a new program can be optimized.