The external review of the graduate programs in the Department of Nuclear Engineering (NE) and Radiation Health Physics (RHP), College of Engineering, Oregon State University, was conducted on February 13, 2006 by three internal and two external reviewers. According to the review report, the review team was favorably impressed by the graduate programs, and was satisfied with the department self-study that highlighted the strengths of the program in its current state while acknowledging future challenges. The reviewers concluded that both NE and RHP graduate programs are well regarded nationally due in large part to the department’s expertise in reactor safety/thermal hydraulics and radiation health physics. They also concluded that, in general, the department’s graduate students were very satisfied with their programs and faculty. They indicated that the department chair and faculty were to be commended for maintaining strong graduate training programs despite budgetary and other constraints. The review team made several valuable suggestions in an effort to help improve and maintain the high quality of the graduate programs. In view of these suggestions, the faculty of the NERHP graduate program drafted an action plan for program improvement and adjustment. After almost three years of efforts, the NE/RHP faculty made the following progresses:

1. **Reduction of Faculty Workload to Maintain Competitiveness of the Program**

   **Reviewers’ Suggestion:**
   "The review committee suggested that Faculty are overburdened and will not be able to meet the rapidly increasing demand for more graduates without a serious investment by the College and the University. As a top 10 nationally ranked program, NE and RHP are great assets to the College and University. The graduate programs risk losing their national stature due to staffing challenges and/or becoming overly dependent on unstable external funding. The committee recommends an increase in full-time, tenure-track faculty. In addition, the faculty needs to find a mechanism to reduce teaching loads to compensate for high productivity in research and obtaining research funding. This recommendation was made in 1991 and remains unaddressed."

   **Actions Plan:**
   Some support from the College has already been provided to help implement this recommendation. One new half-time tenure track faculty member has been hired since the graduate review was conducted. One full-time tenure track faculty member will be hired by the
fall of 2007. These new faculty members will broaden our research capabilities while reducing the teaching load of each individual faculty member. The department’s broader spectrum of research capabilities will attract new research opportunities that will help us continue to grow our graduate programs.

Additional College and University support is needed to fully address this recommendation. Two paths are being considered; faculty hires via collaboration with the Idaho National Laboratory (INL) and faculty hires through a strategic investment by the State of Oregon and industry as stated in the 2006 proposal developed and approved by the Engineering and Technology Industry Council, (ETIC).

Growing with INL is one of our strategies for further advancement. INL’s emphasis on the development of the next generation nuclear power plant, matches our expertise in the advanced reactor technology. As part of INL’s restructuring during the past two years, we have built a strong collaboration with INL that may serve to elevate our research program to a new level. As the nation’s lead university for nuclear plant certification testing, the program would continue to play a major role in developing and testing next generation technologies. If the plan progresses as expected, INL will fund four half-time faculty positions to promote the collaboration.

As part of an effort to strengthen the state’s economic development and its ability to compete nationally, ETIC has approved a proposal that would dramatically strengthen the College. If approved by the legislature and governor, the net result to the department is 6 new full-time faculty hires over the next 4-6 years. Details of the ETIC proposal can be found on their website: [http://www.oregonetic.org/nb.htm](http://www.oregonetic.org/nb.htm).

Actions Taken:
1. In the past three years, three new faculty members were hired, including Dr. Camille Lodwick, Dr. Abi Farsoni and Dr. Alena Paulenova.
2. Currently, we are in the process of implementing the strategy to rely on the partial financial support of Idaho National Laboratory for joint faculty appointments.
3. We also have reduced teaching loads to a baseline of 3 courses per year, with provisions for buyout for faculty with heavy research loads.
4. Hiring two retired professors, Prof. S. Binney and Prof. J. Ringle, for three courses to reduce the teaching average faculty teaching load.
5. Currently, we are in the process of hiring qualified instructors to teach certain courses as the research work load increases. An instructor pool is under construction.

2. Improving Utilization of Graduate Teaching Assistants

Reviewer’s Suggestion:
“The faculty needs to re-evaluate the under-utilization of graduate teaching assistants as a means to reduce the undergraduate teaching load.”

Action Plan:
Based on the committee’s recommendation and subsequent faculty discussions, we have decided to utilize a graduate teaching assistant to teach three freshmen level courses. This will reduce the
faculty teaching load and provide valuable training of graduate students who have the potential for careers in academia. In the past, for the purpose of retaining freshmen, we generally assigned experienced professors to those courses, and occasionally hired one or two Ph.D. candidates to share part of these courses. To guarantee the instructing quality, each graduate instructor will develop the course under the guidance of at least one faculty member having a thorough understanding of the course objectives. In this way, graduate students will learn the elements of course development, notes preparation, and assignment selection.

**Action Taken:**
(1) We have hired 4 graduate students teaching courses partially or independently. This year we have had Ph.D. candidates Wade Marcum and David Bytwerk teach freshmen classes. A third PhD student is scheduled for spring term.
(2) In certain causes, NE467/567 and NE451/551 for instance, professors gave a portion of the course to Ph.D. students, not only for the reduction of faculty teaching load, but also for the training of students.

3. **Developing Joint-degree program in Medical Physics with Caution**

**Reviewers’ Suggestion:**
"Faculty should proceed cautiously with the plan for a new joint-degree program in Medical Physics in collaboration with OHSU."

**Action Plan:**
The plan for the inclusion of a graduate level medical physics program that aims at improved diagnostics and treatment methods would be responsive to developing the technologies needed to care for Oregon’s aging population. A medical physics program is essential to the state and we are in the best position to provide this service. With regard to teaching workload, the new medical physics program coursework significantly overlaps our existing Health Physics program. The fall 2007 faculty hire will have a specialty in the medical physics. Furthermore, because of our joint capabilities in distance education, the teaching load for the core coursework in medical physics can be easily shared between OHSU and OSU. We expect more inter-disciplinary collaborations and research programs as a result of the medical physics program. The number of students admitted into the medical physics program will be limited. The goal is a Fall 2007 startup.

**Action Taken:**
(1) A program preparation team was formed with the participation of Dr. K. Higley, Dr. D. Hamby and Dr. J. Reyes.
(2) Legal and authority support of OSU were obtained, and the plan has been proceeding slowly and carefully.
(3) New hire, Dr. C. Lodwick, is in position to lead the program.
(4) New student selection for the 2009 Fall term to start the program is in process.
4. Expanding the Program to Meet the Increasing Demand

Reviewers’ Suggestion:
“Demand for graduates is high and expected to increase dramatically in the near future. Overall, graduate student quality is very good; however, an equal number of equally qualified applicants are not admitted due limitations based on funding, faculty size and research interests. The college and department need to consider means to expand the program to take advantage of increased demand for graduates and adequate supply of qualified applicants.”

Action Plan:
The department will vigorously pursue industry and private support for graduate scholarships. While the department has committed more funds to support teaching assistants, the faculty, especially the department head, with the support of the university and college, have participated in various fund raising activities. Thus far, their efforts have resulted in the support of at least three more graduate students. Also, relevant to the suggestion, growing the program with the support of INL and the plan for the inclusion of a medical physics program can potentially bring in more research funds to support graduate students.

Action Taken:
(1) We now have 4 to 6 graduate scholarships/fellowships being offered annually.
(2) The growth of distant-education graduate student population has been steady, reaching the limit of our resources.

5. Balance the Efforts on Research Projects and Academic Activities

Reviewers’ Suggestion:
“The faculty members are encouraged to participate in on-going graduate programmatic assessment based on academic goals. Faculty productivity in terms of revenue generation appears to be over-emphasized relative to publication quality. This phenomenon has been identified by the faculty and was included in the self-study document.”

Action Plan:
Regarding faculty and student publication, as the self-study summarized, the faculty felt that we could have done better with the size and scale of our research programs. The growing Ph.D. student population in recent years did make a difference. However, a reduced teaching load would be favorable for the promotion of research publications. Although faculty members have enough research funds to buy out of a certain amount of teaching FTE, there are not enough alternative instructors to shoulder the teaching load. As a result, faculty members are usually tied to teaching a full load of courses each year. To realize the transition from a traditional teaching model to a research model, adding faculty members is the rational choice. For a healthy research group, as we demonstrated in the past decade, the external research funds would be significantly greater than the investment on the manpower. Therefore, the action plan for this suggestion is indirectly related to the growth of the program and the increase of graduate student population, as stated in items 1 and 3, respectively.
Actions Taken:
The actions taken in item 1, 2, and 3 are related to the reduction of faculty teaching load, and thus leaving more time for scholar activities.

6. **Enhanced Use of Facilities for Academic Purposes**

**Reviewers’ Suggestion:**
“The reactor, APEX facility, radiation center, and radiochemistry lab are exceptional facilities. However, they appear to be significantly influenced by funding sources and could be better integrated with the academic mission.”

**Action Plan:**
The OSU TRIGA reactor, the Radiation Center and radiochemistry labs regularly receive significant academic use. Because of the expense of running the large APEX thermal hydraulics system, the primary use for APEX continues to be externally funded graduate level research. Numerous theses have been published using data from the test facility. One option being considered is to obtain a long term grant from the nuclear industry to provide support for academic training using APEX.

**Action Taken:**
(1) The APEX facility has been completely restored for AP1000 testing. A new contract with Westinghouse has been signed to train the Chinese customer, China State Nuclear Power Technology Company (SNPTC) engineers, a educational use of the facility.

(2) The development of a course that uses APEX tests is in progress.

7. **Further Actions Proposed By the Reviewers**

The faculty has adopted the following rules and activities recommended by the reviewers for the improvement of the graduate program.

(1) Require all graduate students to complete at least one application annually for an external scholarship or fellowship. The department covers the expenses of application submission, including costs of requests for official transcripts.

(2) At least one seminar per year is devoted to student applications for external funding.

(3) We recruited outside speakers to highlight internship and scholarship opportunities (e.g., PNNL’s presentation on the NNSA internship program; Dave Brockman on DOE-RLs internship program).

(4) Provided annual seminars for new graduate students centered on ethics (Annual Introduction to the Department).

(5) Develop and integrate a department-level diversity action plan with the College of Engineering’s plan to increase diverse gender and ethnic representation among graduate students, faculty and staff.