Applied Science Accreditation Commission
Accreditation Board for Engineering and Technology
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Program Self-Study Report
for Review of the Idaho State University
Health Physics Masters of Science Program

Based upon the 2008-2009 Criteria for Accrediting Applied Science Programs Effective During the 2008-2009 Accreditation Cycle

Submitted by
Idaho State University
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to the
Applied Science Accreditation Commission

I. INTRODUCTION

This self-study describes the Health Physics Program at Idaho State University that awards Master of Science degrees in physics with an emphasis in health physics. This self-study is based upon the 2008-2009 Criteria for Accrediting Applied Science Programs effective during the 2008-2009 Accreditation Cycle. Supplemental materials, mainly supporting documentation, will be available to the ASAC-ABET review team during their 2008 accreditation visit.

II. BACKGROUND INFORMATION

A. Background

Idaho State University has served the citizens of the state since 1901 when the institution was first established as the Academy of Idaho. Renamed the Idaho Technical Institute in 1915 and reorganized as the Southern Branch of the University of Idaho in 1927, it was established as Idaho State College in 1947. By action of the 37th Idaho Legislature, the institution became Idaho State University on July 1, 1963. Currently about 15,000 students are enrolled at Idaho State University.

Bachelors and masters degrees in a variety of fields are awarded by the College of Arts and Sciences, College of Business, College of Education, College of Engineering, Kasiska College of Health Professions, College of Pharmacy, and the Graduate School. Terminal degrees offered at ISU include Master of Business Administration, Master of Fine Arts, Doctor of Philosophy, Doctor of Arts, Doctor of Education and Doctor of Pharmacy. Certificate programs of varying lengths and an Associate of Applied Science degree are included in the curricula of the College of Technology.

B. University Role and Mission

Idaho State University is a broad-based regional public doctoral university, providing a range of educational services to a culturally diverse population of students and to the state. It is committed to maintaining a strong liberal arts and sciences program as the basis of other academic disciplines and as an independent, multifaceted field of inquiry. The university offers graduate programs in a number of fields and is a national center for the Doctor of Arts degree. Its College of Technology provides high-quality education and training in response to the needs of students and private industry.

Idaho State University is dedicated to excellence in teaching, research and service. The university engages in sustained and significant research as an essential component of its academic and public service programs. It views public service as an integral part of its mission.

Idaho State University is committed to providing accessible, high quality education to the diverse citizenry of its region and state, and delivers comprehensive and creative outreach programs using the latest available technology. The university works in collaboration with other state and regional post-secondary institutions in serving its constituencies. The university offers a range of academic and support services to help all students succeed. It encourages student and public participation in its cultural, recreational and athletic programs, and welcomes the continuing involvement of alumni and other friends in its endeavors.

C. Health Physics Program Background:

The ISU Health Physics Program was established during 1989 with the creation of the emphasis in Health Physics within the Baccalaureate of Science in Physics Degree. This was followed with establishment of the Health Physics Master's program during 1993. Since its inception, nearly 150 scientists have earned their degrees from this program. Administratively, Health Physics Ph.D. students may participate in either of two programs. The current main focus for the Department of Physics is to enroll Ph.D. students in the Applied Physics Ph.D. Program administered by the Department of Physics. A second administrative pathway for Ph.D. students is through the ISU Engineering and Applied Science Ph.D. program that is jointly administered by the ISU College of Engineering and Department of Physics. These two programs are comparable with the differences, being essentially transparent to students.

The program is currently supported by a number of junior and senior faculty. One of the senior faculty is a Certified Health Physicists, a second junior faculty member is an associate member of the American Academy of Health Physics (i.e. has passed part one of the certification examination and awaits the opportunity to successfully complete part two), a second senior faculty member is an distinguished emeritus member of the National Council of Radiation Protection (NCRP), represents over 31 years of exceptional professional experience, 10 of these with the Department of Energy, the balance in academia and is a world renown expert on the subject of environmental radioactivity. The following table lists faculty and official FTEs associated with the Health Physics Academic Program.

Name	Rank	Credentials	Academic FTE
Gesell	Professor	Ph.D.	0.23
Brey	Professor	Ph.D., C.H.P.	0.40
Wells	Professor	Ph.D.	0.00
Harris	Assistant Professor	Ph.D.	1.00
Keller	Instructor	M.S.	1.00

Cummings	Adjunct Professor	Ph.D., C.H.P.	_
Schrader	Adjunct Professor	Ph.D., C.H.P.	_

Although senior faculty have been given partial administrative appointments, this does not reflect well their active roles in providing courses, their roles as student mentors, their active engagement in supporting research, and directing research projects. Reviewers are encouraged to consider active patterns of academic engagement with students as provided in the body of this report.

The approach to Health Physics Program and its mission are based upon the University's commitment to provide high-quality teaching, research, and service to benefit the citizens of Idaho. Public disclosures of the program, its mission, goals, and objectives are provided in the University General Catalog, in various departmental, college, and university publications and brochures, and on our computer World Wide Web sites:

Idaho State University	http:// www.isu.edu
College of Arts and Sciences	http://www.isu.edu/departments/artsci
Department of Physics and Health Physics Program	http://www.physics.isu.edu

D. Health Physics Program's Role and Mission:

Our mission is educating students so they can achieve the highest standards of the health physics profession, and solving important problems for the people and industries of Idaho and the Nation through teaching, research, and service.

1. Degree Titles

Awarded Degree
Master of Science
Physics

Indication on Transcript
M.S. Physics
Health Physics Emphasis

2. Program Modes

The university operates on a semester system for course instruction. The fall semester begins in August and ends in December. The spring semester begins in January and ends in May. Each semester consists of 15 weeks of instruction and one week of final examinations. The university also offers several accelerated pace summer school classes where students may earn full semester credits for courses taken during the summer.

Discipline specific core classes for the Graduate Health Physics Program at Idaho State are offered exclusively during the fall and spring semester. Graduate students in the Health Physics Program may earn credits for special projects conducted during the summer session or in other academic areas relevant to their holistic education.

Discipline specific classes are conducted during the day and evening in two modes:

I. Traditional - students and instructor present at the same facility

II. Closed-circuit two-way live broadcast using either microwave communication or broadband Internet II technology serving constituents in Idaho Falls or at the Idaho National Laboratory (INL).

The mode II normal program practice is for instructors to broadcast the class transmission from Pocatello to Idaho Falls roughly 50% of the time and from Idaho Falls to Pocatello roughly 50% of the time during each semester. This approach is advocated by the College of Arts and Sciences Outreach Office which funds all travel expenses and additionally compensates instructors for the extra logistical responsibilities imposed by this type of arrangement. The exchange of hard copy materials between instructors and students is accomplished by courier, fax, e-mail, and normal postage as appropriate for each circumstance.

This practice is rarely changed unless dictated by externally imposed constraints such as scheduling demands or security restrictions. As examples; the instructor may be required to teach a traditional class back to back with a closed-circuit two-way broadcast in which the 50-minute plus transient time restricts broadcast to just one location, or the course is offered to employees in a secured-restricted facility at the INL which would prohibit open access by instructors to the facility due to security considerations.

Full time graduate students have completed their M.S. degree within two years. This is highly dependent on a student's individual initiative relevant to completion of a degree. All required course work, by design, may be completed within two years for those students who have adequate undergraduate preparation. There are a few instances where completion of a degree requires substantially longer than the two year expected time. The primary reasons for longer times to graduation are:

Inadequate academic preparation of incoming graduate students.

The rigor of the health physics M.S. curriculum within the department of physics requires students to complete a minimum of 30 credits, therefore, even students with appropriate academic preparation choose to tailor their course load in such a way that class completion stretches beyond two years.

Part time students who must work to finance their education often find it difficult or impossible to succeed with a full semester course load, and further, those whose day time schedules include full time work often find the sequential scheduling of classes with prerequisites difficult, and because of their schedule conflicts must extend this course work beyond two years.

The academic retooling of students who transfer into our program from other disciplines or from other institutions often subjects students to longer completion times for a M.S. degree associated with curriculum mis-match. These students often end up with extra, non-applicable credits or lower division course credits that cannot be used toward their M.S. degree.

Protracted research projects sometimes cause the extension of program completion beyond two years.

3. Actions to Correct Previous Shortcomings

During November of 2002 a team representing the Accreditation Board for Engineering and Technology (ABET) Applied Science Accreditation Commission visited the Idaho State University (ISU) campus to review our baccalaureate and masters programs in Health Physics. Although the review team identified many positive aspects of the ISU health physics programs, they also identified two institutional concerns and two programmatic concerns within their Draft Statement for Review and Comment with respect to the M.S. Program.

Institutional Concerns
The first institutional concern was a lack of sufficient financial resources from the State of Idaho. The second identified institutional concern was a lack of adequate support for graduate education especially in the area of recruitment. It was suggested that "increasing graduate student stipends would improve the program's ability to compete with other universities in recruiting and attracting new graduate students."

While all responsible individuals at Idaho State University recognize how a lack of state funding negatively impacts all aspects of the educational effort, this is hardly a unique situation, but is rather a problem affecting most if not all state-supported institutions in the nation. We also appreciate the very great demands on the State of Idaho's ever shrinking budget. Despite these global economic issues the State of Idaho support received by the university under recently better economic conditions is evident. To observe evidence of state support, one need only consider the state-of-the-art Physical Sciences Building described under item 4 of the Institutional Strengths section of the 2002/2003 ABET Draft Statement for Review and Comment. Economic cycles are a part of a long term state funding process. We are confident that State Funding will improve with time. Improvement in economic conditions will ultimately allow an increase in graduate student stipends as will improvements in the ISU's ability to obtain more outside funding sources for research on grants and contracts. It might be noted, that the lack of resources has not substantially impacted student access to our Health Physics Programs as almost all of our students, including undergraduates, are supported by research grants or contracts as research assistants. It is not clear that lack of funding has substantially impacted faculty morale as reported by the faculty of the Health Physics Program.

Since 2003, Graduate students stipends have been raised. M.S. students now receive a $13,285 annual stipend during the academic year while Ph.D. students receive $14,235 per academic year. This does not include summer hours that they are paid for work on grants and contracts.

Programmatic Concerns
The first programmatic concern references Criterion 5 and discusses a lack of faculty to accommodate "all those aspects of a quality education." The major issue identified by the review team was that one faculty member carries too much of the programmatic responsibilities. ISU also recognizes this as an unsatisfactory condition.

Shortly after the ABET site visit, ISU administration committed to obtaining a second Health Physics Faculty member. This person after several delays was originally hired during the fall semester of 2004. Unfortunately, the individual initially hired, left Idaho State University at the beginning of the spring semester in 2006. A second individual was hired and began a full time tenure track academic appointment during the spring semester of 2008. Idaho State University also hired a full time instructor who started during the fall semester of 2006.

The second programmatic concern was associated with Criterion 2 - Program Educational Objectives. It was recommended that the ISU MS program objectives be improved to more accurately reflect the greater rigor of the MS program over those of the ISU Health Physics BS program. Since the ABET ASAC team visit ISU Health Physics faculty have both drafted additional objective statements and received approval of these additional statements from their Program Advisory Committee. The revised objectives have been incorporated into the ISU Health Physics program and are published at all pertinent locations.

III. ACCREDITATION SUMMARY

Criterion 1. Students

The program must evaluate, advice, and monitor students to determine its success in meeting program objectives. The program must have and enforce policies for the acceptance of transfer students and for the validation of courses taken for credit elsewhere. The program must also have and enforce procedures to assure that all students meet all program requirements.

We assure that all students are Systematically Evaluated in the following ways:

Students are evaluated during the admission process prior to entry into the program, while in the program, and upon completion of the program. Admission into the program is allowed under established policy. The following paragraphs describe entry into the graduate program in Health Physics at Idaho State University.

1. Student Trends

Graduate students who enroll in the Idaho State University Health Physics Program and begin course work tend to arise from three different situations.

(1) Idaho State University Health Physics Program Baccalaureate Students continuing their education in the ISU HP graduate program.

(2) Students admitted from other colleges of universities with Baccalaureate degrees. This frequently includes those with baccalaureate degrees from biology, engineering, or non-physical science programs such as those students who have studied radiographic sciences degrees or even in one case theology. This often includes students from non-American universities.

(3) Students entering the graduate program who are not seeking degrees but whom ish to take graduate courses.

2. Graduate School Admission

Graduate students are admitted to the Health Physics program in the following ways:

A. Acceptance and Placement of Graduate Students

Admission Requirements for Degree-Seeking Students

Degree-seeking students must meet the following requirements:

a. A baccalaureate degree from a college or university accredited in the United States or its equivalent from a school in another country.

b. An earned grade point average of at least 3.0 or higher for all upper division credits taken at the undergraduate level, regardless of the institution at which the credits were earned, for those seeking a master's degree. In the case of those students who have not completed the baccalaureate degree, the grade point average shall be recalculated on all upper division credits once the bachelor's degree is completed.

c. Degree-seeking applicants must submit official scores on the aptitude portion of the Graduate Record Examination (GRE).

d. It is possible within the Department of Physics to admit degree-seeking students to Conditional status without submission of test scores. However, in such cases, the test must be taken in the first semester or summer session of enrollment. Applicants who have achieved at least the 35th percentile in one of the aptitude sections of the GRE (Verbal, Quantitative, Analytical), or a raw score of at least 38 on the MAT are eligible for admission as degree-seeking students if the earned grade point average for all upper division credits taken at the undergraduate level is 2.0 or higher.

e. GRE/GMAT/MAT scores are used for other purposes in addition to admission. The Physics Departments also use these scores as part of the criteria for awarding graduate assistantships, fellowships, or scholarships.

f. NOTE: Students admitted to conditional status may not be eligible for federal financial aid.

g. Approval by the Physics Department.

h. Approval by the Dean of Graduate Studies.

B. Admission Requirements for Non-Degree-Seeking Students

Non-degree-seeking students who apply for admission must meet the following conditions:

a. A baccalaureate degree from a college or university accredited in the United States or its equivalent from a school in another country.

b. Proof of graduation must be shown by evidence of a degree. Students must submit one of the following: copy of an unofficial transcript showing proof of degree, copy of the diploma, copy of Idaho Teacher Certification, or a letter from an appropriate college or university official.

c. A properly completed application form which includes signing an agreement that the applicant will provide evidence that he/she holds a baccalaureate degree.

d. International students do not qualify for unclassified status.

C. Admission Requirements for Professional Development Students (597 Courses)

The Graduate School recognizes the need for individuals in their particular occupations to improve their professional capabilities by taking particular courses which would provide that service. Many of these students, particularly public school teachers, are best served if these courses are offered for graduate credit. In some cases the courses are workshops or short courses which can be taken in a short time period. These types of courses are "advanced" with respect to the students who enroll but are not courses which a particular discipline offers to a student with the goal of earning an advanced degree. Therefore, professional development courses are offered by many departments to meet the perceived need and are treated differently in the following respects:

a. Students may enroll in professional development courses offered under the 597 number without the necessity of being admitted to Graduate Studies. However, they must hold a baccalaureate degree from an accredited institution at the time they enter the class or receive special permission from the Dean of Graduate Studies if they are last semester seniors.
b. The credits earned will not count toward an advanced degree nor may they be petitioned to count at a later date.
c. There is no limit to the number of 597 credits which a student may earn.
d. All instructors of 597 courses must have an advanced degree.
e. Students must certify for each 597 course for which they enroll that they possess a baccalaureate degree and agree to the conditions by which they are permitted to register for the course.
f. Students who have not been admitted previously to Graduate Studies at Idaho State University will be classified as Unclassified, Master's, and Professional Development students. They will not be permitted to register for any graduate level courses except 597 courses unless they apply for admission and are accepted into Graduate Studies.
g. Students who have been admitted into Graduate Studies are permitted to take 597 courses but must register for these courses by signing the special registration form in addition to the regular procedures for registration.
h. Departments shall determine if and when professional development courses are to be offered with their prefix.

D. Admission of International Students

Applications for admission to graduate studies will not be processed in the Graduate School until cleared by the International Admissions Clerk in the Office of Admissions. Applications will not be processed until the application fee has been received. In addition to the admission requirements listed previously, international students must meet the following conditions:

a. International students must submit a financial statement to the graduate School verifying that they will be able to support themselves financially for one year while attending Idaho State University. This must consist of a statement or letter from a bank indicating that funds are available and accessible. The amount of money available to the student must be listed on the financial statement. A graduate assistantship or fellowship awarded by a department or college may be used as part of this amount.

b. International students who have not graduated from an accredited college or university in the United States and whose native language is not English, normally must achieve satisfactory scores on the Test of English as a Foreign Language (TOEFL). Specifically, students must achieve a total score of 550 and a score of 55 on Section l (Listening Comprehension). PHOTOCOPIES OF TOEFL SCORES WILL NOT BE ACCEPTED.

c. International students may not enter the United States for graduate study without a U.S. Immigration (I-20) form. This form will be supplied by the International Admissions Clerk in the Office of Admissions after a department or college chooses to accept a student and items l and 2 above are met in addition to the admission requirements listed previously. International students are urged to remain in their own countries until they receive notice of acceptance.

d. International students transferring from a school within the United States must be "IN STATUS" with Immigration and Naturalization Services to be issued an I-20 form from ISU. A transfer form will be sent after the application has been received, to be completed as verification of acceptable immigration status.

E. Admission of Last-Semester Seniors

Seniors in residence at ISU, with permission of the Graduate School, may register for no more than 6 graduate credits during the semester or summer session in which they will complete the work for a bachelor's degree at ISU. This option is reserved for outstanding seniors who are seriously considering attending ISU for graduate studies. The option must be approved not only by the Office of Graduate Studies but also by the student's advisor, the department chairperson, and the course instructor. ONLY COURSES NUMBERED 500-599 MAY BE TAKEN WITH THIS OPTION. If a senior admitted to graduate study under this provision fails to complete graduate requirements for a bachelor's degree, all graduate credits earned revert to undergraduate credit. The student's load, including both graduate and undergraduate credit, may not exceed 16 credits, or 9 credits in the case of summer school. A senior selecting this option must file an Application for Admission with the Graduate School when he/she requests permission to take graduate level courses. Application deadlines for admission of last-semester seniors are the same as those for degree-seeking graduate students.

3. Acceptance and Placement of Students - Classifications of Graduate Students

A. Degree-seeking Students

Classified Status

When considering graduates of accredited institutions, who have earned grade point averages of 3.0 or higher for all upper division credits taken at that undergraduate level, regardless of the institution at which the credits were earned, are eligible, upon submission of official GRE scores, to be admitted to classified status in graduate masters programs.

Students who achieve at least the 35th percentile in one of the aptitude sections (Verbal, Quantitative, or Analytical) may be eligible for this classification if the earned grade point average for all upper division credits taken at the undergraduate level is 2.0 or higher.

Conditional Status

A department/college may, at its discretion, admit students in a degree program on a trial basis to Conditional status to ascertain their ability to do graduate work within a particular curriculum. Students admitted to Conditional status are those who do not have acceptable undergraduate grade point averages and/or GRE scores for admission to the university.

Conditional status also may be used by a department for students whose credentials do not meet specific departmental requirements. Conditional students must adhere to regulations established by the Graduate Council.

Change from Conditional to Classified Status

The following criteria must be met by the student before the Conditional status can be changed to Classified:

a. The student must complete at least nine credits and maintain a 3.0 GPA or better;
b. If the GRE was not taken by the student at the time of admission to Conditional status, the student must take the GRE during the first semester of enrollment.

Upon completion of the above two criteria, a request to change the student's status to Classified may be submitted to the Dean of Graduate Studies. The following steps must be followed to accomplish this change:

a. At any time after meeting the above criteria a student may initiate an Approval for Change of Student Status in the Graduate School. However, the department/college may also initiate the change and should do so by written request when the student has met the required criteria. The department/college also has the option of requesting the change to classified status before the student has completed nine credits.
b. If the student's credentials at the time of the request for change in status to Classified status reveal a GPA of less than 3.0 for all upper division credits taken at the undergraduate level, regardless of the institution at which the credits were earned, and GRE scores lower than the 35th percentile for each of the aptitude sections (Verbal, Quantitative, Analytical), then admission to Classified status must be approved by the Graduate Council.
c. The change from Conditional to Classified status must be approved by the Dean of Graduate Studies.

The Physics Department may request that students be shifted to classified status by written request. If a student admitted to Conditional status fails to meet the conditions for admission stated on the Approval for Admission form, the student will be dismissed from the program.

Non-degree Seeking Students

Unclassified Status

Applicants holding a bachelor's degree who desire to take courses for graduate credit for personal or professional enrichment but who do not want to pursue a graduate degree are eligible to apply for admission to Unclassified (non-degree-seeking) status. Courses may be taken only in those departments that have approved a student's unclassified admission. Students who are admitted to unclassified status are allowed to register for a maximum of 7 credits per semester.

If the student wishes to pursue a graduate degree within the university, the student must
(1) Notify in writing the department/college of his/her intention to seek admission to Classified status and
(2) Apply for change of student status in the Graduate School. The student must also meet application and admission requirements of degree-seeking students described previously or below.

At the option of the departments, students may petition the Dean of Graduate Studies to transfer course work taken while under unclassified status to a degree program. The total number of such credits transferred shall not be more than 30% of the credits of the program of work required of each student for the degree. International students do not qualify for unclassified status.

B. Program Requirements

The Health Physics Emphasis of the M.S. in Physics is a thesis program that will prepare students for radiation protection careers leading to upper technical and management levels in industry, universities, medicine, national laboratories, government, nuclear power and radioactive waste management.

The minimum admission requirements are admission to the Graduate School and a baccalaureate degree as approved by the department. The basic program minimum requirements are 30 credits of which 15 credits must be at the 600 course level. Six of the fifteen 600 level credits may be thesis. The normal core program is listed below. Students who are prepared with some education and experience in Health Physics will likely not need all of the elective health physics courses. Therefore, the program of the student will be determined in consultation with the student's advisor and committee and can include electives to meet their needs. An oral examination in defense of the thesis is required.

C. Evaluation during the Academic Program

The primary tool used to evaluate student progress in our Health Physics Program is the application of the traditional letter assignment (A through F) combined with a plus-minus grade system for performance in each class attempted by the student. The addition of the plus-minus system to the traditional letter grade occurred about eight years ago. At the time of the introduction of the plus- minus system, the students enrolled at ISU were given the option of including that system on there transcript. Students enrolling after the introduction of the system uniformly have the system applied to the grades of their transcript. Grades are assigned at the completion of each semester based upon clearly defined course objectives outlined in class syllabi and a predetermined grade scale which is developed by each instructor of record for each class. University policies for student withdrawal procedures, incomplete grades, or repeating a course to replace a grade are published in the ISU Graduate Catalog.

All thesis credits and some research courses may be graded on a satisfactory (S) or unsatisfactory (U) basis. Also *in progress* (IP) grades may be given to students who have initiated but not completed thesis project research work. No graduate courses are offered on a Pass/No-Pass basis.

Midterm grades are available at a date posted within the published university time schedule of classes (printed each semester) for all graduate students receiving a C or less in any particular class. Faculty academic advisors are notified of these situations shortly after the grade postings.

Graduate health physics students in these circumstances are formally encouraged to meet with their academic advisor to discuss any potential problems and solutions to those problems that may be available. An example of the typical letter sent to students in this circumstance may be found in Attachment One.

At the beginning of a student's final semester of their M.S. program, (a point in time when both the student and the student's major professor agree that their thesis is at or sufficiently close to final form that defense of the thesis is likely during the semester) an application for graduation is filed with the Registrar's Office. This application prompts an audit of the student's transcript by the staff of the Graduate School Office to verify completion of the graduate requirements and the Students approved plan of study. The completion of the student's M.S. thesis with formal approval from all members of the examining committee is also considered.

The result of this audit, if the student has successfully completed all required course work, is that the student is recommended for the degree by the Dean of the Graduate School.

4. Advising and Monitoring Students

We assure that all students are Systematically Advised and Monitored in the following ways:

A. Within the Department of Physics:
Each semester the Director of the Health Physics Programs meets for a formal academic advising session with each actively enrolled and registered student. During this session, a review of the student's academic progress is conducted. Typically the student's proposed academic schedule is reviewed to assure that all necessary classes for completion of the program are being completed, and the courses are being taken in an appropriate sequence given the didactic layout of the schedule sequence and the student's previous academic preparation. Implicitly, the academic performance of each student is monitored and reviewed during this session.

B. Within the Graduate School:
At the end of each semester, graduate students who do not achieve the cumulative GPA of 3.0 are automatically placed on academic probation for the next semester of enrollment and are referred to the appropriate academic dean for advising by the staff of the Registrar's Office. Probationary status serves notice that if a student's cumulative record at the end of the next semester in unsatisfactory, he or she will be disqualified and ineligible to continue at Idaho State University. To register at the university after being academically disqualified, students must be reinstated according to university policy published in the ISU Graduate Catalog.

5. The Acceptance of Transfer Credits

The program must have and enforce policies for the acceptance of transfer students and for the validation of courses taken for credit elsewhere:

Over the last 12 years only one student has attempted to transfer into the ISU Health Physics graduate program. Indeed, this was the only student to attempt this in the memory of any program faculty. Nevertheless, consistent with the ABET requirement, the Health Physics Program follows the administrative procedure/policy found in Attachment Two for the acceptance of graduate transfer students and for the validation of courses taken for credit elsewhere:

We assure that all students meet all program requirements in the following ways:

The Physics Department/ Health Physics Program maintains records of the course work attempted and accomplished by each student, significant accomplishments achieved by the student during their tenure at Idaho State University and any other details about the student that faculty deem important. This file contains unofficial grade transcripts as maintained on the university's electronic records system, curricular advising sheets, and course inventory work sheets completed during semi-annual faculty/student advising meetings by the program director or the student's major professor. Attachment Three provides example copies of the type of forms maintained in our student files. Thus, a track record of courses completed, and planned, is maintained for reference. The university uses a modern, web-based pre-registration system that is accessed by students as the final step in course selection. Students are provided guidance on course selection and informed of specific graduation requirements; however, to maintain an atmosphere of academic freedom to the extent possible, the responsibility of selecting the courses taken each semester is ultimately left to the student.

Criterion 2. Program Educational Objectives

Each program must have in place:

(a) *detailed published educational objectives that are consistent with the mission of the institution and these criteria*

1. Program Educational Objectives

The Idaho State University Health Physics programmatic educational objectives have been developed in close collaboration of faculty and the Idaho State University Health Physics Program Advisory Board. The educational objectives are published on the Program web page, in part in the Graduate School Catalog, and are provided as a part of the syllabi for core courses of the Health Physics Program.

The educational objectives of the ISU Health Physics program are to produce Health Physicists with
1) broad, fundamental technical knowledge,
2) written and verbal communication skills
3) professional judgment and capability to think critically
4) practical experience in solving applied health-physics problems
5) the ability to work independently
6) a professional ethic

of magnitude sufficient for them to productively and successfully work in a variety of health physics settings. The graduate program has two additional educational objectives:

1. an ability to conduct research
2. professional tools and experience above that expected for the baccalaureate program.

Idaho State University is a regional public institution, providing a broad range of educational services to a culturally and ethnically diverse population of students. The university is Idaho's center for education of the health professions and supporting sciences; in business and engineering; and in the liberal arts. Health physics, an allied health discipline that draws strongly on the physical sciences, fits perfectly into ISU's role and mission. Idaho State University is dedicated to excellence in teaching and committed to providing accessible, high quality education while fostering the economic growth of the region, and enhancing development of the human resources infrastructure of Idaho.

The stated goals and objectives of the Health Physics program and the program itself are consistent with Idaho State's role as Idaho's lead institution for education in the health professions and related biological and physical sciences. These objectives are also supportive of Idaho State University's mission to offer an array of undergraduate and graduate academic programs with a dedication to excellence in teaching. They are also consistent with the Health Physics Program's mission:

> Our mission is educating students so they can achieve the highest standards of the health physics profession, and solving important problems for the people and industries of Idaho and the Nation through teaching, research, and service.

Each program must have in place:

(b) *a process based on the needs of the program's various constituencies in which the objectives are determined and periodically evaluated*

2. Program Constituency

The Constituency of the Health Physics Program currently consists of the following groups:
1. Students

2. Advisory Group Members
3. Alumni
   (Alumni are considered in categories based upon their graduation date, this allows us to consider different stages of programmatic development when analyzing data.)
4. Alumni Employers
5. Faculty

The constituency groups described above are consistent with a major goal of Idaho State University which is "to welcome the involvement of alumni and other friends"

> *Idaho State University's extended community includes its alumni and other friends-citizens of Idaho and from around the world who maintain an active interest in, and who may wish to support, the development and progress of the university. Idaho State University welcomes their ongoing involvement in its endeavors. The university strives to keep them informed about its activities, and to provide them with opportunities for participation in a range of programs serving the educational needs of the state and region.*

3. Process for the Determination and Periodic Evaluation of Programmatic Objectives

As part of the programmatic commitment to the Outcome Assessment Process, faculty of the ISU Health Physics Program have agreed to meet periodically and as deemed necessary during the academic school year to assess the current activities of the program, identify key focus areas for development, and plan the implementation of steps to be taken to improve program performance and output consistent with our programmatic objectives. At these meetings, information is documented about how well the educational objectives of the program are serving our constituent groups and how well the objectives are being met. The assessment of programmatic objectives conducted at these meetings is based upon evaluations of an ongoing outcomes assessment process involving class grades, surveys of program alumni, surveys of alumni employers, Focus groups set up in an ad hoc fashion to evaluate and improve specific courses of interest, and student class evaluations. All of these assessment tools themselves are under constant review and revisions to answer the questions arising from this review and continuous improvement/modification process. Periodically, meetings are held with the program's advisory committee. During Advisory Committee meetings activities of the periodic faculty assessment meetings are summarized with the intention of soliciting feedback from the committee on the continued efficacy and appropriateness of the program objectives. All information generated, observations developed, and interpretations of the universe in which the health physics program functions are synthesized into a continuous assessment of programmatic objectives. With the direct input of the program's advisory committee, objectives are developed, modified, or deleted with the goal of improving the program and enhancing the efficacy in which it accomplishes its mission. This procedure is consistent with the concept of feedback loops for program evaluation and assessment. Figure One, provided below, is a diagram depicting the Outcomes Assessment Process committed to by the faculty of the ISU Health Physics Program.

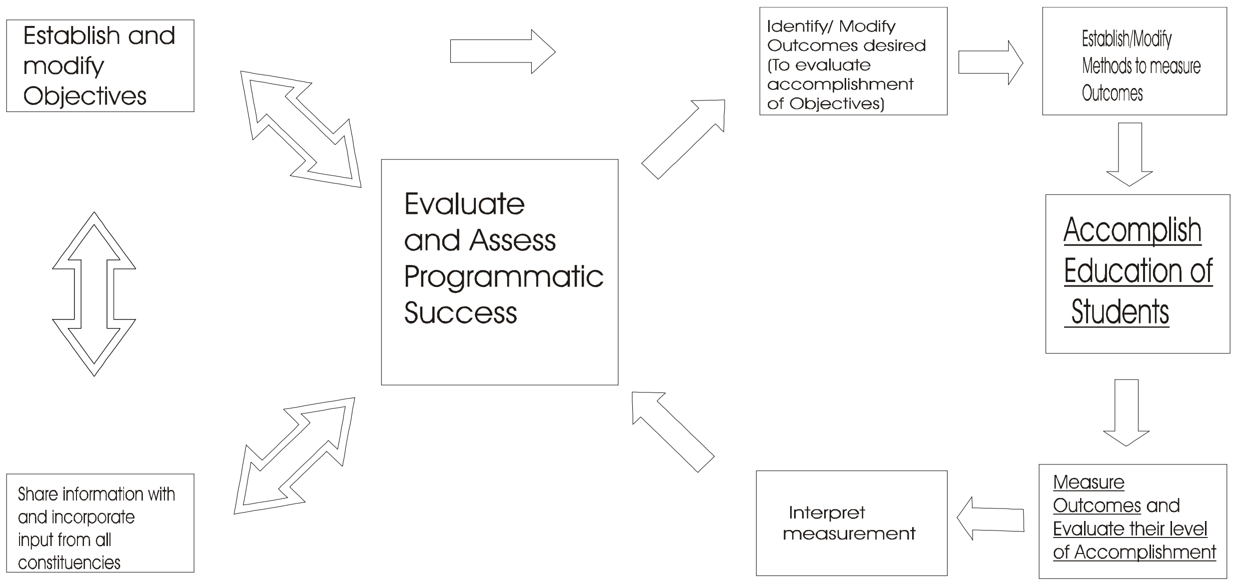

Figure One, The Idaho State University Health Physics Program's Out-comes Assessment Process.

The educational objectives of our Health Physics program have been established and are periodically revised as a collaborative effort between program faculty and the program advisory board. The educational objectives are based upon the perceptions of constituency needs formulated by both the advisory board and faculty after reviewing program history, considering student employment trends, student class evaluations, and interpreting alumni and alumni employer survey information.

Because of this collaborative arrangement and the data considered during the decision making process; alumni, alumni employer and student surveys, grades, etc., our supposition is that there is extensive constituency involvement in this process by which program objectives are determined and evaluated.

Before establishing a new course, modifying an existing course description, or changing programmatic requirements in any substantial way, approval of the Idaho State University Graduate Council must first be obtained. The Graduate Council is composed of representatives from all major academic groups on campus. If the course happens to be a dual level upper division undergraduate and graduate course, then approval must also be obtained from the

Curriculum Council. The Curriculum Council is composed of representatives from all major academic groups on campus.

Each program must have in place:
(c) A curriculum and process that ensure the achievement of these objectives

Table One: Curriculum of the Idaho State University Masters of Science Program

Required Courses	Credit
PHYS 601 - Quantitative Methods in Physics	3
PHYS 605 - Rad. Enviro. Mon. & Surveillance	3
PHYS 610 - Radiation Regulations	3
PHYS 650 - Thesis	6
Electives - That are required if not taken at the undergraduate level.	
PHYS 516 - Intro to Nuclear Measurements	3
PHYS 531 - Radiation Physics I	3
PHYS 532 - Radiation Physics II	3
PHYS 533 - External Dosimetry	3
PHYS 534 - Internal Dosimetry	3
BIOS 507 - Radiation Biology	3
Other Electives	
*Health Physics Rotating Electives Courses**	
PHYS 511 - Accelerator Health Physics	3
PHYS 512- Environmental Health Physics	3
PHYS 513 - Fundamentals of Industrial Hygiene	3
PHYS 517 - Industrial Ventilation & Aerosol Physics	3
PHYS 518 - Non-ionizing Radiation Protection	3
PHYS 519 - Radiological Emergency Planning	3
PHYS 520 - Reactor Health Physics	3
PHYS 555 - Topics in Health Physics I	2
PHYS 556 - Topics in Health Physics II	2
PHYS 592 - Colloquium in Physics (may be repeated up to six times)	6
PHYS 509 - Intro Nuclear Physics	3
PHYS 599 - Medical Applications	3
NS&E 571- Intro to Nuclear Engineering	3
PHYS 501 - Modern Physics	3
PHYS 503 - Advanced Modern Physics	3
PHYS 504 - Advanced Modern Physics	3
PHYS 597 - ABHP Certification	**
PHYS 590 - Advanced Radiation Dosimetry	3

* One of these courses is offered each semester in a continuous rotation. Other electives are offered at other frequencies or upon demand.
** This is a continuing education course which students are encouraged to take; however, credits from this class are not applicable toward the MS degree.

Many other graduate credits may be taken to fulfill the 15 credit elective requirements of the M.S. program. Selection of these is highly dependent on the student's research project, advice from the student's major advisor, and student's previous academic preparation. Under no circumstances are lower division credits allowed to be used toward an MS degree. However, to improve inadequate preparation some graduate students may be required to complete lower division undergraduate courses even if they do not apply toward their MS degree.

<u>The Assessment of Achieving Programmatic Objectives: A System of Ongoing Evaluation that Considers the Level of Achievement of Programmatic Objectives</u>

The assessment of programmatic objectives is conducted at periodic faculty meetings and as appropriate with meetings of the Program Advisory Board. The assessment of programmatic objectives is based upon evaluations of an ongoing outcomes assessment process.

Several different outcomes assessment tools are used as appropriate during the review process. Not all tools are required to be used during each review cycle. The frequency of application of a specific outcomes assessment metric is the decision of the faculty group completing the assessment cycle. The outcome assessment tools used include but are not limited to class grades, student focus groups, surveys of program alumni, surveys of alumni employers, student class evaluations, and cumulative outcome assessment examinations given annually to program seniors. All of these assessment tools are under constant review and revision to answer the questions generated during the review and continuous improvement/modification process. An array of the Outcome Assessment tools is employed, as delineated below in Table Two, to quantitatively evaluate the level of success that has been accomplished while pursuing the objectives.

Table Two: Outcome Assessment Tools used to evaluate achievement of objectives.

<u>Objective 1: Broad, fundamental technical knowledge</u>

Outcome Assessment Tools:

- Students pass core courses
- Graduates pass ABHP certification examination
- Surveys of Program Constituency indicate appropriate knowledge base
- Advisory Board Curriculum review

<u>Objective 2: Written and verbal communication skills</u>

Outcome Assessment Tools:

- Students pass applicable communication courses
- Student laboratory reports
- M.S. Thesis
- Professional papers, presentations and posters

<u>Objective 3: Professional judgment and capability to think critically</u>

Outcome Assessment Tools:

* Performance in classes, problem solving and approaches to "defective problems", laboratory performance
* Assessment of M.S. Thesis supervisor
* Performance in work/research experience as reported by supervisor
* Surveys of students and alumni, alumni employers

Objective 4: Practical Experience in Solving Applied Health Physics Problems

Outcome Assessment Tools:

* Performance in classes, problem solving, laboratory performance
* Assessment of M.S. Thesis Project Administrator
* Performance in work/research experience
* Surveys of students and alumni, alumni employers

Objective 5: The Ability to Work Independently

Outcome Assessment Tools:

* Performance in class problem solving exercises and laboratory performance
* Assessment of M.S. Thesis Project Administrator
* Performance in work/research experience
* Surveys of students, alumni, and alumni employers
* Professional papers, presentations and posters

Objective 6: A Professional Work Ethic

Outcome Assessment Tools:

* Performance in classes
* Performance in work/research experience
* Surveys of alumni employers
* Assessment of students as observed in letters of recommendation

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However, the assessment does not stop after an evaluation is completed. This is a feedback process. Based upon the quantitative evaluation of the outcomes, the institutional approach of the program: the courses offered, course sequence, and course content are revisited. If there is information to justify a modification of the program that would lead to the hypothesis that the change will enhance performance of the objectives, then the program is modified. This internal loop allows for optimization of efforts to accomplish the stated objectives.

Consideration of comments from alumni, alumni employers, and student surveys, faculty perspectives, and Advisory Board perspectives allows for modification of objectives over time so that our program to the maximum extent possible, is relevant to the constituency.

Criterion 3. Program Outcomes

A. Baccalaureate (and Master of Science) degree programs must demonstrate that graduates have:

(a) an ability to apply knowledge of mathematics, science, and applied sciences

(b) an ability to design and conduct experiments, as well as to analyze and interpret data
(c) an ability to formulate or design a system, process, or program to meet desired needs
(d) an ability to function on multidisciplinary teams
(e) an ability to identify and solve applied science problems
(f) an understanding of professional and ethical responsibility
(g) an ability to communicate effectively
(h) the broad education necessary to understand the impact of solutions in a global and societal context
(i) a recognition of the need for and an ability to engage in life-long learning
(j) a knowledge of contemporary issues
(k) an ability to use the techniques, skills, and modern scientific and technical tools necessary for professional practice.

Students must successful complete a series of required courses. The successful completion by a student of a course as designated by letter grade is a demonstration that a student has accomplished the intended purpose of that course. Table Three provides the correlation between the Criterion 3 Programmatic Outcomes and the Required courses offered by Idaho State University**.** Table Four provides the correlation between the Criterion 3 Programmatic Outcomes and the Elective courses offered by Idaho State University**.**

Table Three Correlation among ISU Health Physics Program Required Core Curriculum, the ISU Program Objectives, Criterion 3 attributes, and Health Physics Program Criteria.

Class	ISU Objectives	Criterion 3 attributes	Program Criteria
<u>Required Courses</u>			
PHYS 601Quantitative Methods in Physics	**1,2, 3,4,5,6**	**a,b,c,d,e,f,g,h,i,j,k**	**(a),(b),(c),(d),(e)**
PHYS 605 Rad. Enviro. Mon. & Surveillance	**1,2, 3,4,5,6**	**a,b,c,d,e,f,g,h,i,j,k**	**(a),(b),(c),(d),(e)**
PHYS 610 Radiation Regulations	**1,2, 3,4,5,6**	**a,b,c,d,e,f,g,h,i,j,k**	**(a),(b),(c),(d),(e)**
PHYS 650 Thesis	**1,2, 3,4,5,6**	**a,b,c,d,e,f,g,h,i,j,k**	**(a),(b),(c),(d),(e)**
<u>Electives- That are required if not taken at the undergraduate level</u>			
PHYS 531 Radiation Physics I	**1,2, 3,4,5,6**	**a,b,c,d,e,f,g,h,i,j,k**	**(a)**
PHYS 532 Radiation Physics II	**1,2, 3,4,5,6**	**a,b,c,d,e,f,g,h,i,j,k**	**(a),(b),(e)**
PHYS 516 Intro Nuc. Measurements	**1,2, 3,4,5,6**	**a,b,c,d,e,f,g,h,i,j,k**	**(a),(b),(e)**
PHYS 533 External Dosimetry	**1,2, 3,4,5,6**	**a,b,c,d,e,f,g,h,i,j,k**	**(a),(c),(d),(e)**
PHYS 534 Internal Dosimetry	**1,2, 3,4,5,6**	**a,b,c,d,e,f,g,h,i,j,k**	**(a),(d),(e)**
BIOS 507 Radiobiology	**1,2, 3,4,5**	**a,b,c,e,k,h,d**	**(b),(e)**

The reader may wish to refer to page 16 to refresh themselves on the definitions of all numbered ISU objectives, page 22 to see page Lettered Criterion 3 attributes, and lettered Health Physics Program Criteria.

Table Four. Correlation among ISU Health Physics Program Technical Elective Courses, the ISU Program Objectives, Criterion 3 attributes, and Health Physics Program Criteria.

Class	ISU Objectives	Criterion 3 attributes	Program Criteria
Health Physics Rotating Elective Courses			
PHYS 511 Accelerator Health Physics	1,2, 3,4,5,6	a,b,c,d,e,f,g,h,i,j,k	(a),(b),(c),(d),(e),(f)
PHYS 512 Environmental Health Physics	1,2, 3,4,5,6	a,b,c,d,e,f,g,h,i,j,k	(a),(b),(c),(d),(e),(f)
PHYS 513 Fundamentals of Industrial Hygiene	1,2, 3,4,5,6	a,b,c,d,e,f,g,h,i,j,k	(a),(b),(c),(d),(e),(f)
PHYS 517 Industrial Ventilation and Aerosol Physics	1,2, 3,4,5,6	a,b,c,d,e,f,g,h,i,j,k	(a),(b),(c),(d),(e),(f)
PHYS 518 Non-ionizing Radiation Protection	1,2, 3,4,5,6	a,b,c,d,e,f,g,h,i,j,k	(a),(b),(c),(d),(e),(f)
PHYS 519 Radiological Emergency Planning	1,2, 3,4,5,6	a,b,c,d,e,f,g,h,i,j,k	(a),(b),(c),(d),(e),(f)
PHYS 520 Reactor Health Physics	1,2, 3,4,5,6	a,b,c,d,e,f,g,h,i,j,k	(a),(b),(c),(d),(e),(f)
Other Electives			
PHYS 555 Topics in HP I	1,2, 3,4,5,6	a,b,c,d,e,f,g,h,i,j,k	(a),(b),(c),(d),(e),(f)
PHYS 556 Topics in HP II	1,2, 3,4,5,6	a,b,c,d,e,f,g,h,i,j,k	(a),(b),(c),(d),(e),(f)
PHYS 592 Colloquium in Physics 1st	1,2, 3,4,5	a,f,g,h,i,j	(F)
PHYS 592 Colloquium in Physics 2nd	1,2, 3,4,5	a,f,g,h,i,j	(f)
PHYS 599 Medical Applications	1,2, 3,5	a,b,c,e,k,h,d	NA
NS&E 371 Intro. to Nuc. Engineering	1,2, 3,5	a,b,c,e,k,h,d	NA
PHYS 501 Modern Physics	1,2, 3,5	a,b,c,e,k,h,d	NA
PHYS 503 Advanced Mod. Phys.	1,2, 3,5	a,b,c,e,k,h,d	NA
PHYS 504 Advanced Mod. Phys.	1,2, 3,5	a,b,c,e,k,h,d	NA
PHYS 590 ABHP Certification **	1,2, 3,4,5,6	a,b,c,d,e,f,g,h,i,j,k	(a),(b),(c),(d),(e),(f)
PHYS648 Advanced Radiation Dosimetry	1,2, 3,4,5,6	a,b,c,d,e,f,g,h,i,j,k	(a),(b),(c),(d),(e),(f)

Many other graduate credits may be taken to fulfill the 15 credit elective requirements of the M.S. program. Selection of these is highly dependent on the students research project, advise from the students major advisor, and students previous academic preparation.
**** This is a continuing education course which students are encouraged to take; however, credits from this class are not applicable toward the MS degree.**

The reader may wish to refer to pages 16 to refresh themselves on the definitions of all numbered ISU objectives, Page 22 to see the Lettered Criterion 3 attributes, and page ___to see the lettered Health Physics Program Criteria.

Criterion 4. Continuous Improvement

The program uses a documented process incorporating relevant data to regularly assess its program educational objectives and program outcomes, and to evaluate the extent to which they are being met. The results of the evaluations are used to effect continuous improvement of the program through a documented plan.

Examples of complete review and improvement documentation for a view periodic cycles are provided as attachments two, three, and four.

Criterion 5. Curriculum

The curriculum requirements specify subject areas appropriate to applied science programs but do not prescribe specific courses. The program's faculty must assure that the curriculum devotes adequate attention and time to each component, consistent with the objectives of the program and institution. The curriculum must include:

> *(a) a combination of college-level mathematics and basic sciences (some with experimental experience) appropriate to the discipline*
>
> *(b) applied science topics appropriate to the program*
>
> *(c) a general education component that complements the technical content of the curriculum and is consistent with the program and institution objectives.*

*Students in baccalaureate degree programs (*and Graduate Programs*) must also be prepared for applied science practice through a curriculum culminating in comprehensive projects or experiences based on the cumulative knowledge and skills acquired in earlier course work.*

1. Curriculum of the Idaho State University Master of Science Program

Table One, page 22, provides a list of the required courses and suggested elective courses associated with the Masters Program in Health Physics. Criteria 5 (a) and (c), are satisfied in large part by careful adherence to the University and Graduate School Admission Requirements. As a graduate program the main faculty attention is focused on Criteria 5 (b). A review of course content will need to be conducted by the visiting team to evaluate the appropriateness of applied science topics to the program. Faculty at Idaho State University in the health physics Program continuously review the question of appropriate topic as well as depth of material provided and are well satisfied with the quality of this aspect of the program. All Masters Students must complete a thesis in partial fulfillment of the requirements for the degree offered by Idaho State University.

Criterion 6. Faculty

The faculty must be of sufficient number as determined by student enrollment and the expected outcome competencies of the program. There must be sufficient faculty to accommodate adequate levels of student-faculty interaction, including classroom teaching, laboratory and field supervision, student advising and counseling, and research, as well as, non-student interactions in university service activities, professional development, and interactions with industrial and professional practitioners, as well as employers of students.

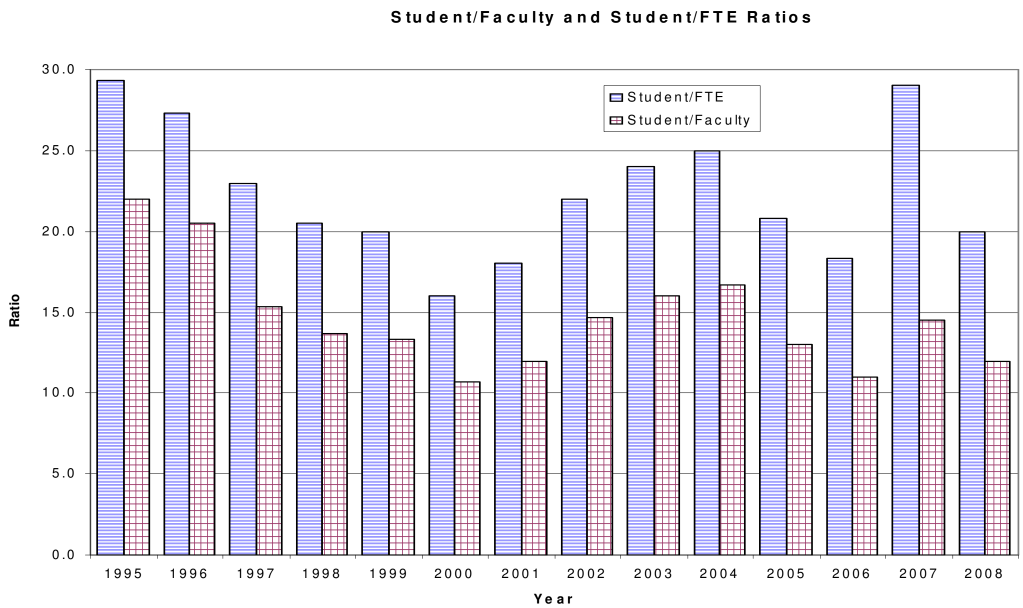
The faculty must have sufficient qualifications and must ensure the proper guidance of the program and its evaluation and development. The overall competence of the faculty may be judged by such factors as education, diversity of backgrounds, applicable experience, teaching performance, ability to communicate, enthusiasm for developing more effective programs, level of scholarship, participation in professional societies, and applicable certifications, registrations, or licensures.

...also...The Health Physics Programmatic Criteria States that: *The faculty primarily committed to the program must demonstrate current knowledge of health physics through education and experience. The overall competence of the faculty may be judged by such factors as education, teaching experience, diversity of backgrounds, professional experience, ability to communicate, enthusiasm for developing more effective programs, level of scholarship, participation in professional societies, and certification by the American Board of Health Physics.*

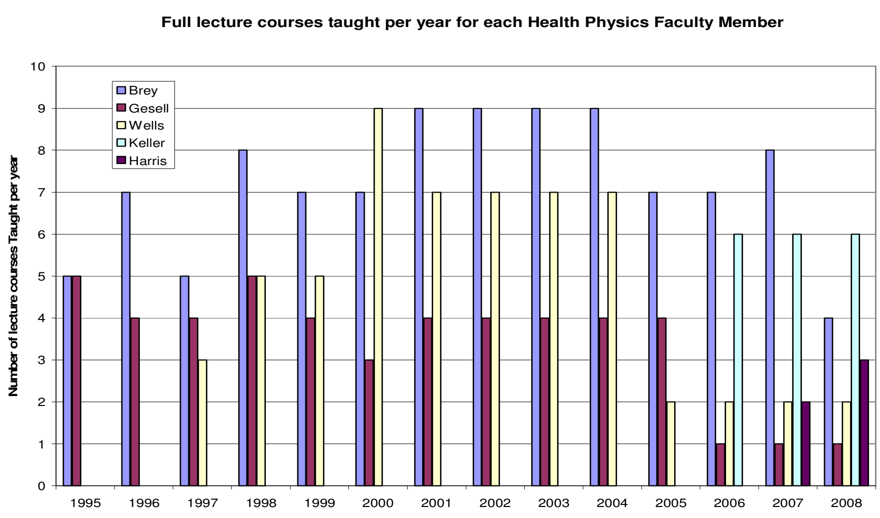
Faculty

The Idaho State University Health Physics Program is currently supported by two senior faculty, one junior faculty member, and an instructor. One of the senior faculty members is a Certified Health Physicist, the other is an distinguished emeritus member of the National Council of Radiation Protection (NCRP), a distinction which represents over 25 years of exceptional professional experience, 10 of these with the Department of Energy, the balance in academia. This individual is a recognized expert on the subject of environmental radioactivity. The ISU junior Health Physics faculty member is an Associate Member of the American Academy of Health Physics.

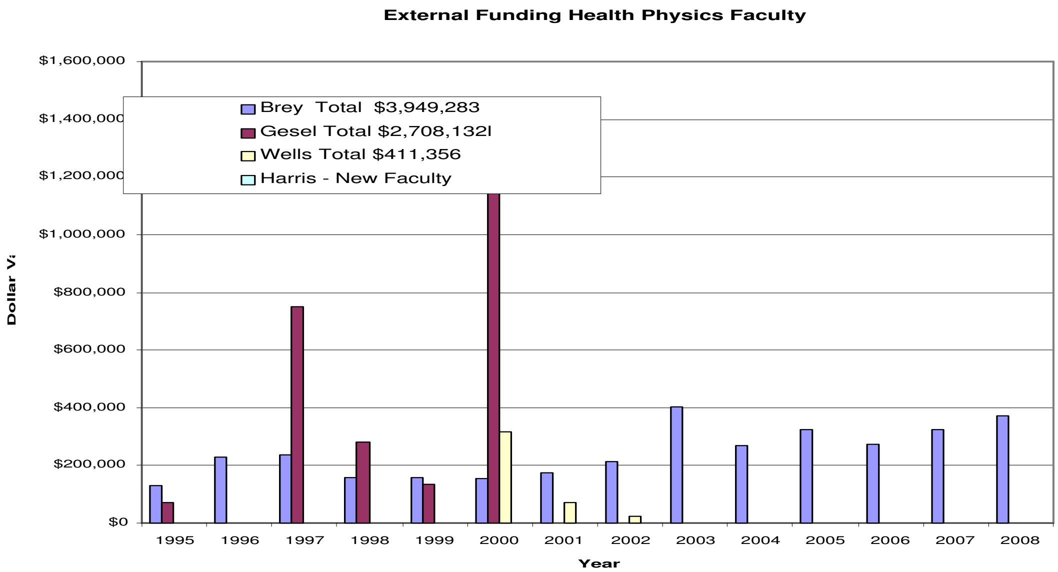
The following figure demonstrates the student/faculty and student/faculty-FTE ratio provided by the Health Physics Program since 1995.



The following figure demonstrates the number of courses taught per year by each faculty member since 1995.



The following figure demonstrates the total outside grant and contact money brought into the university per year by each Health Physics Program Faculty Member since 1995.
(This figure has not been completely updated)



The following table summarizes the number of committee assignments undertaken by Brey, Gesell, and Wells since 1995 on the Departmental, University, and National levels. This table also provides the number of publications of all types produced by these individuals either as first author, or collaborators.
(This table has not been completely updated)

	Number of Committee Assignments			Number of
H.P. Faculty	Department	University	National/International	Publications
Brey	3	9	11	114[a]
Gesell	5	0	16	31[b]
Wells	1	3	3	53[c]
Harris	0	0	6	4

[a] Total since 1995. Of this total: 15 are refereed journal articles, 3 are book chapters and one is an NCRP commentary.
[b] This includes only refereed journal articles; not abstracts and poster papers
[c] Total Since 1997

The program is also supported in various ways by adjunct and affiliate faculty. The Health Physics Program has three Adjunct Faculty members: Clarke, Cummings, and Schrader, and six Affiliate Faculty members: Hall, Langley, O'Rear, Rich, Ritter, and James. Adjunct Faculty provide full 2 or 3 credit hour courses. Occasionally Affiliate Faculty provide guest lectures in Health Physics Courses.

When considering the full time faculty alone there is clearly a firm capability among the available talent to completely provide the educational services necessary to accomplish all programmatic objectives. The addition of affiliate and adjunct faculty enhances this considerable pool of talent. Review of this section also serves to demonstrate that the research and service aspects of the Health Physics Program's mission statement are clearly being fulfilled.

Criterion 7. Facilities

Classrooms, laboratories, and associated equipment must be adequate to accomplish the program objectives and provide an atmosphere conducive to learning. Appropriate facilities must be available to foster faculty-student interaction and to create a climate that encourages professional development and professional activities. Programs must provide opportunities for students to learn the use of modern applicable instruments and equipment. Computing and information infrastructures must be in place to support the scholarly activities of the students and faculty and the educational objectives of the program.

1. Facilities

The Idaho State University Health Physics Program is proud to boast of their recently remodeled facilities in the Physical Sciences Building on the Campus of Idaho State University in Pocatello, Idaho. The physical sciences building houses departmental head quarters, faculty offices, graduate student offices - and offices for many undergraduates employed by research grants or contracts, and working in the laboratories. All of these facilities maintain current micro-computers with internet capabilities that students have access to under various circumstances. There is a state of the art nuclear instrumentation teaching laboratory used for PHYS 516. There are two sister environmental radioanalytical laboratories, the Environmental Monitoring Laboratory (EML) and Environmental Assessment Laboratory (EAL). The EML serves the INEEL State of Idaho Oversight Program's needs. The EAL currently works with a private contractor group: Stoller Inc., to analyze a large fraction of the regulatory required INEL Off-Site monitoring requirements. These laboratories employ both graduate and undergraduate students. Both laboratories also employ full time laboratory supervisors and are administered by Health Physics Program faculty.

The Physical Science Building also houses the ISU Technical Safety Office (TSO) which is responsible for both Radiation Safety on Campus and Hazardous Waste Management. The TSO is administered by a Health Physics Faculty member. The organization also employs undergraduate and graduate students. The Physical Science Building also houses one of the three laboratories which comprise the Idaho Accelerator Center (IAC).

The Idaho Accelerator Center (IAC) plays an integral part in the educational experience offered to Idaho State Health Physics Program students. The IAC operates three separate accelerator laboratories on the ISU campus. Although not verified, the university believes that the IAC perhaps operates more accelerators than any other institution on the planet and clearly represents more available accelerator capital than any other institution of comparable size. Idaho State University students at all levels have greater opportunity to operate, repair, and in short gain experience with accelerator technology than is commonly encountered within a university setting.

The three IAC laboratories are the IAC central facility (referred to locally as the IAC), the Airport field facility, and the Small Accelerator Facility. The IAC's Particle Beam Laboratory located in the ISU Physical Sciences Building operates one Van de Graaff accelerator and one LINAC. The IAC central facility houses and operates a 45-MeV fast pulse LINAC and a 22-MeV LINAC. The facility also houses ISIS a 100-amp beam pulsed-machine. IAC also owns and operates several other smaller linear accelerators in collaboration with various industrial partners.

Idaho State University Facilities are thought to be entirely appropriate to achieve all programmatic objectives, provide an atmosphere conducive to learning, and provide an atmosphere that encourages professional development and professional activities. Over the last 14-years of the ISU Health Physics Program's history all traditional graduate students have been gainfully employed in one of these facilities performing professional quality work and undertaking professional level responsibilities for some fraction of their tenure year at ISU.

Table Six provides an extensive, although perhaps not exhaustive, list of all nuclear instrumentation and research capital equipment available within the facilities described above.

2. University Library

The University Library, located in the Eli M. Oboler Library building, contains major collections of books, maps, microfiche, periodicals and government publications and provides a full range of services to students and staff. The book collection of approximately 360,000 volumes is accessed via an on-line catalog which is linked to an automated circulation system. The library subscribes to some 3,400 periodicals and serials including Health Physics, Radiation Protection Dosimetry, Radiological Protection and other journals important to Health Physics. Complete collections of many of these journals have been established. The Library is working to complete its partial collection of NCRP and ICRP reports. The government publications collection comprises over

400,000 items. ISU has been a depository for federal publications since 1908 and for Idaho State publications since 1972. The government publications department contains a collection of more than 1,500,000 items published in microform. The ISU policy on periodical resources is based upon interlibrary loan request. Since this is dominated by the physical sciences and physics in particular, The Health Physics Program anticipates an equitable share of the periodical budget presently and in future years.

Table Six: Nuclear Instrumentation and Research Capital Equipment

Equipment/Facility	**Location (on/off campus)**	**Description of Equipment/Facility Utilization**
Accelerators	On	1(2 MeV) Van de Graaff3(4-MeV), 10-MeV,18-MeV, and 22-MeV electron LINACs/ materials irradiation, sterilization, biological effect, photon activation, neutron generation, BNCT, waste characterization, and dosimetry studies 45-MeV fast pulse LINAC/ to go online during 1998 - many similar applications. Febatron unit ISIS a 100-amp beam pulsed-machine
5 mW AGN-201 reactor	On	Activation studies, instrumentation studies, iodine generation in therapy studies.
Neutron Howitzer and neutron transport cask	On	20 Ci PuBe neutron source in a water filled howitzer, 50 Ci AmBe source calibration and activation investigations.

Equipment/Facility	**Location (on/off campus)**	**Description of Equipment/Facility Utilization**
Solid state detectors: 121 Intrinsic Germanium detectors one of the 12 is a LE(Ge) with Be window 6 Si(Li) Detectors	On	Shielded high resolution gamma spectrometers and x-ray spectrometers The LE(Ge) is currently shielded with a 12" annular NaI(Tl) crystal operated as an active shield for Compton suppression. Most systems are operated via NIM electronics with AIM modules and employing Genie 2000 /Pro-count 2000 software. Also several different portable MCA systems are available
Independent Radiation detectors and NIM electronics	On	The department has a **large assortment** and great quantity of radiation detectors and supporting NIM electronics including: NaI(Tl), Geiger-Muller, proportional counters detectors (gas flow and sealed), long counters, BF_3 tubes, a spherical tissue equivalent proportional counter, Phoswich systems, plastic scintillators, light pipes, etc. and amplifiers, pre-amplifiers, scalers & counters, timers, pulsers, cables, bins, and various pulse manipulation NIM. For example ISU has over 3 dozen NaI(Tl) detectors ranging in size from 1-inch to 8-inch.
Workstations (3)	On	Hewlett Packard, Apollo, and Athena unit
Personal computers, most computers are networked to the Athena mini-computers. (>30)	On	PC's with MCA data acquisition cards for data acquisition and analysis, gross data analysis, report generation.

Equipment/Facility	Location (on/off campus)	Description of Equipment/Facility Utilization
Machine Shops: Physics and IAC facility.	On	Fabricate research items.
Frequency Generators and pulse generators	On	Calibrated frequency generators for use in survey meter calibration and pulse generators Used for calibrating portable survey instruments.
Misc. laboratory equipment	On	Glassware (volumetric flasks, condensers, distillation flasks, vacuum filtration flasks, burrets, pipettes etc.) balances, micro-balances, oscilloscopes, multi-meters, temperature probes, hot plates, mixers, centrifuges, refrigerators, ovens, vacuum ovens, pH meters, conductivity meters, calibrated standards, calibration standards, etc.
TLD readers and TLDs	On	ALNOR automated TLD reader and Harshaw research grade single chip, powder, and rod reader with a large assortment of TLD 100, 600, and 700 chips, TLD powders, rods, capsules etc.
Portable survey equipment (several)	On	Ion chambers, GM tubes, scintillators, including HP REM 500 neutron survey meter and other neutron survey meters self-reading dosimeters etc. Used for health physics surveys and as investigation tools.

Equipment/Facility	Location (on/off campus)	Description of Equipment/Facility Utilization
Air Pumps; Portable Air samplers and env. air sampling systems	On	Portable and stationary air samplers for collecting airborne radioactive materials for isotope identification and hazard evaluation.
Liquid Scintillation Counters (5)	On	2 Wallac, and 3 Packard. All systems employ an active shield to reduce bkg.
Laboratory Proportional Counters (5)	On	3 Canberra 2404 APC systems, and 2 Protean APC system. All have active guard ring shielding capability and significant passive shielding.
Calibration Sources (many)	On	All NIST traceable, of various geometries, densities, and radionuclide compositions in dispersable and non-dispersable forms.
Idaho National Engineering Laboratory	Off	This large multi-disciplinary laboratory has numerous facilities which can be accessed on a case basis by ISU students. Included are whole body counters, beta, gamma and neutron calibration sources, and radioanalytical laboratories.

Criterion 8. Support

Institutional support, financial resources, and constructive leadership must be adequate to assure the quality and continuity of the program. Resources must be sufficient to attract, retain, and provide for the continued professional development of a well-qualified faculty. Resources also must be sufficient to acquire, maintain, and operate facilities and equipment appropriate for the program. In addition, support personnel and institutional services must be adequate to meet program needs.

1. Institutional Support and Financial Resources

The Health Physics program was first available to students at ISU 17 years ago when the first faculty member was hired. Growth of the program and institutional support allowed a second faculty to be hired in 1993 with a third hired in 1996. (This person was originally 0.5 FTE Health Physics and 0.5 FTE Physics but is now serves a full administrative role of the Idaho Accelerator Center.) A fourth person, an instructor was hired in 2006. The last new hire was a tenure track assistant professor who was hired in January of 2008.

Since Physics at ISU has focused on Nuclear Physics and its applications, Health Physics was a natural extension of our activities. The budget for Health Physics is not separately determined from the rest of the department's. Departmental budgets are based on the previous year's budget unless there has been a major change in the program or number of faculty. Thus, in Physics, the FY08 budget was determined by applying an inflationary adjustment to the FY07 budget. The department has been able to institute lab fees which have taken some of the pressure off our capital equipment budget and provided us with some capability to maintain reasonable computational facilities and, when coupled with grant monies, provide well equipped teaching labs.

After initial start-up funding from the Department, College, and Office of Research, research equipment is generally provided and upgraded through individually obtained external funding or, to a lesser extent, through University funding competitions. This means that faculty development is funded through grants that provide travel to conferences, etc. The university provides resources to assist faculty in taking advantage of new technologies as desired by the faculty.

Criterion 9. Program Criteria

Each program must satisfy applicable Program Criteria. Program Criteria provide the specificity needed for interpretation of the General Criteria as applicable to a given discipline. If a program, by virtue of its title, becomes subject to two or more sets of Program Criteria, then *that program must satisfy each set of Program Criteria; however, overlapping requirements need to be satisfied only once.*

<u>*Curriculum:*</u>
The program must demonstrate that graduates possess the necessary knowledge, skills, and attitudes to competently and ethically implement and practice applicable scientific, technical, and regulatory aspects of Health Physics. More specifically, graduates must produce a culminating senior project and demonstrate competency in the following curricular areas:

1) *radiation physics*
2) *radiation biology*
3) *radiation detection and measurements with laboratory experience*
4) *internal and external radiation dosimetry*
5) *principles of radiation safety and health physics*
6) *contemporary issues in health physics*

1. Program Criteria

Because of the entwined nature of the Program Criterion and Professional Component Criterion this report address both criteria in section 3 of this report. The reader is requested to review section 3 and consider in detail Tables Three and Four pages 26 and 27.

List of Attachments

ATTACHMENT ONE Forms from Files

HEALTH PHYSICS - M.S.

The Department of Physics, in addition to the more traditional physics program, also offers the M.S. option in Health Physics. Health Physics, an applied science, is concerned with the protection of humans and their environment from the possible harmful effects of radiation while providing for its beneficial uses. It is a multidisciplined profession that incorporates aspects of both the physical and biological sciences.

Progress Check-off Work-sheet for Requirements of Major

Required Courses

Phys 601......Quantitative Methods in Physics - 3 cr ______
Phys 605......Radiological Environmental Monitoring & Surveillance - 3 cr ______
Phys 610......Radiation Regulations - 3 cr ______
Phys 650......Thesis - 6 cr ______

Total ______

Elective Courses (may be required if not taken at the undergraduate level.)

Bios 507......Radio Biology ______
Phys 509......Introductory Nuclear Physics - 3 cr ______
Phys 516......Introduction to Nuclear Measurements - 3 cr ______
Phys 531......Radiation Physics I - 3 cr ______
Phys 532......Radiation Physics II - 3 cr ______
Phys 533......External Dosimetry - 3 cr ______
Phys 534......Internal Dosimetry - 3 cr ______
Phys 555......Topics in Health Physics I - 3 cr ______
Phys 556......Topics in Health Physics II - 3 cr ______
Phys 592......Colloquium in Physics (may be repeated) - 1 cr ______
Phys 000......Other ______
Phys 000......Other ______
Phys 000......Other ______

Total ______
Grand Total ______

Title of Thesis Proposal____
____

Proposal is...... ______
Thesis is...... ______

C=completed SRC=still required to be completed W=waived NA=not applicable
T=transfer credits accepted IP=in progress

Signature_________________
Date_____________________

ATTACHMENT ONE
Forms from Files

NOTES

date

date

date

Forms from Files

Month Day, Year

Name
XXXXXXX.
YYYYYYs Rd.
City, ID Zip

Dear :

I see that you have had some difficulty with mid-term grades. I would like to encourage you to keep working at your classes. Please stop by the Health Physics office and see me, room 123B, during the week of DATE. I can also be reached at 282-2667. If this is not convenient, contact my secretary, NAME, at 282-4308.

Thank you.

Sincerely,

Rich Brey, Professor
Health Physics

RB/en

Forms from Files

Graduate Program of Study
Idaho State University

___Planned Program_______ _X__Final Program
(date submitted) (date submitted)
(submitted first semester of enrollment) (submitted semester prior to graduation)

....

Student Name:
Address: s.s.
bengal
Department:
Degree Sought: ____M.S.

Major Advisor:

Departmental Committee members:

....

List below the courses that you wish to apply to your degree.
All transfer courses must be converted to semester credits.

Dept. Course # Title Credits Year Institution

....

____
Student's signature Date

____ non-thesis option
_X___thesis option

____
Primary Advisor's signature Date

____
Primary Department Chair's signature Date

____
Graduate Dean's signature Date

Summary
500 level credits___________
600 Level credits___________
Total credits______________

ATTACHMENT TWO

<u>Health Physics Program Transfer Credit Policy</u>

The Idaho State University Graduate Catalog states the following with respect to the transfer of Graduate Credits:

> **Master's Degrees**
> ***All credits must be earned on the Idaho State University campus except for the following: In all master's degree programs a total of 9 semester credits may be transferred from an accredited institution. Transfer of residence credits from an accredited institution is acceptable only if the courses were taken as resident credits at that institution and are specifically approved by the Graduate School and the academic department of ISU when the final program of study is submitted. In these instances, it is the credit hours that transfer, not the grades. Official transcripts to be used for transfer of credits in a degree program must be received before application for a degree will be approved.***

Clearly there are limitations, requirements, and approvals explicit in this policy:

7) A <u>maximum</u> of 9 credit hours may be transferred.
8) For the credits to be transferable it is <u>required</u> that they:
   a. were obtained at an accredited university and
   b. were obtained as resident credits
9) The transferred credits must be <u>approved</u> by the Idaho State University Graduate School
10) The transferred credits must be <u>approved</u> by the academic department
11) As a <u>limitation</u>, only the credit hours are transferred not the grades.

The Master of Science in Physics with emphasis in Health Physics is an ABET accredited program. This program specifies that 18-required credits of courses be completed and 15-elective credits relative to the discipline be completed.

The Bachelor of Science in Physics with emphasis in Health Physics is an ABET accredited program. This program specifies that 120 credit hours be completed. These are composite of general education requirements and requirements imposed by the Department of Physics.

To transfer credits from another institution or program into the Idaho State University Health Physics Master or Bachelor of Science Programs which are acceptable as replacements for the required course credits four criteria must be met:

1) The course credits transferred must be associated with a specific class and the student must have earned a grade at least comparable to a B.

2) The faculty member responsible for the ISU course that is being replaced by the transfer credits **must authorize in writing the acceptance of this transfer course**. Such authorization should be guided by a <u>concept of majority</u>. This concept implies that the student has covered the majority of the areas of the course appropriate to the goals and objectives of the ISU Health Physics Program and the academic elements that are essential to an understanding of the topic.
   a. This <u>Concept of Majority</u> may be achieved if it can be demonstrated to the ISU faculty member's satisfaction that at least 80% of the material in the ISU course has been covered in the transferred course at an intellectual level comparable to the course offered at ISU.

   b. To augment or verify that the Concept of Majority has been achieved ISU faculty member may:
      i. Request the student to take a written examination to verify that the course

level was comparable to the ISU course.

ii. Require the student to attend specific subject area lectures to assure that the student has received exposure to all appropriate materials and information relative to the course in question.

3) The transfer credits must be approved by the ISU Health Physics Program Director.
4) The transfer of credits must comply with Idaho State University policy on credit transfer.

To accept elective courses from other ISU colleges or ISU programs acceptance of the students Program of Study is sufficient authorization.

To transfer credits from another institution or program into the Idaho State University Health Physics Master or Bachelor of Science Programs which are acceptable as elective course credits two criteria must be met:

1) The Health Physic Program Director **must authorize in writing the acceptance of this course**. Acceptance of an elective course implies that the course is consistent with the goals and objectives of the ISU Health Physics Program.

2) The transfer of credits must comply with Idaho State University policy on credit transfer.

Health Physics Program Assessment Report Presentation of 2000 (for reference).

Data related to the ISU Health Physics Program (HPP) Period of July 1, 2001 to July 1, 2002, T. F. Gesell, March 15, 2002

Introduction

The HPP has recorded grades of all students in all HPP courses since the inception of the program in 1989. Faculty evaluations by the students for 17 attributes have also been collected. In late 2001, the HPP alumni and their supervisors were surveyed, using 21 questions for alumni and 12 questions for their employers. The instruments used for the faculty evaluations and for the alumni and employer surveys will be available for review of the ABET Review Team. The raw survey data and summary data for grades and faculty evaluations are located in binders in Room 120 B of the Physical Science Building. Grade and faculty evaluation data for 1997 through 2001 and the survey data have also been entered into an Excel spreadsheet. The paper and electronic copies of the data are available to authorized users for official purposes.

The electronic format of the data allows analysis in various ways. This report provides an overview of the data and offers a few observations. We have resisted the temptation to provide numerous, detailed tables and charts with the understanding that specific questions that arise can usually be addressed quickly by accessing the spreadsheet. Thus it is not necessary to attempt to anticipate all possible questions and provide the answers in this paper.

Grades

Most grades are on an A to F system (A= 4, F= 0) with withdrawal (w) and incomplete (I) as options. A few courses such as thesis are graded as satisfactory (s) or unsatisfactory (u). The average grades by year for undergraduate and graduate courses in the HPP are given in Figure Two. The results are unremarkable with an average undergraduate grade in the major of 3.42 and an average graduate grade in the major of 3.66. By comparison, the average ISU Fall 2001 upper division GPA is 3.3 and the average graduate GPA is 3.78. Figure Three includes a Table and Scatter Plot of the Idaho State University grade distribution comparison from Fall 1997 through Fall 2001. As indicated in Figure Two, there is no indication of grade inflation in the HPP program over the five year period. About 6.5 percent of students withdraw from HPP courses for various reasons and 2% receive an incomplete.

Student Evaluations

Faculty evaluations by students are also on an A to F system but we have chosen to use a 1 to 5 scale (A= 5, F= 1) to be consistent with the scale of the alumni and employer surveys. The overall average scores over the 5 year period 1997 through 2001 is 4.64. With one exception, the various attributes are fairly tightly grouped. The attribute *"examinations were graded and returned promptly,"* was scored noticeably below the mean for all 5 years studied. Detailed results of the individual faculty evaluations by students are available to faculty members who are expected to use them as an aid to improving their teaching.

Survey of Alumni

The first alumni survey was developed in board and revised several times before use. Upon trying to analyze the data, several flaws were discovered. There was not a one to one correspondence between knowledge and skills to be scored for importance and those to be scored for how well the student was prepared by the HPP. We failed to ask them how well the HPP prepared them regarding regulations. We also failed to ask the alumni whether they were responding for the undergraduate program or the graduate program. We sent out 80 questionnaires and received 40 responses for a return rate of 50 percent. Summaries of the results are given in Figure Four for all alumni who responded, in Figure Five for alumni who responded and who graduated prior to 1996, and in Figure Six for alumni who responded and who graduated in 1996 or later. These dates were chosen in order to allow comparison of program performance in the early and later periods. A few generalizations can be drawn. Alumni felt that their level of preparation was lowest in computer programming and software application. The alumni felt that they were well prepared in health physics theory and in laboratory and instrumentation skills, although these were not highly rated in importance. Both groups cited communication skills as most important.

Survey of employers

The first employer survey was also developed in board and revised several times before use. The major flaw in this survey was an almost complete lack of correspondence between attributes to be scored for importance and those to be scored for how well the employee had been prepared by the HPP. Thus we could not extract this potentially important correlation from the data. We were able to make comparisons between the alumni and their employers regarding their perceptions of the importance of the various attributes (Figure Seven) and the degree to which the alumni had been prepared in those same topics (Figure Eight). There is a remarkable agreement between the employers and alumni in the relative importance of the five knowledge and skill areas that could be compared (Figure Seven). There is less agreement between employers and alumni on how well the alumni had been prepared by the HPP (Figure Eight). It is comforting; however, that for all six knowledge and skills categories, the employers believed that the alumni were better prepared than did the alumni themselves. Perhaps the alumni are too modest and unassuming.

Figure Two: Average grades by year for undergraduate and graduate courses in the HPP

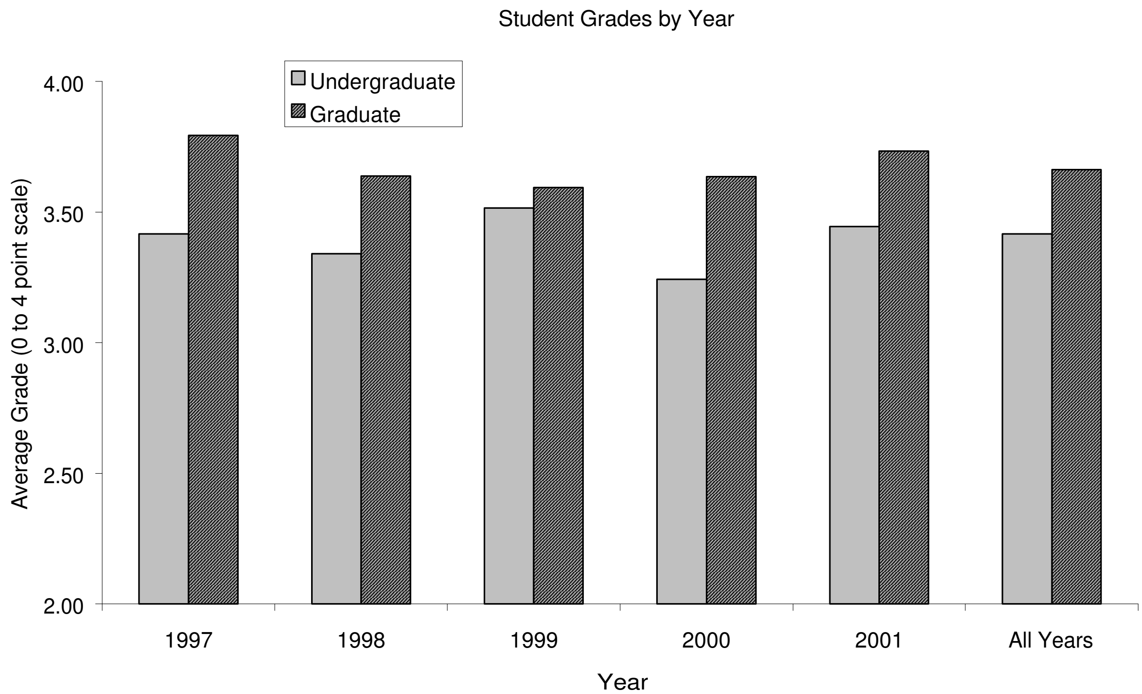


Figure Three: Table and Scatter plot of Idaho State University grade distributions from Fall 1997 through Fall 2001.

ISU						R&R
IDAHO STATE UNIVERSITY						
GRADE DISTRIBUTION COMPARISON						
FALL 1997 THROUGH FALL 2001						
		AVERAGE OF GRADES GIVEN				PERCENT
COLLEGE BY LEVEL	FALL 1997	FALL 1998	FALL 1999	FALL 2000	FALL 2001	CHANGE 1997 - 2001
ARTS AND SCIENCES						
LOWER DIVISION	2.71	2.74	2.73	2.73	2.67	-1.48%
UPPER DIVISION	3.06	3.07	3.06	3.18	3.16	3.27%
GRADUATE LEVEL	3.69	3.66	3.72	3.78	3.80	2.98%
BUSINESS						
LOWER DIVISION	2.61	2.50	2.63	2.52	2.57	-1.53%
UPPER DIVISION	2.91	2.88	2.84	2.97	2.85	-2.06%
GRADUATE LEVEL	3.22	3.41	3.45	3.39	3.45	7.14%
EDUCATION						
LOWER DIVISION	3.44	3.49	3.54	3.56	3.70	7.56%
UPPER DIVISION	3.51	3.59	3.56	3.63	3.74	6.55%
GRADUATE LEVEL	3.88	3.85	3.81	3.84	3.88	0.00%
ENGINEERING						
LOWER DIVISION	2.81	3.06	2.53	2.94	2.77	-1.42%
UPPER DIVISION	2.98	3.00	3.05	2.98	3.08	3.36%
GRADUATE LEVEL	3.72	3.76	3.75	3.54	3.63	-2.42%
HEALTH PROFESSIONS						
LOWER DIVISION	3.28	3.44	3.36	3.57	3.51	7.01%
UPPER DIVISION	3.58	3.56	3.60	3.60	3.58	0.00%
GRADUATE LEVEL	3.71	3.78	3.77	3.83	3.88	4.58%
INTERDISCIPLINARY						
LOWER DIVISION	--	--	--	--	3.19	N.A.
PHARMACY						
LOWER DIVISION	3.93	3.97	4.00	4.00	3.98	1.27%
UPPER DIVISION	3.47	3.13	3.12	3.38	3.27	-5.76%
GRADUATE LEVEL	3.49	3.42	3.41	3.33	3.43	-1.72%

TECHNOLOGY / ACAD.						
UPPER DIVISION	--	--	--	3.94	3.89	N.A.
GRADUATE LEVEL	--	--	--	3.98	3.97	N.A.
UNIVERSITY OF IDAHO						
LOWER DIVISION	3.33	3.53	3.34	3.41	3.45	N.A.
UPPER DIVISION	3.42	3.37	3.45	3.49	3.43	N.A.
GRADUATE LEVEL	3.72	3.79	3.83	3.87	3.82	N.A.
TOTAL ACADEMIC						
LOWER DIVISION	2.85	2.88	2.90	2.93	2.90	1.75%
UPPER DIVISION	3.25	3.22	3.22	3.32	3.30	1.54%
GRADUATE LEVEL	3.68	3.71	3.72	3.76	3.78	2.72%
TECHNOLOGY / PTE						
LOWER DIVISION	3.05	3.06	3.03	3.01	3.08	0.98%
UPPER DIVISION	2.12	2.03	2.11	1.85	2.29	8.02%
SOURCE: Grade Distribution Reports -- Office of Registration and Records -- Prepared by Cathy Blair						
EXCEL:GradeFall					(UPDATED: 01/10/2002)	

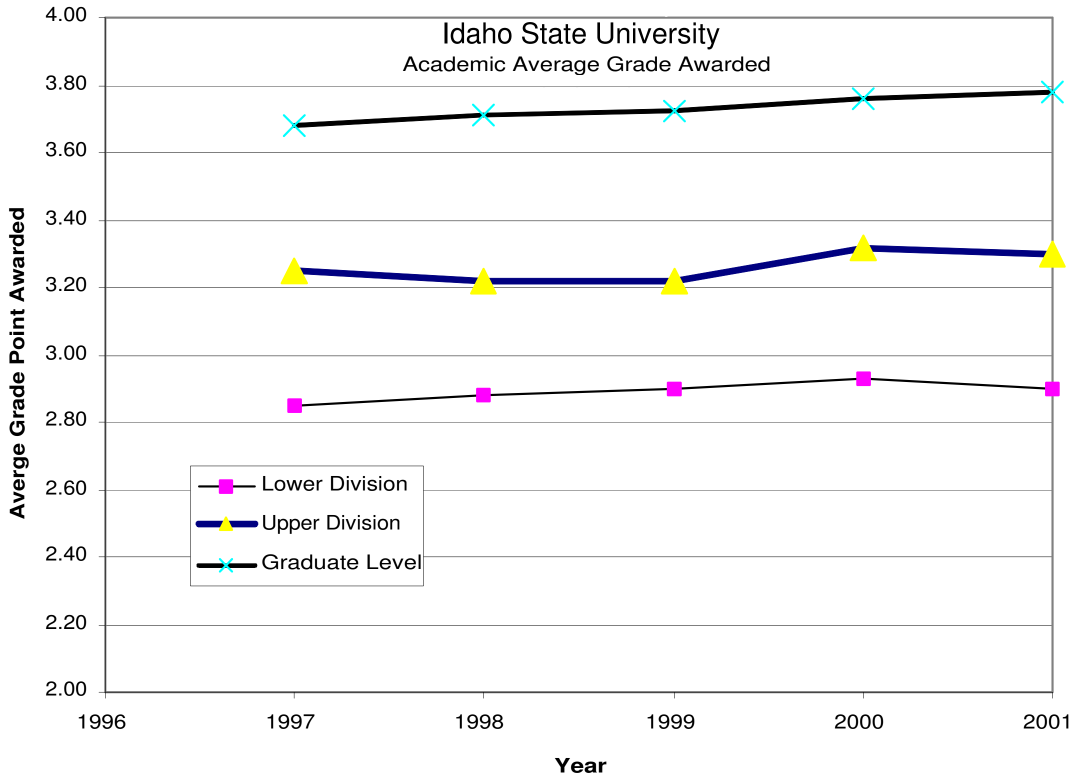


Figure Four: Comparison of all alumni perceptions of the importance of various topics and their preparation by the HPP. Topics are ordered along the abscissa with increasing perceived importance.

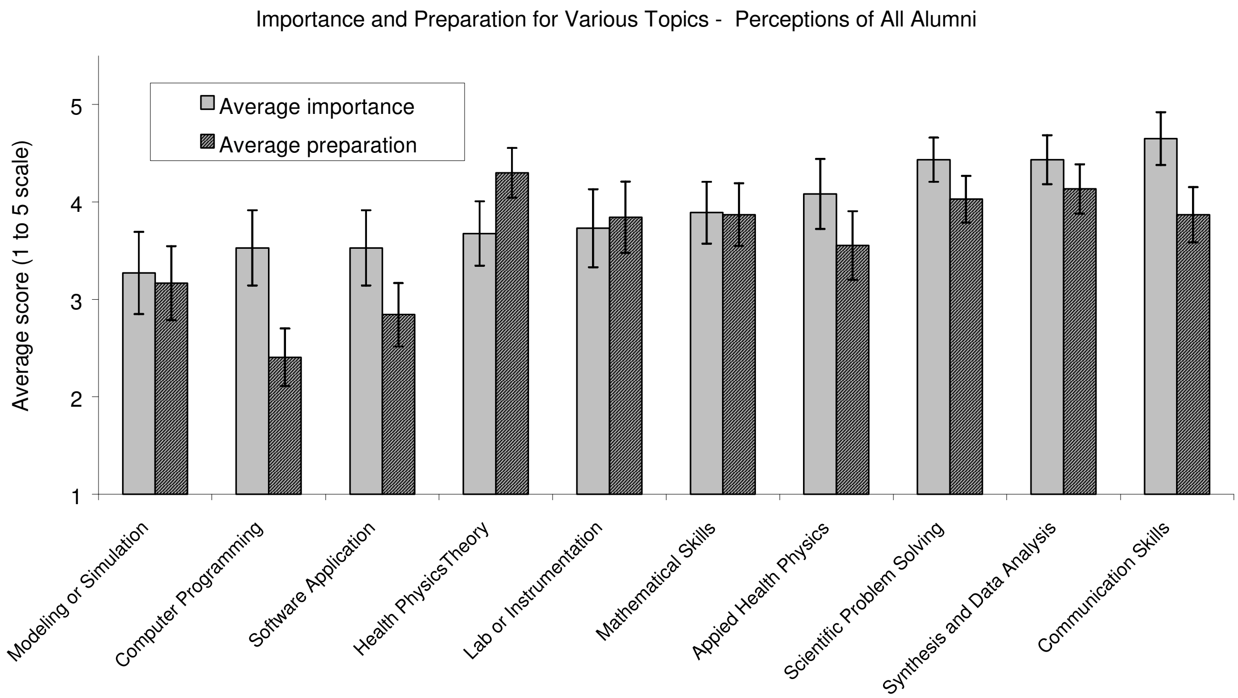


Figure Five: Comparison of 1989-1995 alumni perceptions of the importance of various topics and their preparation by the HPP. Topics are ordered along the abscissa with increasing perceived importance.

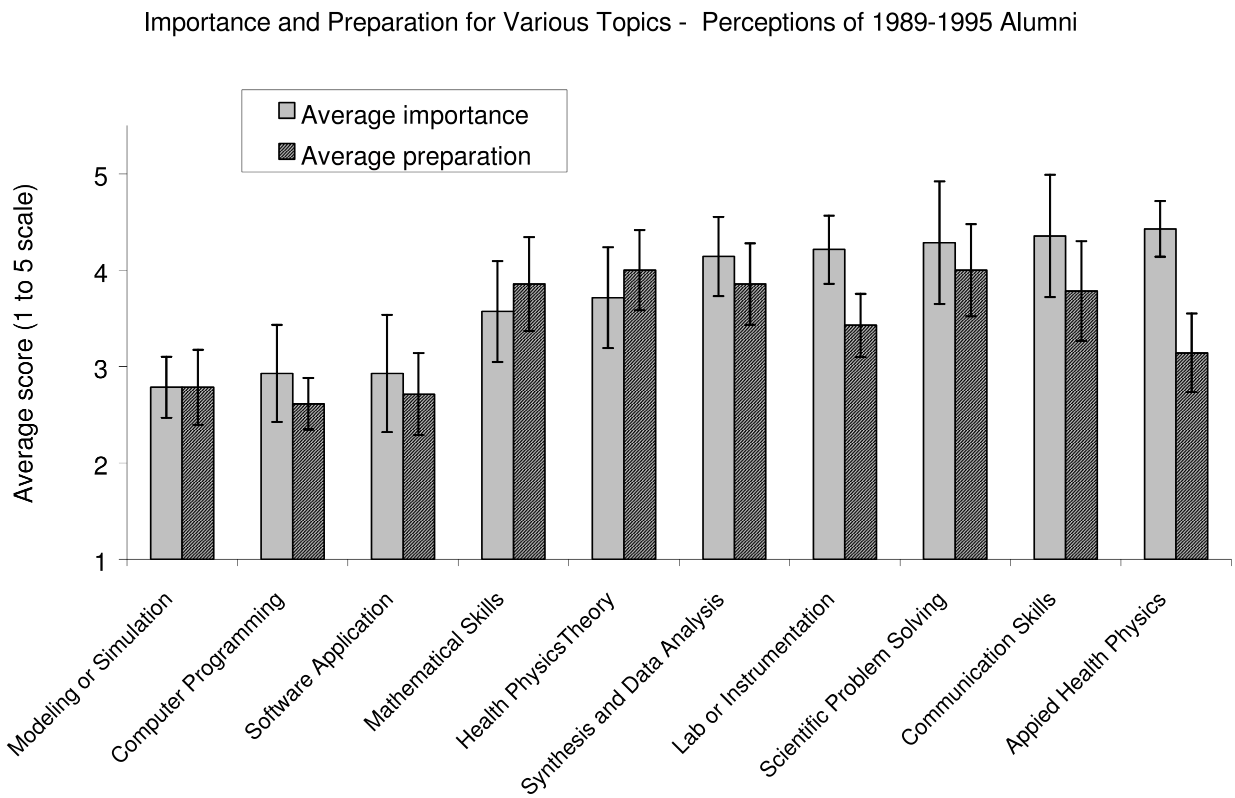


Figure Six: Comparison of 1996-2002 alumni perceptions of the importance of various topics and their preparation by the HPP. Topics are ordered along the abscissa with increasing perceived importance.

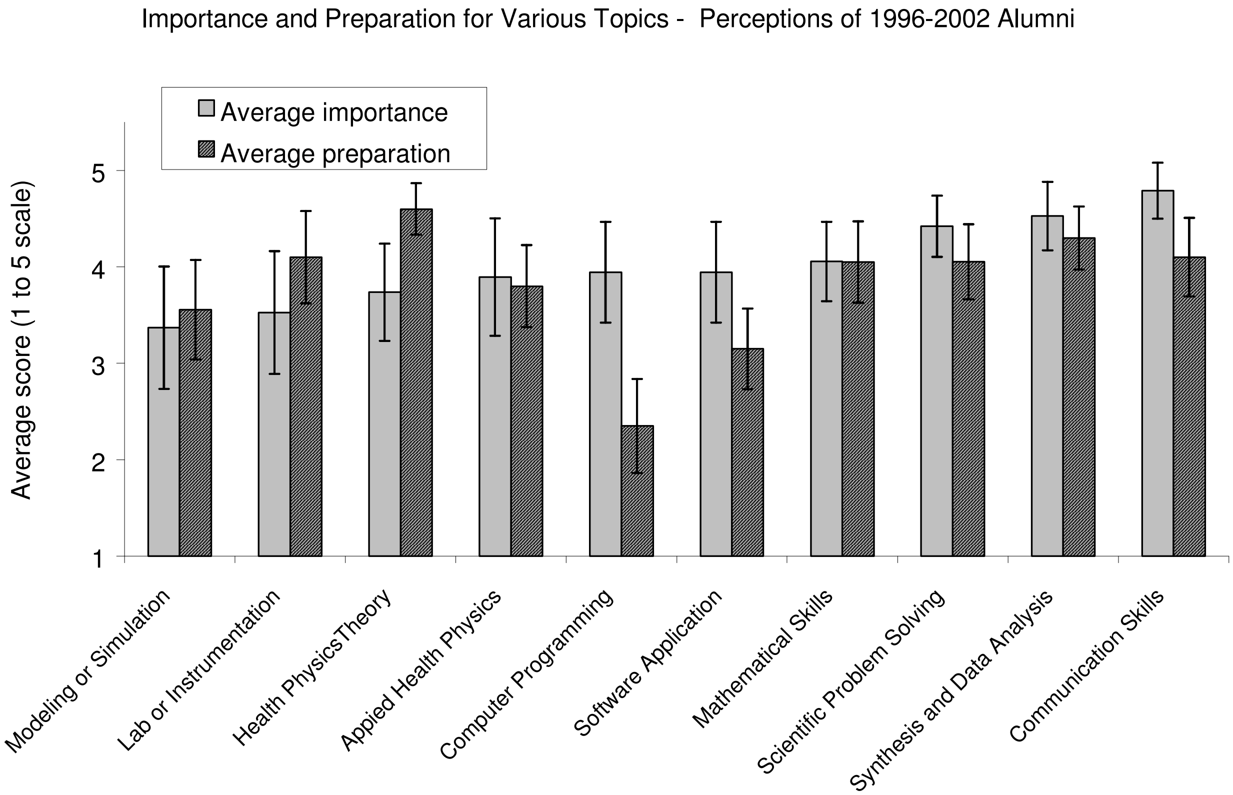


Figure Seven: Comparisons between the alumni and their employers regarding their perceptions of the importance of the various knowledge and skills.

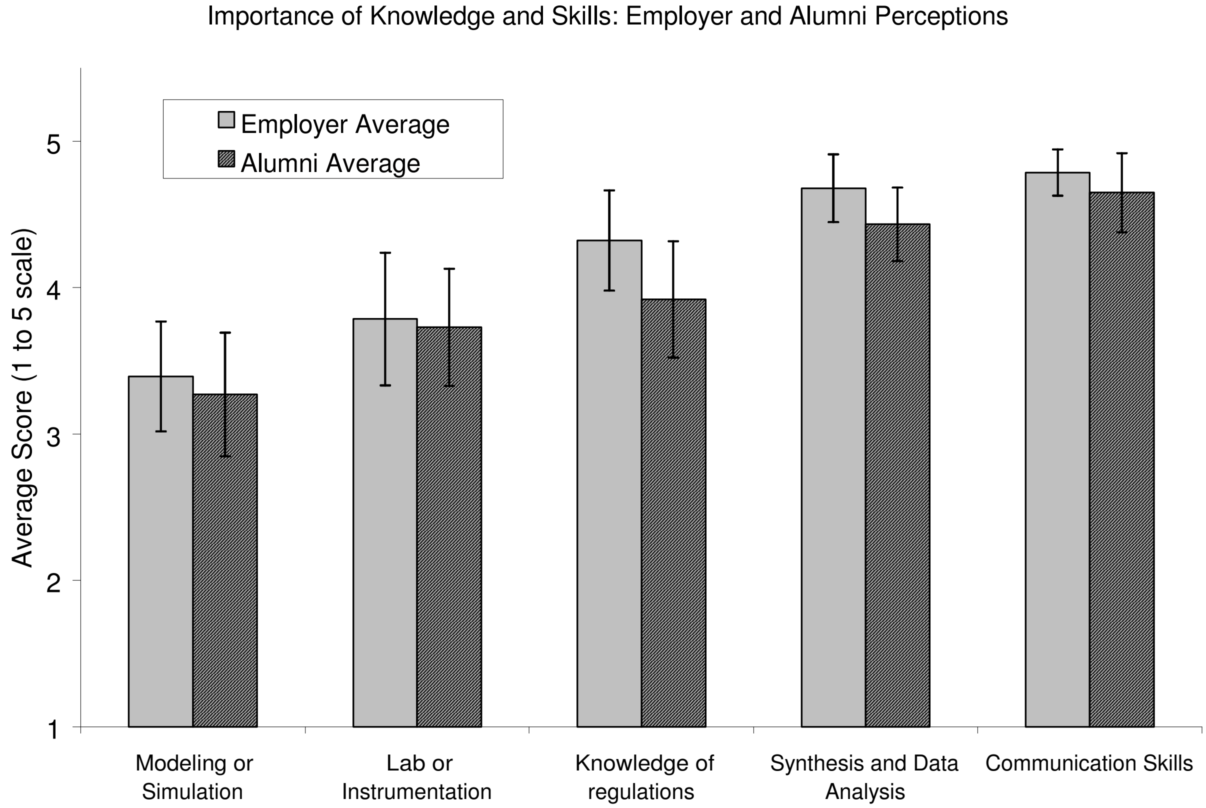
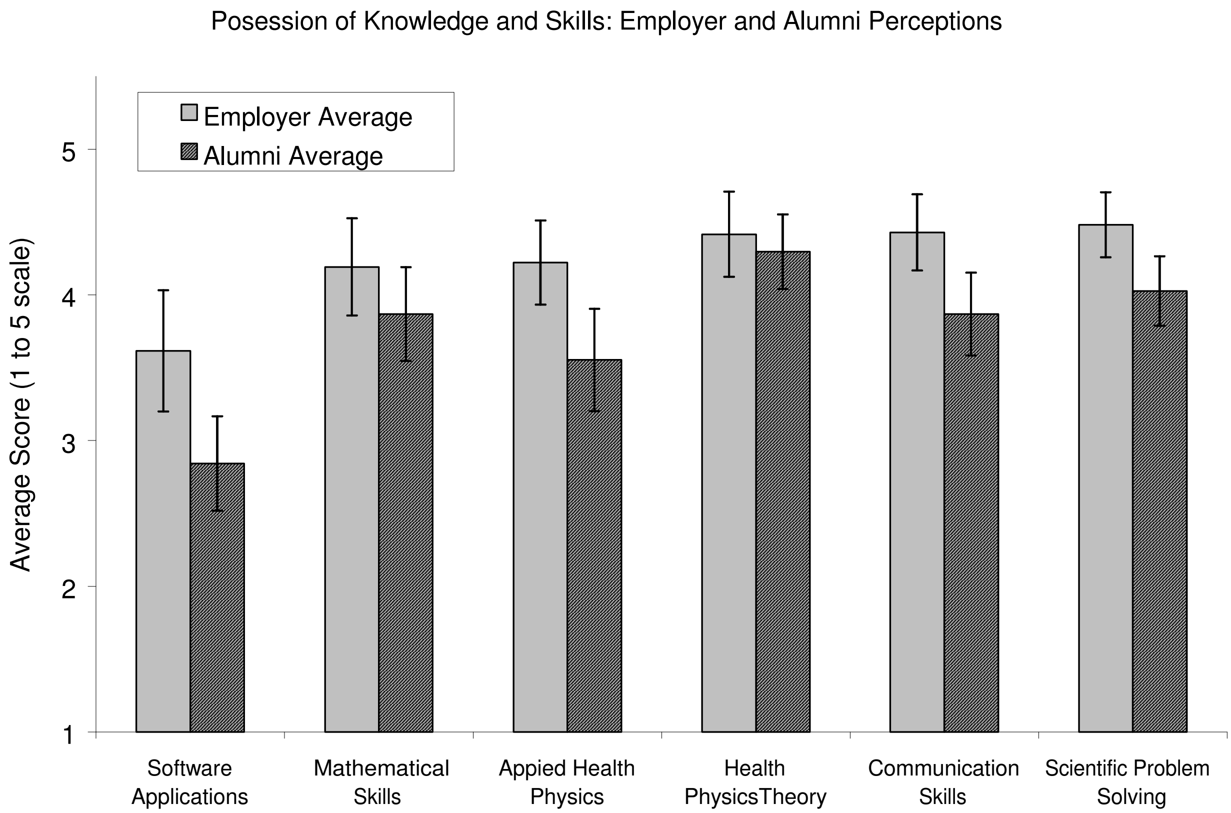


Figure Eight: Comparisons between the alumni and their employers regarding their perceptions of the to which the alumni possessed knowledge and skills in those same topics.



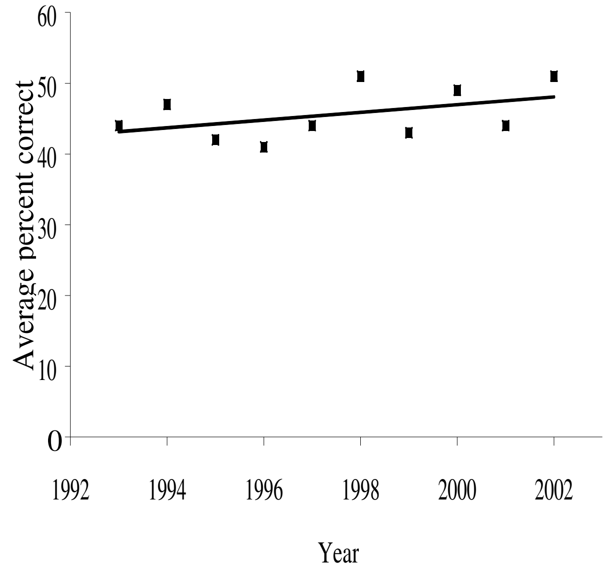
Outcome Assessment Examination
Another Outcome Assessment Tool that was used during this assessment cycle was a test given to all students enrolled in the course Topics in Health Physics II PHYS-g456. Ideally these are seniors in their spring semester. However, this is not always the case. Following is a mini-report and conclusions from this exercise:

Results
All graduating seniors in the Health Physics Emphasis of the Physics B.S. program have been given a simulated American Board of Health Physics certification examination for the past 10 years. No class average reached the passing grade of 70% that would be required for certification had this been an actual exam. However, of 230 persons taking part 1 of the ABHP exam in 1992, fewer than half (105) scored a passing grade of 70% or higher on their first attempt. The instructor of the ISU certification review course, a certified, practicing Health Physicist, took the ISU outcome assessment exam in 1994 and achieved only 85%. The test instrument is difficult, but does provide for consistent evaluations over the years.

Average Class Performance

Topic	Number of questions	Average scores (%)									
		1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Nuclear reactor operations and principles	5	56	55	43	48	53	50	40	40	40	40
Neutron physics and neutron activation	7	45	47	41	31	52	40	57	57	43	57
Dosimetry of external radiation sources	8	44	44	41	53	46	44	38	31	33	56
Radiation shielding physics and design	7	38	35	37	20	43	31	36	29	38	43
Radiation biology	9	48	54	52	38	56	50	72	78	44	50
Radiation physics, sources, detectors, and counting	27	44	50	41	46	33	59	37	54	49	54
Environmental releases of radioactive material	2	41	23	36	20	50	50	25	25	33	50
Dosimetry of internally deposited radioactive material	5	25	53	49	44	53	73	60	60	53	70
Regulations and standards	5	47	35	37	40	40	47	20	30	47	30
Overall	75	44	47	42	41	44	51	43	49	44	51
Number of Seniors		11	11	7	5	3	6	2	2	3	2

Overall performance, given in the next to last line of the table as percent correct answers, has varied from a low of 41% in 1995 to a high of 51% in 1998 and 2002. It is not known if the differences among the 10 years are statistically significant but there is an observable upward trend in the scores (see figure).



Many of these students are weak in their science and mathematics backgrounds to an extent that makes academic success in the field of health physics challenging. Although we markedly increased the rigor of both the classroom and laboratory portions of our academic program in 1997 and 1998, scores are still not consistent with the passing requirements for the national examination.

The characteristics of the class have changed over the period. In the earlier classes we had a majority of students with prior experience at national laboratories or the Naval Nuclear Propulsion Program. Graduating class sizes were larger because we were meeting a pent up demand for higher education among employees of the Idaho National Engineering and Environmental Laboratory. Later undergraduate classes contained primarily younger, traditional students with little prior experience in the field, and graduate education became a larger component of the ISU health physics program. The fact that examination scores for seniors improved at the same time that the experience level of the incoming students decreased suggests that the undergraduate program has become stronger over the years.

In addition to Dr. Gesell's data report and the Outcome Assessment Examination, both of which were provided above, faculty were asked to comment on student work performance, class room performance, and laboratory performance during a monthly outcomes assessment meeting conducted during the late spring of 2002.

To summarize this faculty discussion, student performance had been on par with previous years with the exception of a number of incomplete grades initially awarded for the Spring 2002 Nuclear Instrumentation Class. This was thought to be related to several different items including several interdepartmental research activities and projects, and perhaps an overzealous emphasis on report quality. There was no observation of dishonest or unethical behavior within the group of health physics majors. Over various and sundry interactions on grants, contacts, and in class activities students were observed to conduct themselves in a professional manner, and with the exception of a few late laboratory reports, students appeared to be consistently performing in a manner consistent with a professional work ethic. Generally, the observation of student problem solving capability were consistent with past experiences if not slightly better in several instances in particular several current students displayed good ability to sort through unnecessary data in an appropriate way to solve specific questions. There were no reports of upper division health physics students failing any classes.

With the exception of one lower division undergraduate student, the work performance of all students, with respect to practical problem solving skills were considered to be good or consistent with past experience. Idaho State University Health Physics students were reported to have published the papers, posters, or presentations listed in Attachment Three during the last academic year from July 1, 2001 to July 1, 2002. Faculty agreed that this record seemed reasonable.

The Following List indicates which Outcome Assessment tools were employed during this year (July 1, 2001 to July 1, 2002) program review. Those tools employed are designated using a check mark (T).

Objective 1: broad, fundamental technical knowledge

Outcome Assessment Tools:

T* Students pass core courses

T* Students perform well on outcome assessment examination

* Graduates pass ABHP certification examination

T* Surveys of Program Constituency indicate appropriate knowledge base

* Advisory Board Curriculum review

Objective 2: Written and verbal communication skills

Outcome Assessment Tools:

T* Students pass applicable communication courses

T* Students laboratory reports

* Capstone course student reports

T* Professional papers, presentations and posters

Objective 3: Professional judgment and capability to think critically

Outcome Assessment Tools:

T* Performance in classes, problem solving and approaches to "defective problems", laboratory performance

* Assessment of Capstone Project Administrator

* Performance in work/internship experience as reported by supervisor

T* Surveys of students and alumni, alumni employers

Objective 4: Practical Experience in Solving Applied Health physics Problems

Outcome Assessment Tools:

* Performance in classes, problem solving, laboratory performance

* Assessment of Capstone Project Administrator

T* Performance in work experience

T* Surveys of students and alumni, alumni employers

Objective 5: The Ability to Work Independently

Outcome Assessment Tools:

* Performance in class problem solving exercises and laboratory performance

* Assessment of Capstone Project Administrator

* Performance in work experience

T* Surveys of students, alumni, and alumni employers

T* Professional papers, presentations and posters

Objective 6: A Professional Work Ethic

Outcome Assessment Tools:

T* Performance in classes

T* Performance in work experience

* Surveys of alumni employers

T* Assessment of students as observed in letters of recommendation

Interpretations and Recommendations

Summary of the 2001-2002 Outcomes Assessment Report: Objectives Evaluated, the Outcomes Assessment Tools Employed, interpretation of the outcomes assessment data relative to meeting objectives, and specific action items taken with respect to the outcomes and objectives evaluated.

Objectives and Outcome Assessment Tools	Results/Interpretation	Actions
Objective 1: broad, fundamental technical knowledge		
Outcome Assessment Tools:		
* Students pass core courses	Satisfactory	No New Action
* Students perform well on outcome assessment examination	Satisfactory	No New Action
* Surveys of Program Constituency indicate appropriate knowledge base Required	Satisfactory	Further evaluation of "computer confidence" (See report Attachment Five)
Objective 2: Written and verbal communication skills		
Outcome Assessment Tools:		
* Students pass applicable communication courses	Satisfactory	No New Action
* Students laboratory reports	Satisfactory	No New Action
* Professional papers, presentations and posters	Satisfactory	No New Action
Objective 3: Professional judgment and capability to think critically		
Outcome Assessment Tools:		
* Performance in classes, problem solving and approaches to "defective problems", laboratory performance	Satisfactory	No New Action
* Surveys of students and alumni, alumni employers	Satisfactory	No New Action
Objective 4: Practical Experience in Solving Applied Health physics Problems		
Outcome Assessment Tools:		
* Performance in work experience	Satisfactory	No New Action
* Surveys of students and alumni, alumni employers	Satisfactory	No New Action
Objective 5: The Ability to Work Independently		
Outcome Assessment Tools:		
* Surveys of students, alumni, and alumni employers	Satisfactory	No New Action
* Professional papers, presentations and posters	Satisfactory	No New Action
Objective 6: A Professional Work Ethic		
Outcome Assessment Tools: (Outcome assessment tool is weak - require improvement see report -Attachment Five)		
* Performance in classes	Satisfactory	No New Action
* Performance in work experience	Satisfactory	No New Action
* Assessment of students as observed in letters of recommendation	Satisfactory	No New Action

Interpretations and Recommendations

The university interprets this first formal-documented set of outcomes assessment data to indicate that, in general, the programmatic objectives are being achieved based upon the reports of the constituency; including Class Grades, Course Evaluations, Alumni Survey, Alumni Employer Surveys, Faculty Assessments, Advisory Board Reviews and Comments, and an Outcome Assessment Examination. All metrics considered this year indicate that the programmatic objectives are being accomplished in a positive fashion.

Response to Surveys
Alumni and their employers in particular indicate strength in knowledge of Health Physics Theory and Laboratory skills. Based upon constituency survey and discussion with the advisory board there is no indication that programmatic objectives should be modified at this time. Specifically this is one of at least two metrics that indicates that ISU HPP Programmatic Objectives 1, 3, 4 and 5 regarding:

- Broad, fundamental technical knowledge
- Professional judgment and capability to think critically
- Practical experience in solving applied health physics problems
- The ability to work independently are currently being accomplished to a satisfactory level.

There is an indication by program alumni that students could benefit from more computer confidence, although this indication is not reflected in the comments of student employers. The survey question from which this issue arose was unfortunately not worded well enough to define the exact weakness which motivated the alumni response. It has been agreed that this issue will be considered in much greater detail during the next portion of the review process so that specific solutions to this possible weakness might be developed.

An important aspect of the survey is the satisfaction with the level of preparation in science and mathematics relative to job requirements and professional aspirations. Based upon this result, it can be concluded that differences in the calculus requirements between the APT and BST options has no apparent impact on job performance.

Response to Grades
The metric of student grades carried no surprises. All aspects of this metric seemed appropriate and consistent with programmatic goals. Specifically this is one of at least two metrics that indicates that ISU HPP Programmatic Objectives 1, 2, 3 and 6 regarding:

- Broad, fundamental technical knowledge
- Written and Verbal Communication Skills
- A professional work ethic are currently being accomplished to a satisfactory level.

Response to Outcomes Assessment Examination
The general trend in the ISU HPP Outcome Assessment Examination has been positive, demonstrating continuous improvement. This trend is defined by too small a data set to define it as statistically significant. Nevertheless the trend is positive and it is counted as a satisfactory accomplishment of Programmatic Objective 1 regarding broad, fundamental technical knowledge. This metric supports a conclusion that objective 1 is currently being accomplished to a satisfactory level. The positive trend is expected to continue. The absolute grade is felt to

be related to the rigor of the examination which perhaps is actually greater than that of Part I of the ABHP examination. It can be demonstrated with a more detailed review of the data then presented here that this examination clearly favors students with more experience. The relative scores are focused on to assess this data rather than absolute scores.

Response to Student-Course Evaluations

Student course evaluations generally reflected that ISU faculty and facilities were providing a good educational experience to which students appeared satisfied. This information is consistent with trends of data developed over several years. Unfortunately, one negative aspect, which also is consistent with a trend over the last several years was identified. Apparently, faculty are not consistently returning graded homework, test, and projects back to students in a timely fashion. Although faculty discussed this issue, and agreed that the timely return of graded documents is extremely important to the didactic process, no recommendations to alleviate this trend were identified. It was speculated that perhaps this reflects a spectacularly large work-load among program faculty. Faculty agreed to try harder to improve this particular situation. Student evaluations are interpreted as an indication that Programmatic Objectives 3, 4, and 5 regarding:

- Professional judgment and capability to think critically
- Practical experience in solving applied health physics problems
- The ability to work independently are currently being accomplished to a satisfactory level.

Faculty Reports and Reflections

Individual faculty, a constituency group of the ISU HPP, conducts on essentially a continuous basis an assessment of student performance. This is a job responsibility. As part of the educational process faculty interact, encourage, motivate, and sometimes admonish their students. Considering the extensive faculty/student contact time and the frequent quantitative assessment encountered during simple laborious grading, it can be surmised that faculty can provide perhaps one of the most thorough assessments of objective-achievement. Summary comments made by faculty regarding student performance have been documented during periodic outcome assessment meetings. Extensive personalized student evaluations are formally conducted when letters of reference are written for individual students. Faculty informal assessments assert that Programmatic Objectives 2, 3, 4, and 6 regarding

- Written and verbal communication skills
- Professional judgment and capability to think critically
- Practical experience in solving applied health physics problems
- A professional work ethic are currently being accomplished to a satisfactory level.

Student Papers and Presentations

A final metric can be mentioned at this point; this is the historical record of student publications and presentations. A faculty review of student papers and presentations lead to a conclusion that Programmatic Objectives 2, and 5 regarding:

- Written and Verbal Communication Skills
- The Ability to Work Independently are currently being accomplished to a satisfactory level.

Based on this evaluation, an understanding of faculty research and service *(as described in Section 5: Faculty in the main body of this report)*. It is concluded that the ISU Health Physics Program is achieving all of its programmatic objectives and its mission:

“Our mission is educating students so they can achieve the highest standards of the health physics profession, and solving important problems for the people and industries of Idaho and the Nation through teaching, research, and service.”

ACTION ITEMS FOR THE NEXT ASSESSMENT CYCLE

The responsibility for accomplishing action items is ultimately that of the HPP Director. These are ultimately collaborative agreements among faculty to be accomplished as a team effort.

1) A consideration of the outcome assessment tools indicates that some tools need further refinement.

A) One glaring item was the inability of survey information to be easily correlated among the different groups surveyed. This information will be used during the design of the next set of surveys to be conducted.

B) A second item which seemed to require a better process with respect to defining a quantified outcome assessment tool was the objective of developing within students - a professional work ethic.

1. This will become a specific item to ask employers about in the next survey.
2. Specific report requirements, quizzes, and questionnaires by which students can specifically by assessed with regard to this objective will be developed.
3. Further course development with respect to this area is expected.

C) A third item to be revised includes the alumni and alumni employer surveys with respect to questions involving computer confidence. The program’s goal is to further evaluate this initial indication observed in the latest survey results to determine the root cause of this issue. Once identified, aggressive steps to remedy this item will be conducted.

2) Student Course Evaluations indicate a reoccurring trend with respect to the belated return of classroom assignments. Faculty agreed to work harder at reducing this valid criticism.

3) There was an indication from the ISU Health Physics Advisory Board that prerequisite-performance standards perhaps should be set higher primarily for cosmetic purposes. Some advisory Board members expressed that the HPP should consider raising this from a D grade minimum to a C grade minimum. Faculty indicated that experience with the normal self-selection process generally excludes D students from continuing in physics. However, the impact of this proposal will be considered as time permits. After assessment, if this proposal can be justified, it will be forwarded to the ISU Curriculum Council for review and approval. If this proposal is ultimately appropriate the HPP will adopt the idea judiciously.

ATTACHMENT FOUR Assessment Report 2004

DEPARTMENT OF PHYSICS HEALTH PHYSICS PROGRAM

SUMMARY OUTCOME ASSESSMENT REPORT, Spring 2004

Introduction

During the 2003 through 2004 Assessment Cycle eleven different Assessment Tools were considered to evaluate the ISU Health Physics Programs and the progress achieved in accomplishing the six stated undergraduate and eight stated graduate programmatic objectives. Additionally the ISU Health Physics Program provides an annual Outcomes Assessment examination to upper division and certain graduate students.

The eleven specific Assessment Tools used are as follows:

1) Students Pass Core Classes

2) An Advisory Board Curriculum Review

3) Performance in Work/Research as reported by supervisor

4) Students Pass Applicable Communication Courses

5) The Quality of Student's Laboratory Reports

6) The program's productivity of professional papers, presentations, and posters

7) Student performance in classes, problem solving, approaches to "defective problems".

8) Assessment of Students as Observed in Letters of Recommendation

9) Student Evaluation of Instructor Performance and Classes

For Graduate Students

10) Successful Completion of High Quality Thesis or Dissertations

11) Satisfactory performance in Upper division and 600 level graduate courses

This report will summarize the data generated with respect to each Assessment Tool accompanied by a brief interpretation of the data. It will discuss how each of these tools relate to programmatic objectives and a section which links the Assessment Tools to Objectives. The final section <u>Conclusions of Data Evaluation and Action Items</u> will describe both the overall conclusion and the programmatic changes that are being employed in response to the findings of the assessment review.

Outcome Assessment Examination:

Students enrolled in Topics in health Physics have been given a simulated American Board of Health Physics certification examination for the past 12 years. Up until this year, the exam was administered only to seniors in the undergraduate program. However, the number of seniors has declined as the numbers of MS and PhD students have risen, so this year we began including graduate students who had entered the Health Physics MS program from other disciplines. In 2004 one senior and two graduate students who had entered the Health Physics MS program from other disciplines took the exam. No class average reached the passing grade of 70% that would be required for certification had this been an actual exam. However, of 230 persons taking part 1 of the ABHP exam in 1992, fewer than half (105) scored a passing grade of 70% or higher on their first attempt. The instructor of the ISU certification review course, a certified, practicing Health Physicist, took the ISU outcome assessment exam in 1994 and achieved only 85%. The test instrument is difficult, but does provide for consistent evaluations over the years.

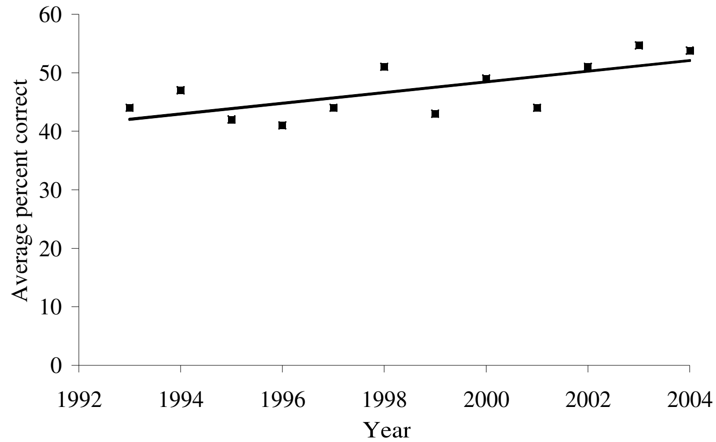
Average Class Performance

Topic	Number of questions	Average scores (%)											
		‘93	‘94	‘95	‘96	‘97	‘89	‘99	‘00	‘01	‘02	‘03	‘04
Nuclear reactor operations and principles	5	56	55	43	48	53	50	40	40	40	40	80	47
Neutron physics and neutron activation	7	45	47	41	31	52	40	57	57	43	57	57	52
Dosimetry of external radiation sources	8	44	44	41	53	46	44	38	31	33	56	38	71
Radiation shielding physics and design	7	38	35	37	20	43	31	36	29	38	43	43	38
Radiation biology	9	48	54	52	38	56	50	72	78	44	50	67	56
Radiation physics, sources, detectors, and counting	27	44	50	41	46	33	59	37	54	49	54	56	53
Environmental releases of radioactive material	2	41	23	36	20	50	50	25	25	33	50	100	67
Dosimetry of internally deposited radioactive material	5	25	53	49	44	53	73	60	60	53	70	40	60
Regulations and standards	5	47	35	37	40	40	47	20	30	47	30	40	47
Overall	75	44	47	42	41	44	51	43	49	44	51	55	54
	Number of Students*	11	11	7	5	3	6	2	2	3	2	1	3

*Undergraduate seniors only from 1993 to 2003. MS students entering the program from other discipline are included beginning in 2004

Overall performance, given in the next to last line of the table as percent correct answers, has varied from a low of 41% in 1995 to a high of 55% in 2003. It is not known if the differences among the 10 years are statistically significant but there is an observable upward trend in the scores (see figure).

Many of these students are weak in their science and mathematics backgrounds to an extent that makes academic success in the field of health physics challenging. Although we markedly increased the rigor of both the classroom and laboratory portions of our academic program in 1997 and 1998, scores are still not consistent with the passing requirements for the national examination.

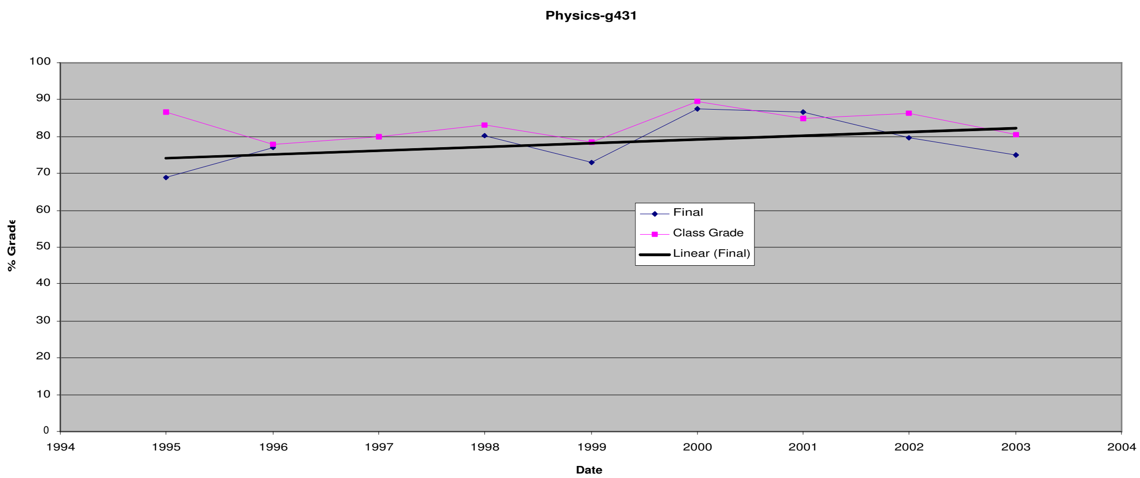


The characteristics of the class have changed over the period. In the earlier classes we had a majority of students with prior experience at national laboratories or the Naval Nuclear Propulsion Program. Graduating class sizes were larger because we were meeting a pent up demand for higher education among employees of the Idaho National Engineering and Environmental Laboratory. Later undergraduate classes contained primarily younger, traditional students with little prior experience in the field, and graduate education became a larger component of the ISU health physics program. The fact that examination scores for seniors improved at the same time that the experience level of the incoming students decreased suggests that the program has become stronger over the years.

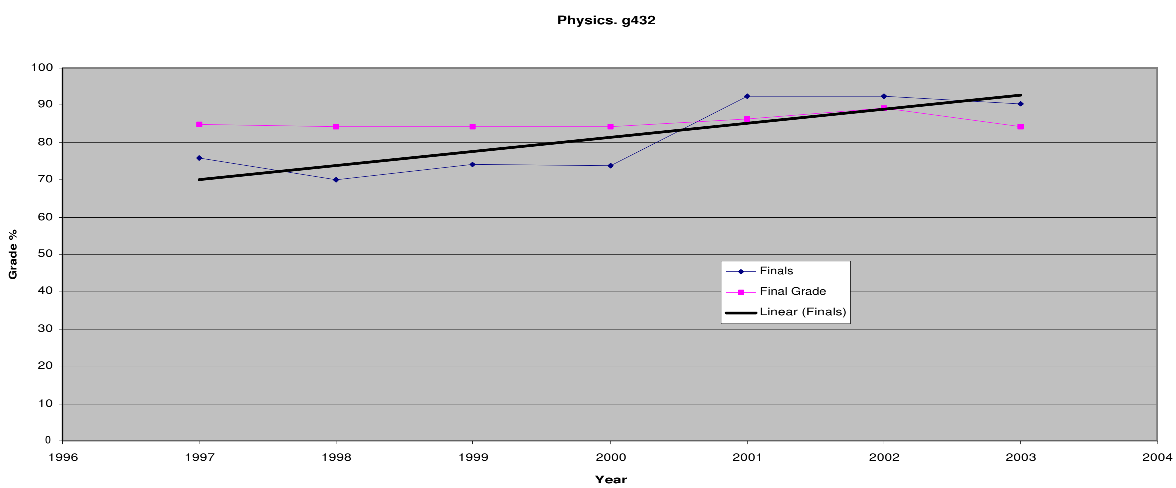
Alumni success on the ABHP Examination:

5 ISU alumni passed either part I or II of the ABHP Certification Examination during 2003.

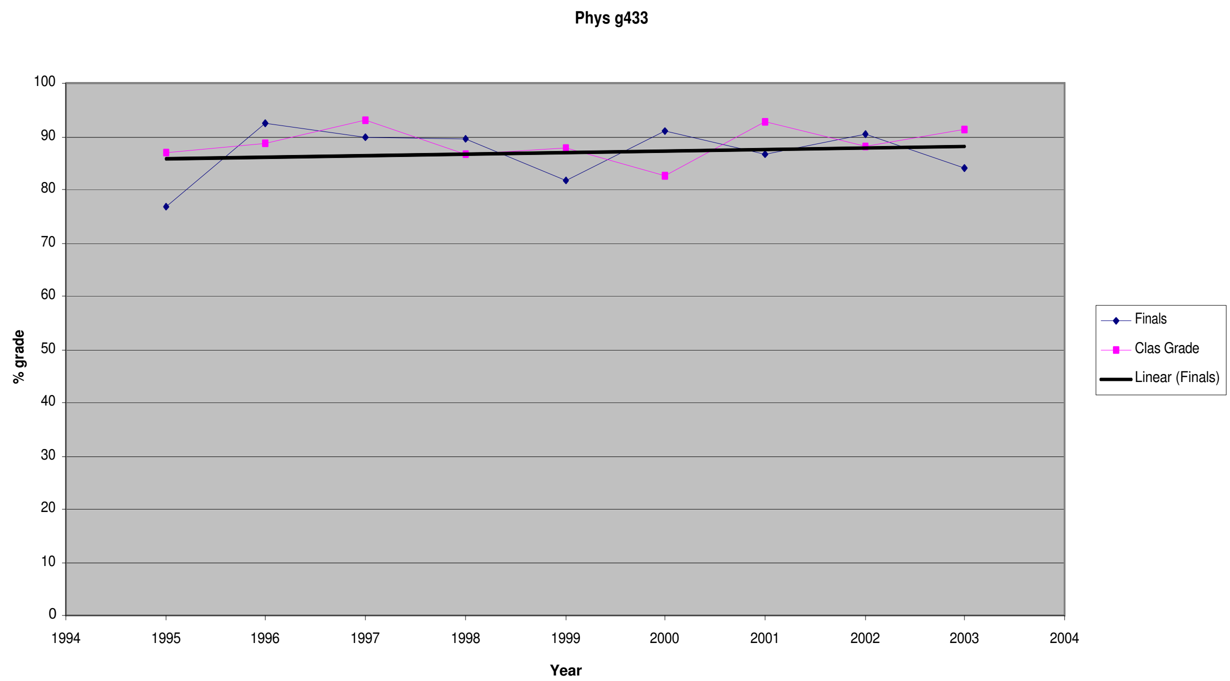
Students Pass Core Classes:
Following are trend plots of grades earned in core courses:
Physics g431:



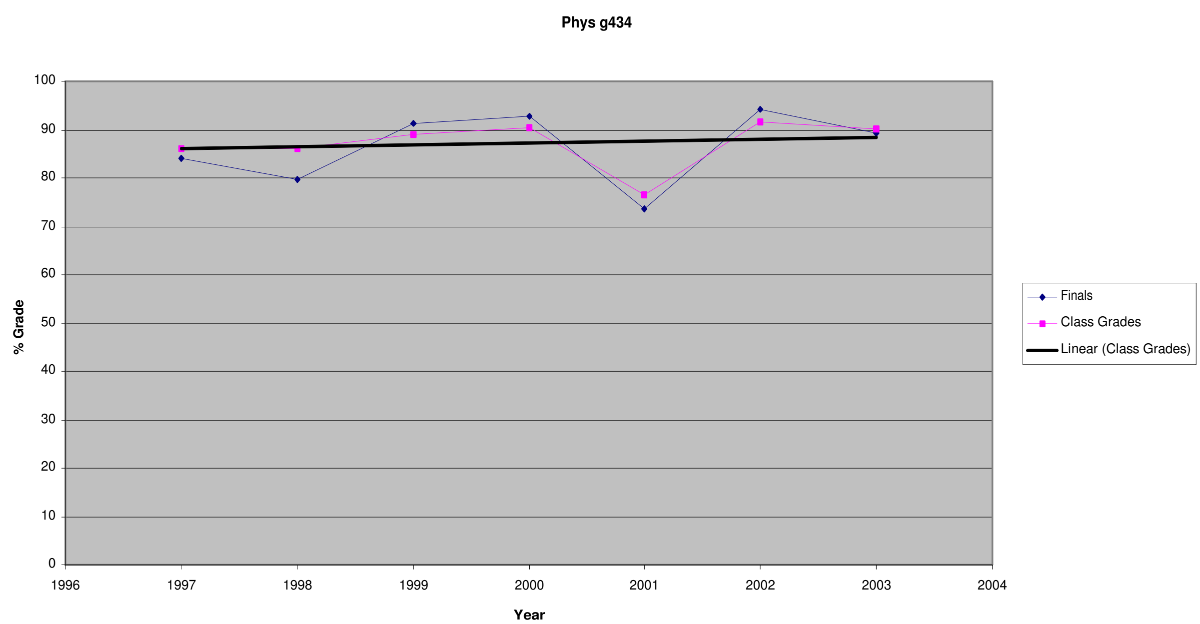
Physics-g432:



Physics-g433:

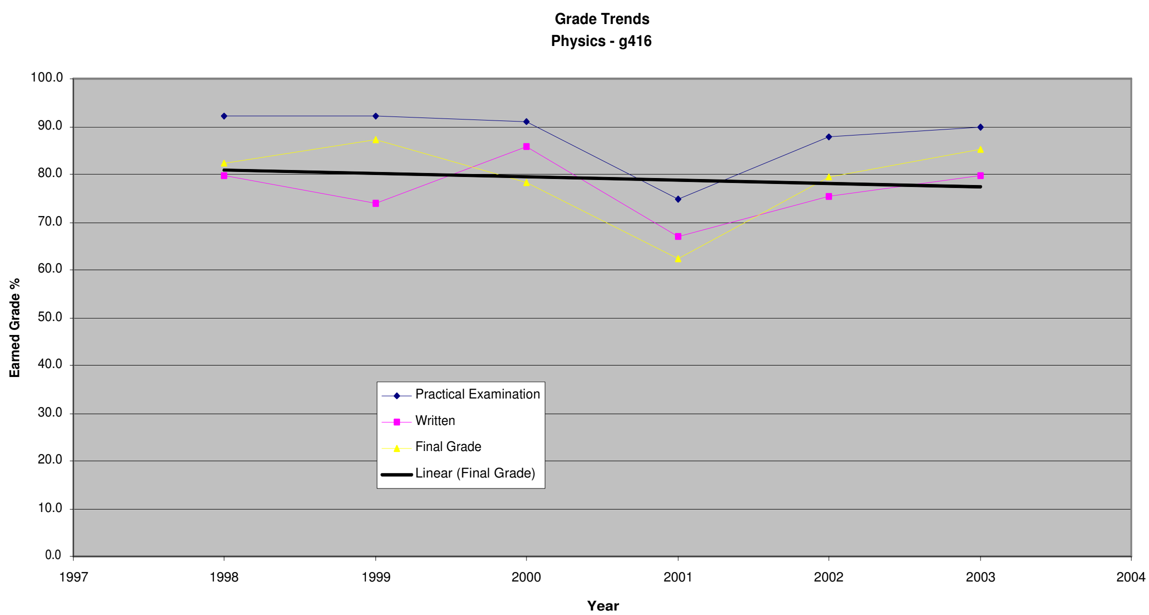


Physics-g434:

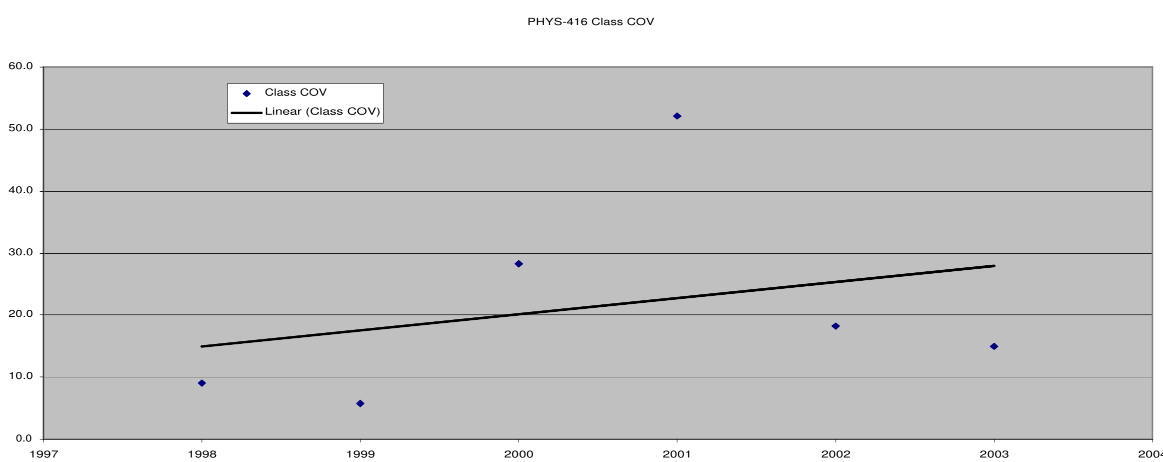


Considering these four required core courses for undergraduate students and graduate students entering Health Physics from different disciplines, we observe a gradual increase in student grades. Since homework assignments are similar with little change in course expectation over the period under consideration, we interpret this as gradual improvement in student performance. Final examination grades also plotted in some cases are perhaps the best indicator to support this interpretation as the same examination has been used for several years running in these cases. The trend in performance for Physics-g416 (Introduction to Nuclear Instrumentation) is different than observed in other core courses. A further issue with this course is the Coefficient of Variation (COV) observed over the years.

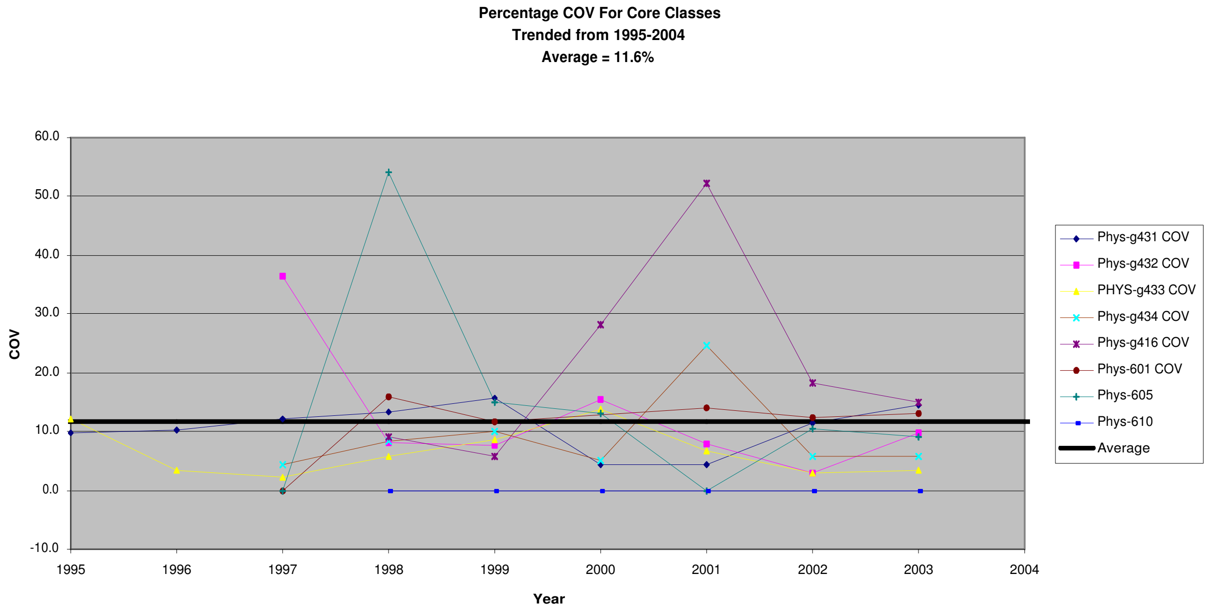
Physics-g416



Coefficient of Variation for Physics-g416



Coefficient of variation for core courses from 1995 through 2004 provides historical perspective on the expected COV for typical courses.



Although some variation is anticipated from year to year when considering the COV large swings may be an indicator worthy of follow-up. The COV of Physics-g416 when compared to that of the other courses does demonstrate fairly large variations that are not easily explained by obvious confounding factors.

Advisory Board Curriculum Review

An Advisory Board Curriculum review was conducted Bryce Rich, an Advisory Board representative. Following are the paraphrased conclusions of this report:

1. The program is basically sound with a comprehensive curriculum in radiation safety.
2. Specific radiation safety classes are being provided rather than radiation safety being a portion of some other focus area; hence, students have the opportunity to obtain the necessary fundamentals of the discipline.
3. The program appears to be general in nature with the opportunity for more specific education in focused application areas.
4. As the program matures some additional emphasis in specific areas may be necessary:
    a. Specific (unique) measurement techniques
    b. Uncertainty analysis for specific problems
    c. Incident investigation techniques
    d. Dose Reconstruction
    e. Measurement Techniques, analysis, and decision making relative to D&D (MARSIM)

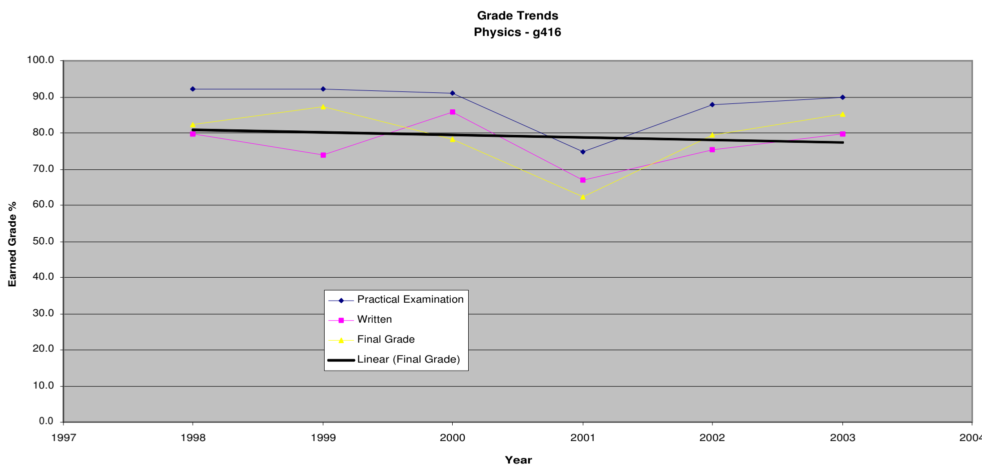
Performance in Work/Research as reported by supervisor
Appendix B provides raw data i.e. student performance reports in work/research in the EAL, EML, TSO and in Internship Situations. The following is a summary of the items identified:

1. Once students finish course work their level of understanding and engagement in "work" challenges improves.
2. Sometimes students seem to initially stall when asked to creatively apply didactic information to laboratory problems, this may be associated with confidence, but ultimately students accomplish the tasks.

Students Pass Applicable Communication Courses

1. There is an absence of any information on failure in communication classes.
2. Informal reports from instructors indicate that the Health Physics Students are well regarded in ENGL-305 (reference Faculty Minutes of October 17, 2002 - Item 2.
3. The written communication skills of students anecdotally seems to be steady.

The Quality of Students Laboratory Reports
We refer to grade trends in Physics-g416 as the most quantitative indicator of Laboratory report Quality and Quality of Laboratory Work.



The program's productivity of professional papers, presentations, and posters

During the time span between 2002 to 2003 student production with respect to various types of publications was as follows:

1. At least 13 Abstracts, and several proceedings articles have been published by ISU Health Physics Students. Appendix C provides copies of these abstracts.
2. Although no papers were completed, 5 papers were under development/review at the time the assessment cycle ended.
3. 4 M.S. thesis and 1 Ph.D. dissertation were completed with 6 theses in the writing phase.

Student performance in classes, problem solving, approaches to "defective problems".

1. We refer the reader to class grade trends as a metric on class room performance.
2. Application of Broken Problems:
   a. Gesell employed a 5 part essay question that was constructed in such a way that one

part could not be answered in a rational fashion.

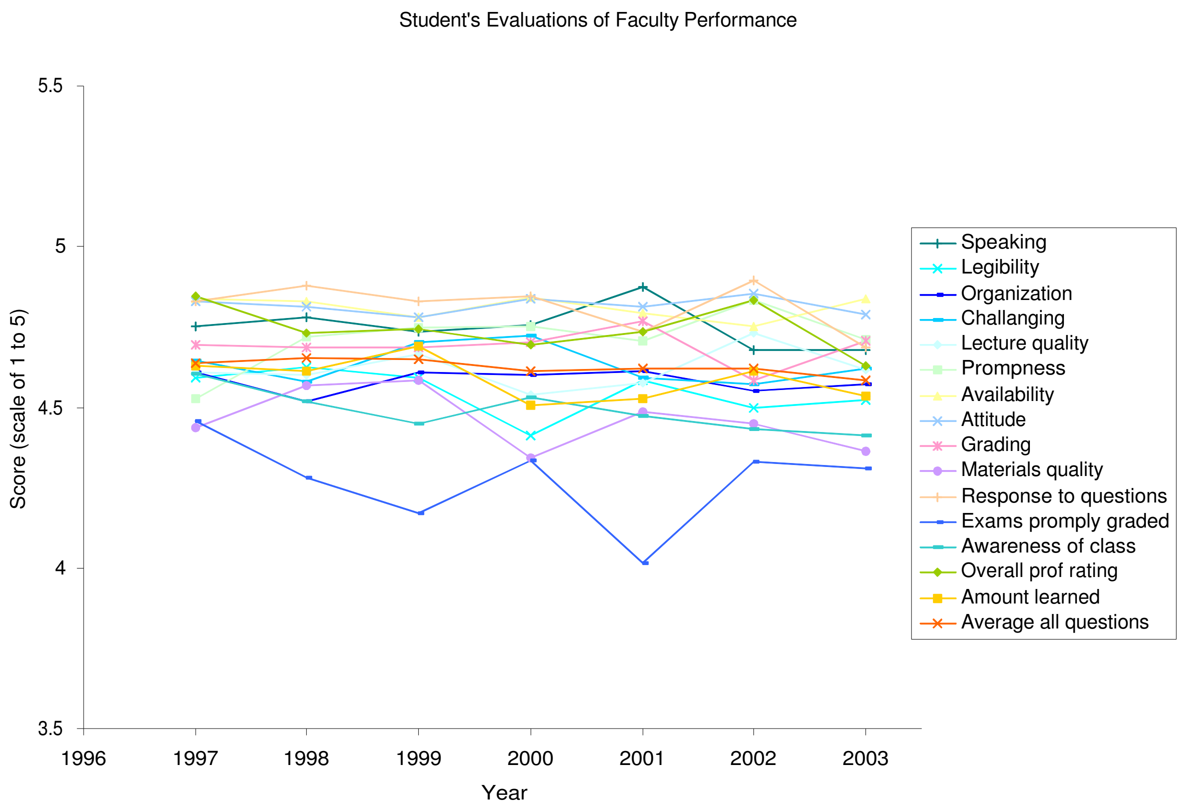
b. Wells employed 2 to 3 questions in Physics 610 to intentionally confuse the students. Results of these "tests" are provided in Appendix D.

Assessment of Students as Observed in Letters of Recommendation

No faculty reported having to refuse doing a recommendation letter for a student. The strength of recommendation letters demonstrates obvious and expected fluctuations.

Student Evaluation of Instructor Performance and Classes

We conclude that the level of course quality is acceptable to the students.



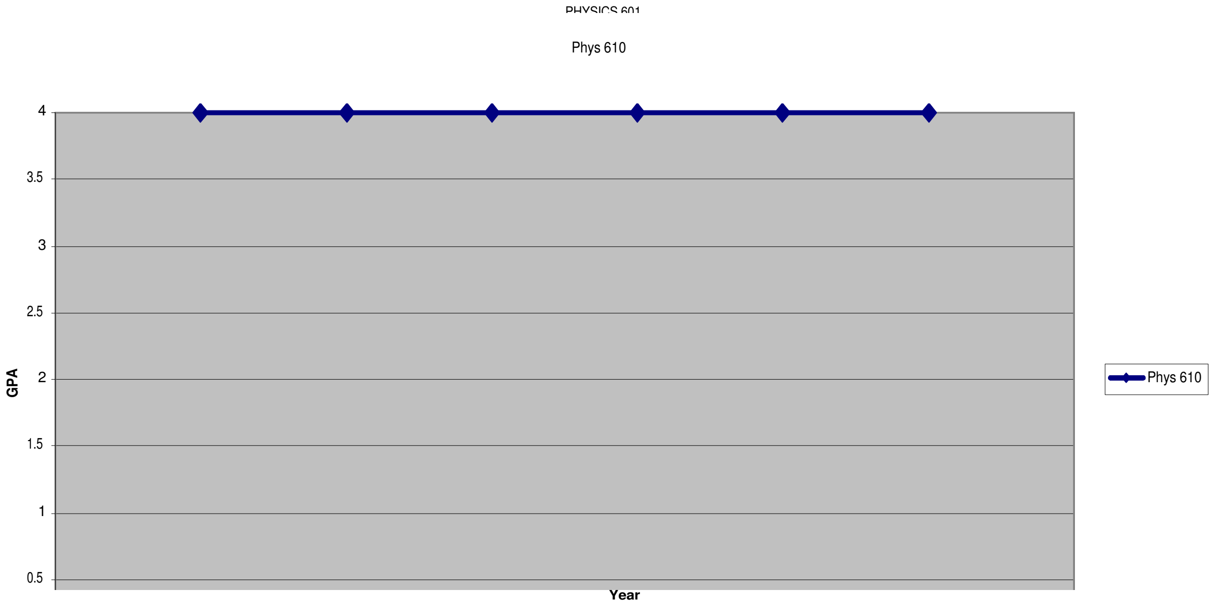
The Successful Completion of High Quality Thesis or Dissertations

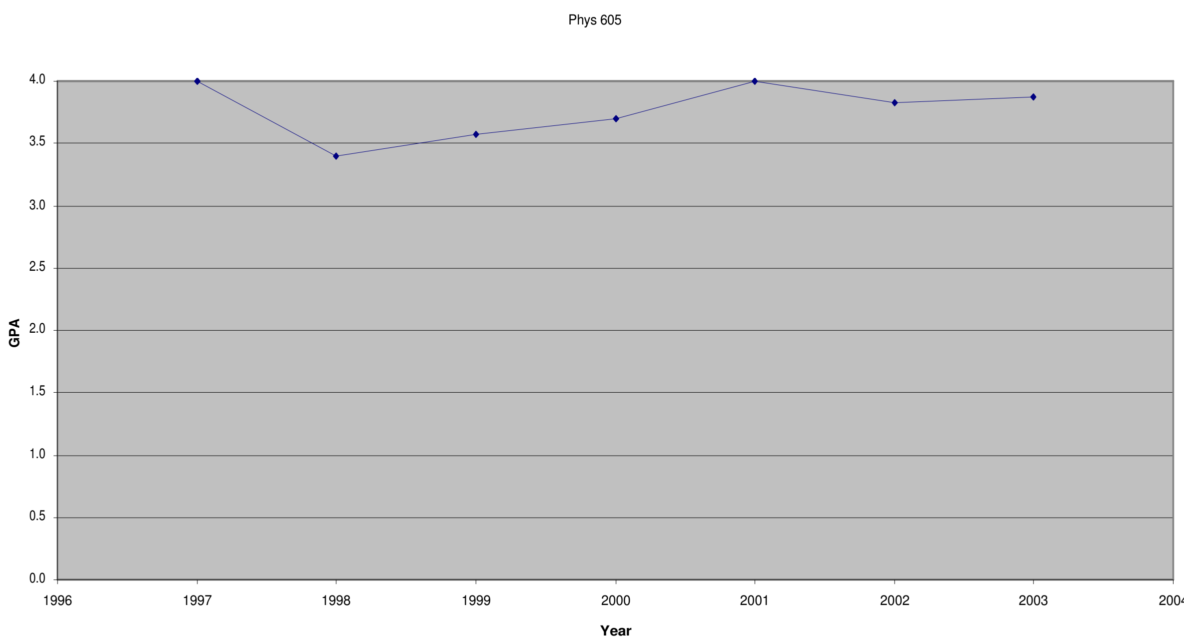
The MS Program includes additional Programmatic Educational Objectives and hence some additional Outcome Assessment Tools are employed to evaluate these Objectives. During this assessment cycle 4 M.S. theses and 1 Ph.D. dissertation were completed with 6 theses in the writing phase. The defense of all these was conducted successfully.

Satisfactory performance in Upper division and 600 level graduate courses

The following are grade trends for required upper division 600-level Health Physics courses.

Physics 605





Assessment Conclusions:
Our conclusion is that ISU is satisfactorily satisfying each of their published 6 objectives for the B.S. program and 8 objectives for the M.S. program. The Assessment tools used to evaluate each Objective are associated with each Objective in the list that follows. The data generated as the Assessment tool was provided above. At least two assessment tools are used to evaluate the accomplishment of each objective.

The Objectives are as Follows:

1) Broad Fundamental Technical Knowledge

   Assessment Tools evaluated during this cycle:

   i. Advisory Board Curriculum Review
   ii.(The following two were added to the original plan)
   iii. Graduates Pass ABHP Certification Examination
   iv. Students Pass Core Classes
   v. Performance in Work/Research as Reported by Supervisor

2) Written and Verbal Communication Skills

   Assessment Tools evaluated during this cycle:

   i. Student Laboratory Report Quality
   ii. M.S. Thesis Quality
   iii. Professional Papers, Presentations and Posters
   iv. Students Pass Applicable Communication Courses

3) Professional Judgment and Ability to Think Critically

   Assessment Tools evaluated during this cycle:

   i. Performance in work/research experience as reported by supervisor
   ii. Assessment of MS Thesis
   iii. Performance in classes, problem solving and approaches to "defective problems, laboratory performance.

4) Practical Experience in Solving Applied Health Physics Problems

   Assessment Tools evaluated during this cycle:

   i. Performance in Classes, Problem Solving and Approached to "Defective Problems", Laboratory Performance
   ii. Performance in Work Research Experience as Reported by a Supervisor

5) The Ability to Work Independently

   Assessment Tools evaluated during this cycle:

   i. Performance in class, problem solving, laboratory performance.
   ii. Performance in Work Research Experience as Reported by a Supervisor

6) A Professional Work Ethic

   Assessment Tools evaluated during this cycle:

   i. Performance in work/ research experience
   ii. Assessment of Students as Observed in Letters of Recommendation

As applied to Graduate students:

7) An ability to conduct research
8) Professional Tools and experience above that expected for the baccalaureate program

   Assessment Tools evaluated during this cycle:

   i. Evidenced by successful completion of High Quality Thesis or Dissertation.
   ii. Satisfactory performance in Upper division and 600 level graduate courses

Conclusions of Data Evaluation and Action Items

This assessment of the Idaho State University Health Physics Programs supports a statement that all measured and evaluated outcomes considered during this review provide evidence that the current Idaho State University Health Physics Program Educational Objectives for both the B.S. and M.S. programs are being attained at a satisfactory level.

Current Course work is entirely appropriate and shows trends of continued improvement; however, Phys-g416 (Introduction to Nuclear Measurements) may need some attention as evidenced by two subtle indicators, larger than average COV and a slightly negative trend in class grades.

a. We will re-evaluate the application of Teaching Assistants to this class
b. We will overhaul all laboratories and revamp some exercises with improved instrumentation.

Student evaluations demonstrate a generalized low mark in prompt return of homework and tests. We are likely to be able to improve on this with the addition of a new faculty member which will decrease individual teaching loads.

One observation in the programmatic audit (to paraphrase) was that perhaps courses could focus on applied items like:

a. Specific (unique) Measurement Techniques
b. Uncertainty analysis for specific problems
c. Incident Investigation Techniques
d. Dose Reconstruction
e. Measurement techniques, analysis, and decision making relative to D&D (MARSIM)

Faculty will explore ways these ideas might be brought into current courses/curriculum.

ATTACHMENT FIVE Assessment Report 2006

DEPARTMENT OF PHYSICS HEALTH PHYSICS PROGRAM
SUMMARY OUTCOME ASSESSMENT REPORT, 2006

Introduction

During the 2004 through 2006 Assessment Cycle ten different Assessment Tools were considered to evaluate the ISU Health Physics Programs and the progress achieved in accomplishing the six stated undergraduate and eight stated graduate programmatic objectives. Additionally the ISU Health Physics Program provided an annual Outcomes Assessment examination to upper division and certain graduate students.

The ten specific Assessment Tools used were as follows:

1) Students Pass Core Classes
2) Performance in Work/Research as reported by supervisor
3) Students Pass Applicable Communication Courses
4) The Quality of Student's Laboratory Reports
5) The program's productivity of professional papers, presentations, and posters
6) Student performance in classes, problem solving, approaches to "defective problems".
7) Assessment of Students as Observed in Letters of Recommendation
8) Student Evaluation of Instructor Performance and Classes

   For Graduate Students

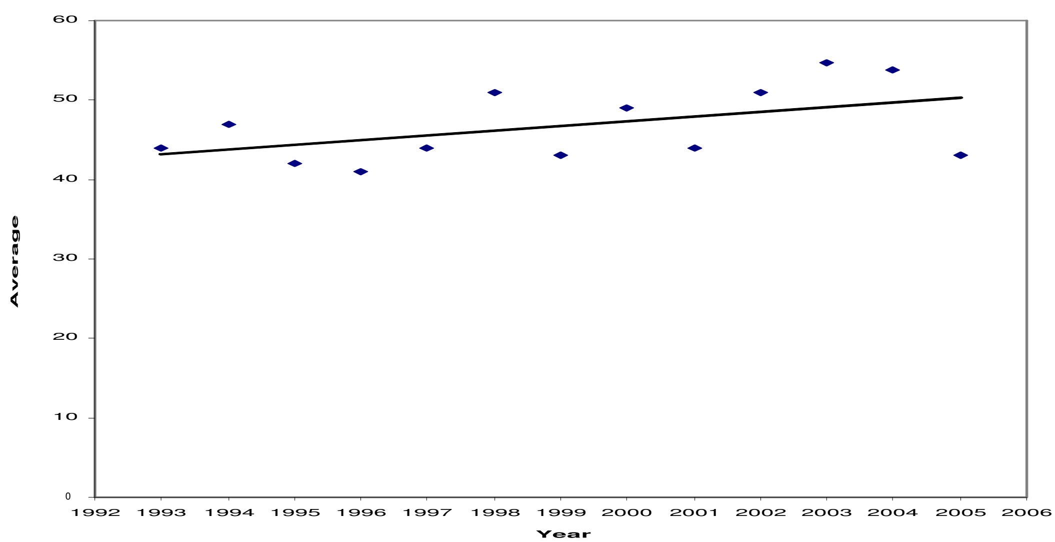
9) Successful Completion of High Quality Thesis or Dissertations
10) Satisfactory performance in Upper division and 600 level graduate courses

This report will summarize the data generated with respect to each Assessment Tool accompanied by a brief interpretation of the data. It will show how each of these tools relate to programmatic objectives in a section which links the Assessment Tools to Objectives. The final section Conclusions of Data Evaluation and Review of Action Items will describe both the overall conclusion and the programmatic changes that are being employed in response to the findings of the assessment review.

Results and Discussion from Various Assessment Tools

Outcome Assessment Examination:

Students enrolled in Topics in Health Physics have been given a simulated American Board of Health Physics certification examination for the past 14 years. Up until 2004, the exam was administered only to seniors in the undergraduate program. However, the number of seniors has declined as the numbers of MS and PhD students have risen, so starting in 2004 we began including graduate students who had entered the Health Physics MS program from other disciplines. During 2006 no students took the Topics class and the exam was not administered. As of 2005 no class average reached the passing grade of 70% that would be required for certification had this been an actual exam. However, of 230 persons taking part 1 of the ABHP exam in 1992 for example, fewer than half (105) scored a passing grade of 70% or higher on their first attempt, this trend in ABHP passing rates nationally persists. The instructor of the ISU certification review course, a certified, practicing Health Physicist, took the ISU outcome assessment exam in 1994 and achieved only 85%. The test instrument is difficult, but does provide for consistent evaluations over the years. The following scatter plot summarizes test results over the last several years.



Overall performance, given in the next to last line of the table as percent correct answers, has varied from a low of 41% in 1995 to a high of 55% in 2003. It is not known if the differences among the 14 years are statistically significant but there is an observable upward trend in the scores (see figure). When students are informally categorized by the amount of field experience they have had, it is clear that experience is a factor in successful performance on this test.

Average Class Performance

Topic	Number of Questions	Average Score (%)													
		1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Nuclear Reactors	5	56	55	43	48	53	50	40	40	40	40	80	47	58	n/a
Neutron Physics	7	45	47	41	31	52	40	57	57	43	57	57	52	41	n/a
External Dosimetry	8	44	44	41	53	46	44	38	31	33	56	38	71	49	n/a
Radiation Shielding	7	38	35	37	20	43	31	36	29	38	43	43	38	29	n/a
Radiation Biology	9	48	54	52	38	56	50	72	78	44	50	67	56	43	n/a
Radiation Physics	27	44	50	41	46	33	59	37	54	49	54	56	53	44	n/a
Environmental	2	41	23	36	20	50	50	25	25	33	50	100	67	56	n/a
Internal Dosimetry	5	25	53	49	44	53	73	60	60	53	70	40	60	53	n/a
Regulations and Standards	5	47	35	37	40	40	47	20	30	47	30	40	47	24	n/a
Total/Average	75	44	47	42	41	44	51	43	49	44	51	55	54	43	n/a
Number of Students		11	11	7	5	3	6	2	2	3	2	1	3	9	n/a

*Undergraduate seniors only from 1993 to 2003. MS students entering the program from other discipline are included beginning in 2004.

The characteristics of the class have changed over the period. In the earlier classes we had a majority of students with prior experience at national laboratories or the Naval Nuclear Propulsion Program. Graduating class sizes were larger because we were meeting a pent up demand for higher education among employees of the Idaho National Engineering and Environmental Laboratory. Later undergraduate classes contained primarily younger, traditional students with little prior experience in the field, and graduate education became a larger component of the ISU health physics program. The fact that examination scores for seniors improved at the same time that the experience level of the incoming students decreased suggests that the program has become stronger over the years.

Many of these students are weak in their science and mathematics backgrounds to an extent that makes academic success in the field of health physics challenging. Although we markedly increased the rigor of both the classroom and laboratory portions of our academic program in 1997 and 1998, scores are still not consistent with the passing requirements for the national examination.

Responses to Assessment Results

We continually seek to strengthen the program. The outcome assessment test is thought to reflect the over all understanding achieved by students over a broad range of rigorous technical areas. Although test scores are on a general increasing trend, it is clear that they not only reflect academic preparation but experience. We interpret this matrix as an indication that the rigor of the academic program is currently reasonable although we will be seeking means of improving this quality. We also interpret the results as reflecting, to a small degree, a deficiency in field experience among traditional students. The use of practicum, work study arrangements, and laboratory employment of students during their educational experience will continue to be stressed, particularly among the traditional students with no prior experience in the field. Problem solving will continue to be emphasized in the classes. In 2003 we added a requirement for a capstone course in which seniors are required to complete a project, integrating the knowledge and skills developed in their studies. All of these efforts are ongoing and their integrated impact on student test performance will be tracked as we continue to administer this test and track its annual result.

This metric is considered to be affirmation of achieving the following objectives:

1. Broad fundamental technical knowledge.
3. Professional Judgment and ability to think critically.
4. Practical Experience in solving applied health physics Problems

Alumni Pass rates of the ABHP Examination:

Between 2003 and 2006 16- ISU Health Physics Program students or alumni attempted and passed either part I or part II of the American Board of Health Physics Certification Examination. The information on the number of students passing each part of the examination during each of the following years is provided below:

Year	Number of ISU Health Physics Alumni Passing Part I	Number of ISU Alumni Attempting Examination	National Passing Rate	Number of ISU Health Physics Alumni Passing Part II	Number of ISU Alumni Attempting Examination	National Passing Rate
2002	2	2	17.7%	0	0	35.7%
2003	3	3	29.3%	2	2	31.8%
2004	2	2	33.9%	3	3	49.4%
2005	5	5	Not yet available	1	1	Not yet available
2006	7	7	Not yet available	2	1	Not yet available

Source: http://www.hps1.org/aahp/data.htm#AAHPRoster, @006 data represents preliminary results as reported by students.

Considering the alumni who have graduated during the last 10 years, the pass rate for those who have attempted either part I or part II of the ABHP certification examination has been 100%. The pass rates for students graduating prior to 10-years ago is also very high nearly 100%. The majority of students who have taken this examination are alumni from the graduate program.

Responses to Assessment Results

We interpret this metric as additional evidence of generally acceptable program rigor. This metric is considered to be affirmation of achieving the following objectives:

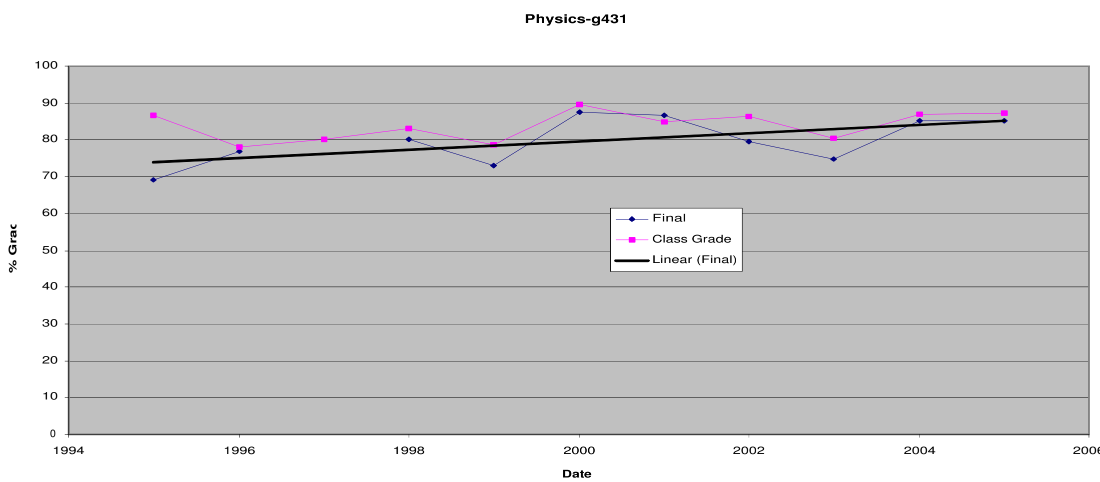
1. Broad fundamental technical knowledge.
3. Professional Judgment and ability to think critically.
4. Practical Experience in solving applied health physics Problems
8. Professional tools and experience above that expected for the baccalaureate program.

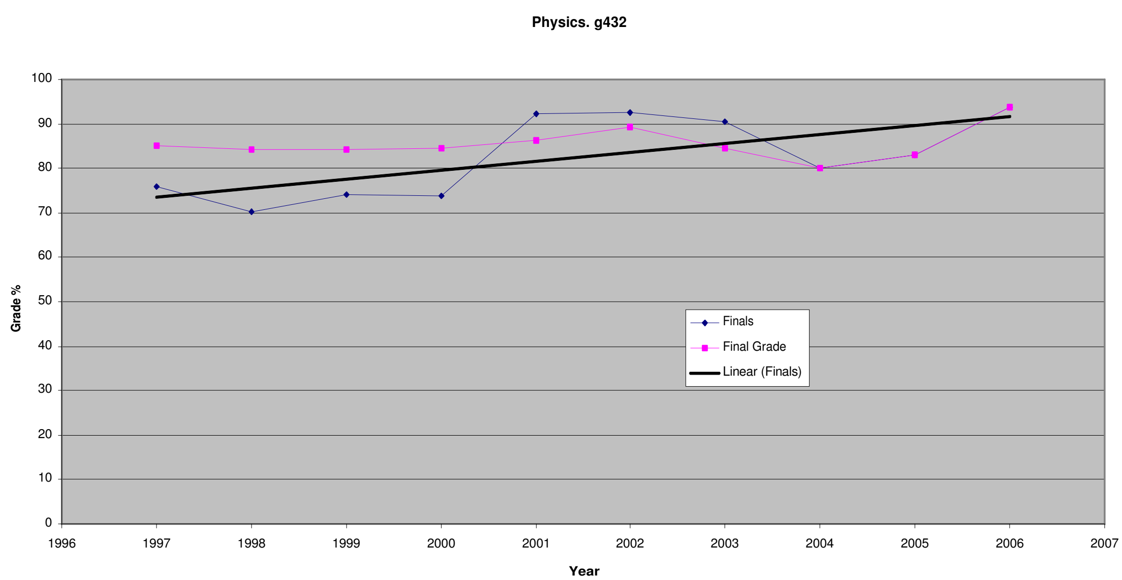
Students Pass Core Classes:

Following are trend plots of grades earned in core courses:

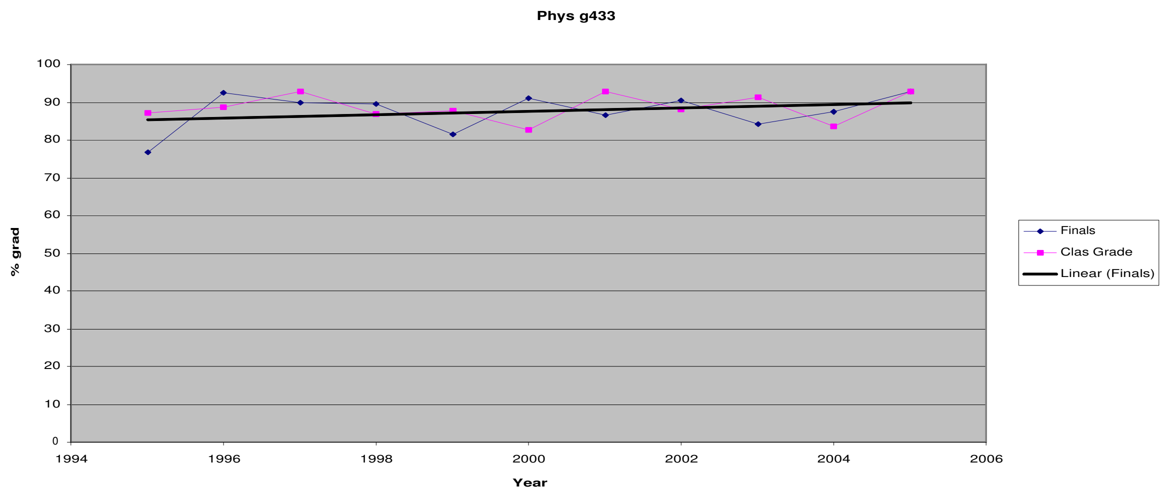
Physics g431:

Physics-g432:

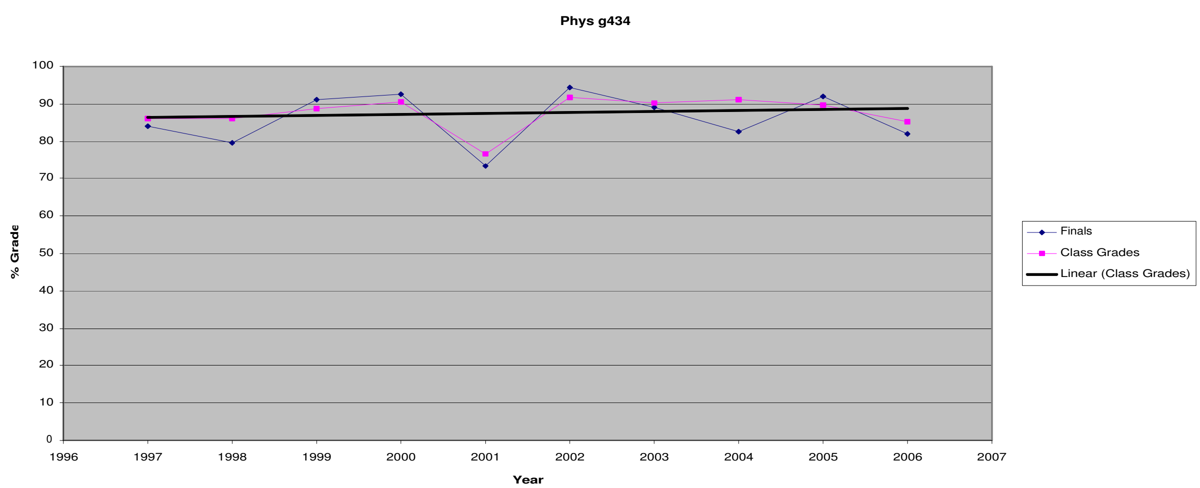




Physics-g433:

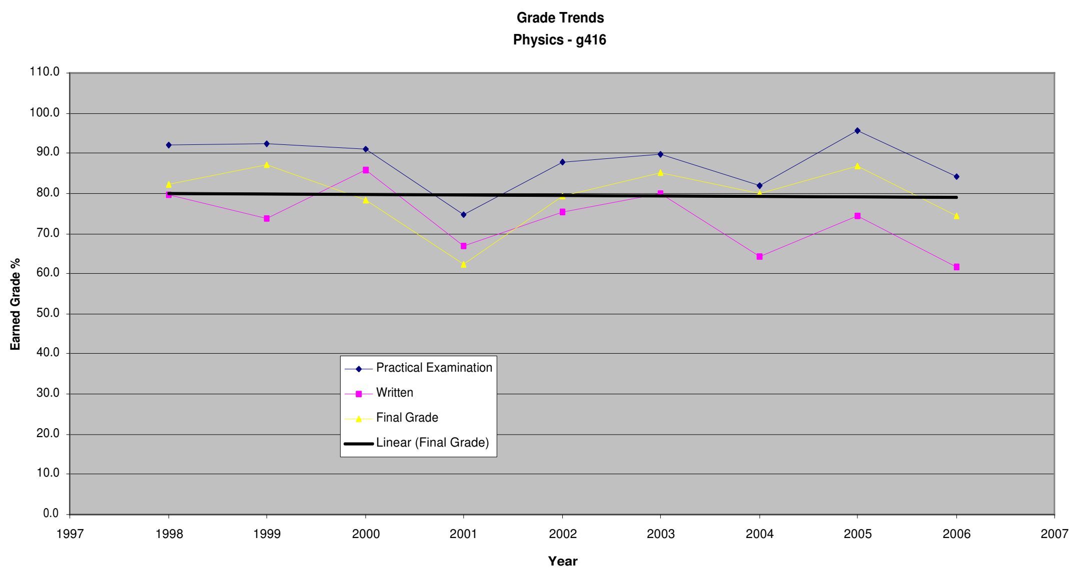


Physics-g434:



Considering these four required core courses for undergraduate students and graduate students entering Health Physics from different disciplines, we observe a gradual increase in student grades. Since homework assignments are similar with little change in course expectation over the period under consideration, we interpret this as gradual improvement in student performance. Final examination grades also plotted in some cases are perhaps the best indicator to support this interpretation as the same examination has been used for several years running in these cases.

The trend in performance for Physics-g416 (Introduction to Nuclear Instrumentation) is different than observed in other core courses. During the last review it was observed that a step decrease occurred in grades during 2001. Efforts were expended to improve the class. This has apparently paid off considering improvements in student performance since the 2001 situation.



It should be noted that this class has tripled in size since the 2001 data point. At this time this is a required course for Physics undergraduates as well as Health Physics undergraduates. Recently, the ISU Nuclear Engineering program has included this course as a required class for both their graduate and undergraduate students. So improvements in student outcome should be considered along with a tripling of class size. Current enrollments are at the 20 to 25 student level. This is a substantial number considering the capital and labor intensive approach to nuclear instrumentation employed in this course.

The coefficient of variation for Physics-g416 grades was another parameter considered when evaluating the 2001 anomaly. Although a plot has not been provided it was observed that this value seems to be on a decreasing trend implying a decrease in variability of outcome.

Although some variation is anticipated from year to year when considering the COV, large swings may be an indicator worthy of follow-up, and hence this class continues to be carefully watched.

Responses to Assessment Results

We interpret these matrices as additional evidence of generally acceptable program rigor. This metric, student performance in classes, is considered to be affirmation of achieving the following objectives:

1. Broad fundamental technical knowledge.
2. Written and Verbal Communication Skills
3. Professional Judgment and ability to think critically.
4. Practical Experience in solving applied health physics Problems
5. The Ability to Work Independently.
8. Professional tools and experience above that expected for the baccalaureate program.

Performance in Work/Research as reported by supervisor

Interviews with laboratory supervisors from the EAL, EML, TSO and Internship supervisors were uniformly positive. The following is a summary of the items identified:

1. Once students finish course work their level of understanding and engagement in “work” challenges improves.
2. Sometimes students seem to initially stall when asked to creatively apply didactic information to laboratory problems, this may be associated with confidence, but ultimately students accomplish the tasks.

Students Pass Applicable Communication Courses

1. There is an absence of any information on failure in communication classes.
2. Informal reports from instructors indicate that the Health Physics Students are well regarded in ENGL-305 (reference Faculty Minutes of October 17, 2002 - Item 2. This continues to be the trend based upon recent conversations with course instructors.
3. The written communication skills of students anecdotally seem to be steady.

The Quality of Students Laboratory Reports

We refer to grade trends in Physics-g416 as the most quantitative indicator of Laboratory report Quality and Quality of Laboratory Work.

The program’s productivity of professional papers, presentations, and posters

During the time span between 2004 to 2006 student production with respect to various types of publications was as follows:

1. At least 14 Abstracts, and several proceedings articles have been published by ISU Health Physics Students.

2. Four papers were completed; several papers were under development/review at the time the assessment cycle ended.

3. Seven M.S. thesis and 3 Ph.D. dissertations were completed with several thesis in the writing phase.

Student performance in classes, problem solving, approaches to “defective problems”.

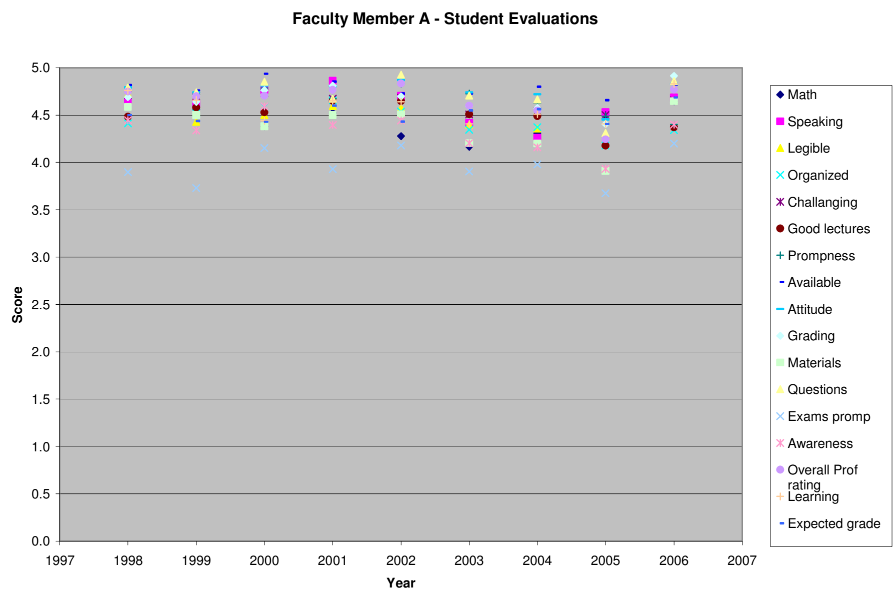
1. We refer the reader to class grade trends as a metric on class room performance.
2. Application of Broken Problems: This metric remains unchanged since the last evaluation.

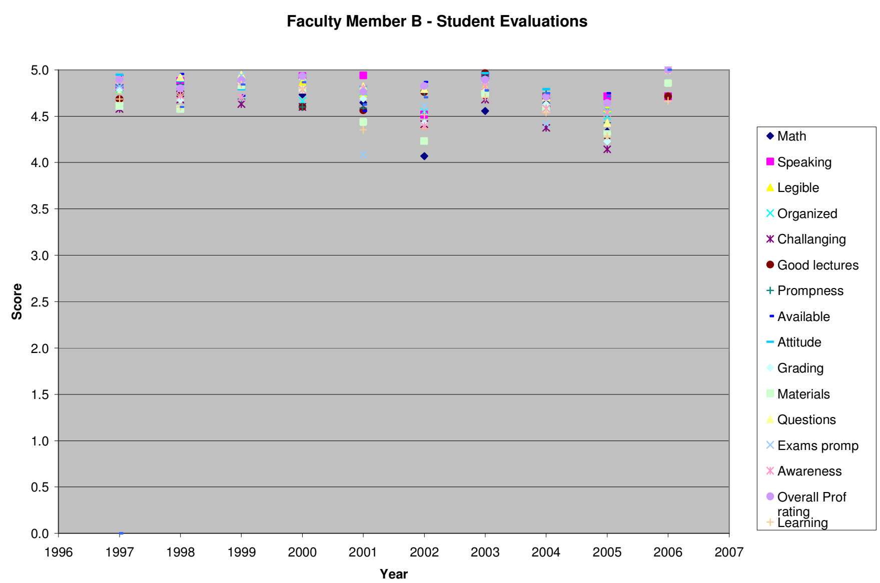
Assessment of Students as Observed in Letters of Recommendation

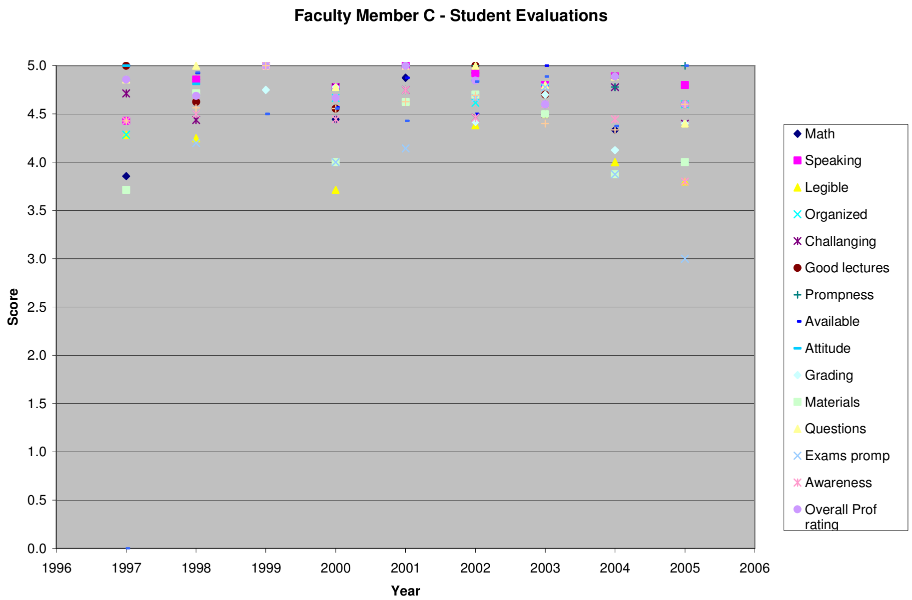
No faculty reported having to refuse doing a recommendation letter for a student. The strength of recommendation letters demonstrates obvious and expected fluctuations.

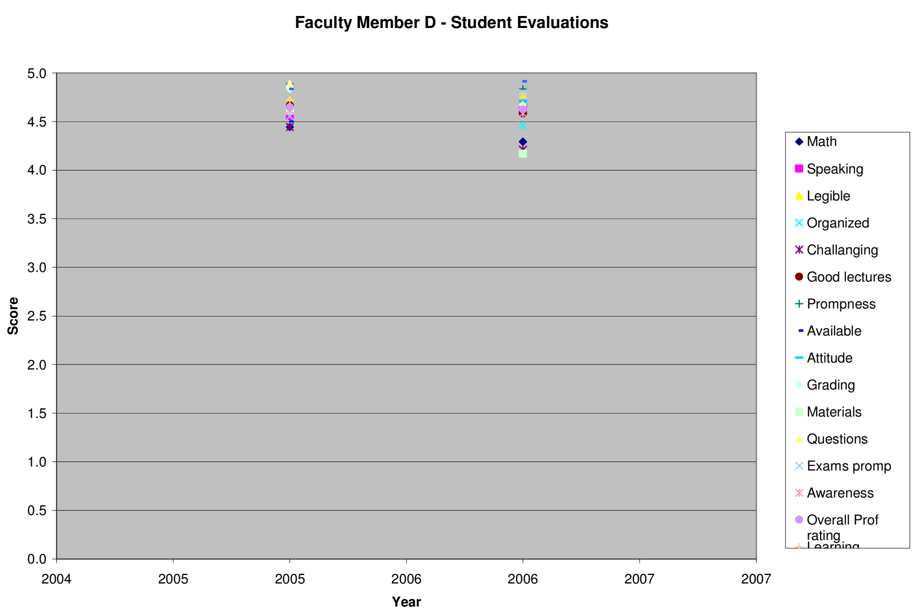
Student Evaluation of Instructor Performance and Classes

The following scatter plots demonstrate provide the summarized average student response for each tenure-track faculty member for each class taught over the last several years.









We conclude that the level of course quality is acceptable.

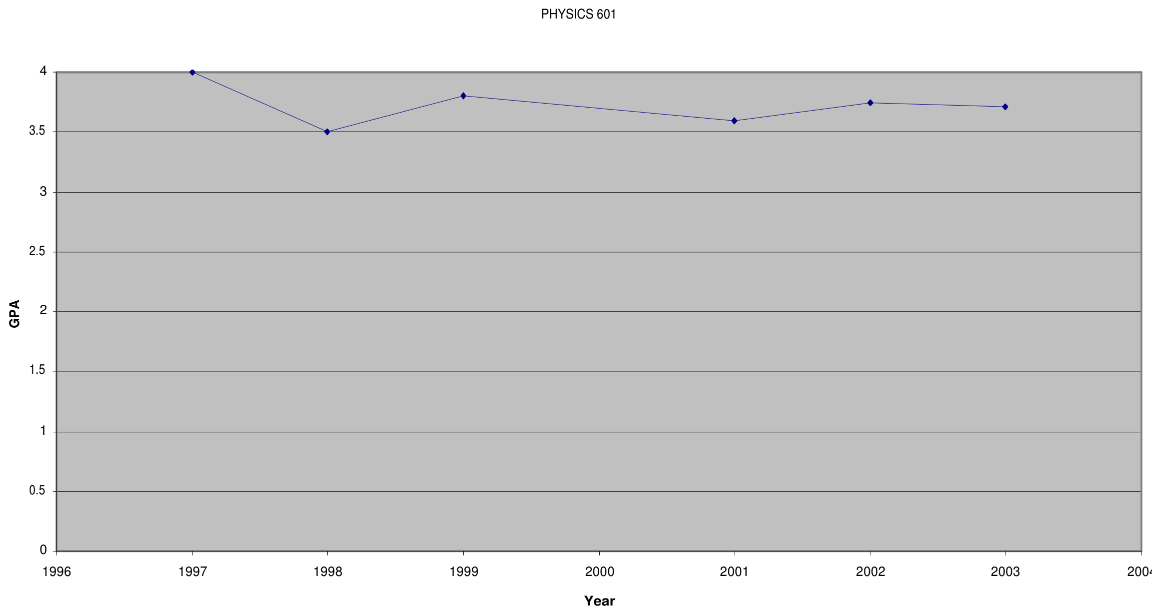
The Successful Completion of High Quality Thesis or Dissertations

The MS Program includes additional Programmatic Educational Objectives and hence some additional Outcome Assessment Tools are employed to evaluate these Objectives. During this assessment cycle 4 M.S. theses and 1 Ph.D. dissertation were completed with 6 thesis in the writing phase. The defense of all these was conducted successfully.

Satisfactory performance in Upper division and 600 level graduate courses

The following are grade trends for required upper division 600-level Health Physics courses.

Physics 605:



Assessment Conclusions:

Our conclusion is that ISU is satisfactorily satisfying each of their published 6 objectives for the B.S. program and 8 objectives for the M.S. program. The Assessment tools used to evaluate each Objective are associated with each Objective in the list that follows. The data generated as the Assessment tool was provided above. At least two assessment tools are used to evaluate the accomplishment of each objective.

The Objectives are as Follows:

1) Broad Fundamental Technical Knowledge

Assessment Tools evaluated during this cycle:

i. Graduates Pass ABHP Certification Examination.

ii. Students Pass Core Classes.

iii. Performance in Work/Research as Reported by Supervisor.

iv. Results of ISU administered outcome assessment examination.

2) <u>Written and Verbal Communication Skills</u>

Assessment Tools evaluated during this cycle:

i. Student Laboratory Report Quality.

ii. M.S. Thesis Quality.

iii. Professional Papers, Presentations and Posters.

iv. Students Pass Applicable Communication Courses.

v. Students Pass Core Classes.

3) <u>Professional Judgment and Ability to Think Critically</u>

Assessment Tools evaluated during this cycle:

i. Performance in work/research experience as reported by supervisor

ii. Assessment of MS Thesis

iii. Performance in classes, problem solving and approaches to "defective problems, laboratory performance.

iv. Results of ISU administered outcome assessment examination.

v. Graduates Pass ABHP Certification Examination

vi. Students Pass Core Classes.

4) <u>Practical Experience in Solving Applied Health Physics Problems</u>

Assessment Tools evaluated during this cycle:

i. Performance in Classes, Problem Solving and Approached to "Defective Problems", Laboratory Performance

ii. Performance in Work Research Experience as Reported by a Supervisor.

iii. Results of ISU administered outcome assessment examination.

iv. Graduates Pass ABHP Certification Examination

v. Students Pass Core Classes.

5) <u>The Ability to Work Independently</u>

Assessment Tools evaluated during this cycle:

i. Performance in class, problem solving, laboratory performance.

ii. Performance in Work Research Experience as Reported by a Supervisor

iii. Students Pass Core Classes.

6) <u>A Professional Work Ethic</u>

Assessment Tools evaluated during this cycle:

i. Performance in work/ research experience

ii. Assessment of Students as Observed in Letters of Recommendation

As applied to Graduate students:

7) <u>An ability to conduct research</u>

i. Results of students' thesis defense.

ii. Production of student research papers and poster presentations.

8) <u>Professional Tools and experience above that expected for the baccalaureate program</u>

Assessment Tools evaluated during this cycle:

i. Evidenced by successful completion of High Quality Thesis or Dissertation.

ii. Satisfactory performance in Upper division and 600 level graduate courses

iii. Graduates Pass ABHP Certification Examination.

iv. Students Pass Core Classes.

Conclusions of Data Evaluation for 2006 and review of 2003 Action Items

This assessment of the Idaho State University Health Physics Programs supports a statement that all measured and evaluated outcomes considered during this review provide evidence that the current Idaho State University Health Physics Program Educational Objectives for both the B.S. and M.S. programs are being attained at a satisfactory level.

Current Course work is entirely appropriate and shows trends of continued improvement.

Student evaluations demonstrated a generalized low mark in prompt return of homework and tests. This parameter has shown general improvement since 2005 with the addition of faculty in the program which has reduced individual teaching loads.

One observation in the programmatic audit of 2004 (to paraphrase) was that perhaps courses could focus on applied items like:

a. -Specific (unique) Measurement Techniques

b. - Uncertainty analysis for specific problems

c. - Incident Investigation Techniques

d. - Dose Reconstruction

e. - Measurement techniques, analysis, and decision making relative to D&D (MARSIM)

Faculty were to explore ways these ideas might be brought into current courses/curriculum.

These have been evaluated by faculty and incorporated to varying extent into the various courses offered.

ATTACHMENT SIX Assessment Report 2008

DEPARTMENT OF PHYSICS HEALTH PHYSICS PROGRAM

SUMMARY OUTCOME ASSESSMENT REPORT, Spring 2008

DEPARTMENT OF PHYSICS HEALTH PHYSICS PROGRAM
SUMMARY OUTCOME ASSESSMENT REPORT, 2008

Introduction

During the 2006 through 2008 time period, twelve different Assessment Tools were considered to evaluate the ISU Health Physics Program and the progress achieved in accomplishing the six stated undergraduate and eight stated graduate programmatic objectives.

The twelve specific Assessment Tools used were as follows:

1) Outcome assessment examination results
2) Pass rates of the ABHP examination
3) Student grades in core classes
4) Performance in work/research as reported by supervisor
5) Students pass applicable communication courses
6) Quality of students' laboratory reports
7) The program's productivity of professional papers, presentations, and posters
8) Student performance in classes, problem solving, approaches to "defective problems".
9) Assessment of students as observed in letters of recommendation
10) Alumni and alumni employer surveys

For Graduate Students

11) Successful completion of high quality thesis or dissertations
12) Satisfactory performance in upper division and 600 level graduate courses

This report will summarize the data generated with respect to each Assessment Tool accompanied by a brief interpretation of the data. It will discuss how each of these tools are related to programmatic Objectives. The final section, Conclusions of Data Evaluation and Review of Action Items, will describe both the overall conclusion and the programmatic changes that are being employed in response to the findings of the assessment review.

Results and Discussion from Various Assessment Tools

Outcome Assessment Examination:
Students enrolled in Topics in Health Physics have been given a simulated American Board of Health Physics certification examination for the past 15 years. Up until 2004, the exam was administered only to seniors in the undergraduate program. However, the number of seniors has declined as the numbers of MS and PhD students have risen, so starting in 2004 we began including graduate students who had entered the Health Physics MS program from other disciplines. During 2006 no students took the Topics class and the exam was not administered. No class average reached the passing grade of 70% that would be required for certification had this been an actual exam. However, of 145 persons taking Part I of the ABHP exam in 2000, for example, only 45 scored a passing grade of 70% on their first attempt, this trend in ABHP passing rates nationally persists. The instructor of the ISU certification review course, a certified, practicing Health Physicist, took the ISU outcome assessment exam in 1994 and achieved only 85%. The test instrument is difficult, but does provide for consistent evaluations over the years. The following scatter plot summarizes test results from 1993 to 2007.

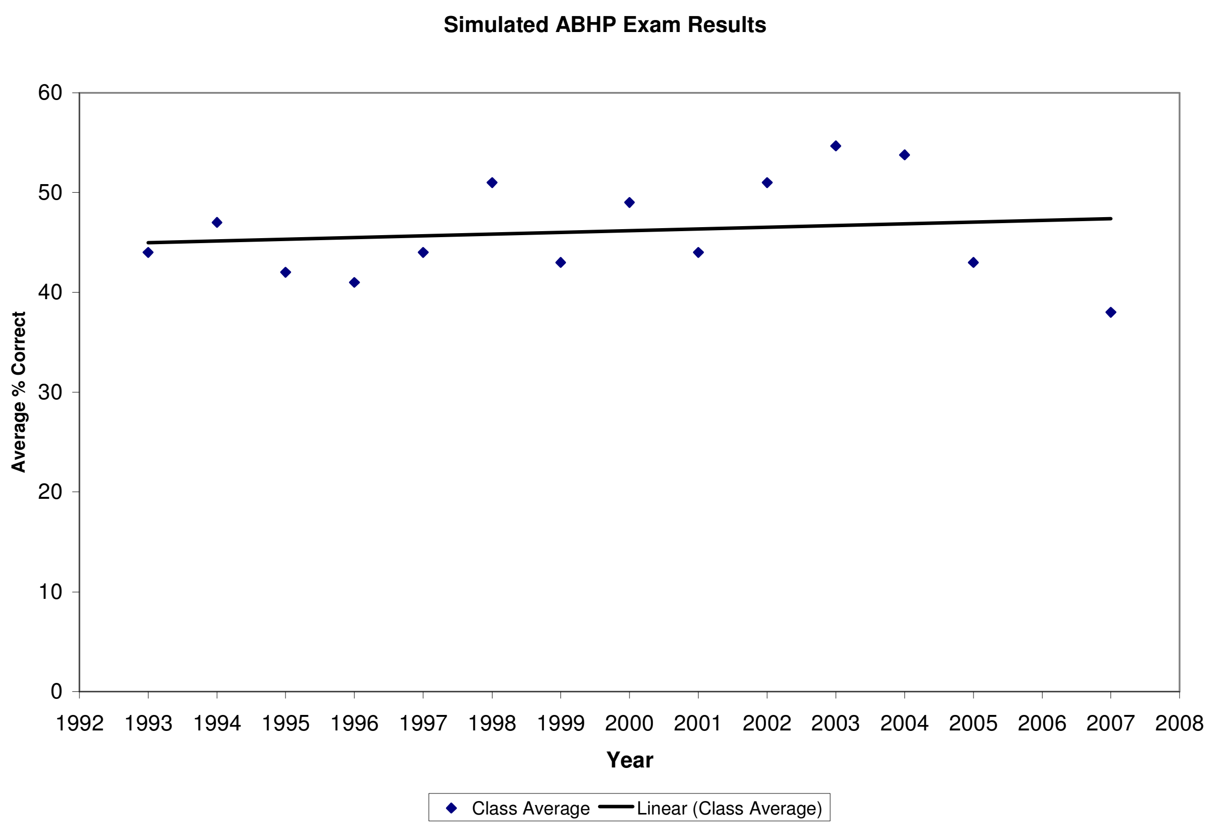


Figure (1): Average percent correct answers per year on the simulated ABHP exam given to students enrolled in the spring semester of Topics in Health Physics.

Overall performance, given in the next to last line of Table (1) as percent correct answers, has varied from a low of 41% in 1996 to a high of 55% in 2003. It is not known if the differences among the 15 years are statistically significant but there is an observable upward trend in the scores (see Figure (1)). When students are informally categorized by the amount of field experience they have had, it is clear that experience is a factor in successful performance on this test.

The characteristics of the class have changed over the period. In the earlier classes we had a majority of students with prior experience at national laboratories or the Naval Nuclear Propulsion Program. Graduating class sizes were larger because we were meeting a pent up demand for higher education among employees of the Idaho National Engineering and Environmental Laboratory. Later, undergraduate classes contained primarily younger, traditional students with little prior experience in the field, and graduate education became a larger component of the ISU Health Physics Program. The fact that examination scores for seniors improved at the same time that the experience level of the incoming students decreased suggests that the program has become stronger over the years. However, many of these students are weak in their science and mathematics backgrounds to an extent that makes academic success in the field of health physics challenging. Although we markedly increased the rigor of both the classroom and laboratory portions of our academic program in 1997 and 1998, scores are still not consistent with the passing requirements for the national examination.

Topic	Number of Questions	Average Score (%)														
		1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Nuclear Reactors	5	56	55	43	48	53	50	40	40	40	40	80	47	58	n/a	44
Neutron Physics	7	45	47	41	31	52	40	57	57	43	57	57	52	41	n/a	43
External Dosimetry	8	44	44	41	53	46	44	38	31	33	56	38	71	49	n/a	30
Radiation Shielding	7	38	35	37	20	43	31	36	29	38	43	43	38	29	n/a	23
Radiation Biology	9	48	54	52	38	56	50	72	78	44	50	67	56	43	n/a	49
Radiation Physics	27	44	50	41	46	33	59	37	54	49	54	56	53	44	n/a	39
Environmental	2	41	23	36	20	50	50	25	25	33	50	100	67	56	n/a	60
Internal Dosimetry	5	25	53	49	44	53	73	60	60	53	70	40	60	53	n/a	44
Regulations and Standards	5	47	35	37	40	40	47	20	30	47	30	40	47	24	n/a	20
Total/Average	75	44	47	42	41	44	51	43	49	44	51	55	54	43	n/a	38
Number of Students		11	11	7	5	3	6	2	2	3	2	1	3	9	n/a	5

Table (1): Summary of types and numbers of questions asked and percent answered correctly on the simulated ABHP exam given to students enrolled in the spring semester of the Topics in Health Physics class. Note that the exam was administered only to undergraduate seniors from 1993 to 2003. MS students entering the program from other disciplines are included beginning in 2004. Data for the 2008 tests were not available at the time of report generation.

Responses to Outcome Assessment Exam Results:
We continually seek to strengthen the program. The simulated ABHP exam results are thought to reflect the over all understanding achieved by students over a broad range of rigorous technical areas. Although test scores are on a general increasing trend, it is clear that they not only reflect academic preparation, but experience as well. We interpret this matrix as an indication that the rigor of the academic program is currently reasonable although we will be seeking means of improving this quality. We also interpret the results as reflecting, to a small degree, a deficiency in field experience among traditional students.

The use of practicum, work study arrangements, and laboratory employment of students during their educational experience will continue to be stressed, particularly among the traditional students with no prior experience in the field. Problem solving will continue to be emphasized in all classes. In 2003 we added a requirement for a capstone course in which seniors are required to complete a project, integrating the knowledge and skills developed in their studies. All of these efforts are ongoing and their integrated impact on student test performance will be tracked as we continue to administer this test and track its annual result.

This metric is considered to be affirmation of achieving the following Objectives:

- Broad fundamental technical knowledge.
- Professional judgment and ability to think critically.
- Practical experience in solving applied health physics problems.

Alumni Pass Rates of the ABHP Examination:
Between 2000 and 2006, at least 26- ISU Health Physics Program students or alumni attempted either Part I or Part II of the American Board of Health Physics Certification Examination. The information on the number of students passing one or both parts of the certification is shown below.

ABHP Cert. Exam Data

Year	No. of ISU Students/Alumni Passing One Part	No. of ISU Students/Alumni Completing Certification	Nat. Pass Rate for Part I (%)	Nat. Pass Rate for Part II (%)	No. of ISU Students/Alumni attempting Part I*	No. of ISU Students/Alumni attempting Part II*
2000	0	0	31.03	67.35	not available	not available
2001	0	0	20.69	44.19	not available	not available
2002	2	0	not available	not available	2	0
2003	3	3	45.33	31.76	3	2
2004	2	3	33.33	49.37	2	3
2005	1	0	55.64	20.00	5	1
2006	4	2	43.24	38.54	7	1
2007	1	0	48.76	32.00	1	0
2008	not yet available					

* all data come from HP Newsletter publications except for no. of students participating, which is based on internal count and may not be accurate

Table (2): Participation results for ISU students and alumni in the American Board of Health Physics Certification Exam. *Number of students/alumni participating is based on internal count and may not be accurate; other data are based on the Health Physics News publication of exam results.

Considering the alumni who have graduated during the last 10 years, the pass rate for those who have attempted either Part I or Part II of the ABHP certification examination has been nearly 100%. The majority of students who have taken this examination are alumni from the graduate program.

Responses to ABHP Examination Results:

We interpret this metric as additional evidence of generally acceptable program rigor. This metric is considered to be affirmation of achieving the following Objectives:

- Broad fundamental technical knowledge.
- Professional judgment and ability to think critically.
- Practical experience in solving applied health physics problems
- Professional tools and experience above that expected for the baccalaureate program.

Student Grades in Core Classes:
Following are trend plots of average grades earned on final exams and average course grades earned in core classes of the Health Physics Program. All of our courses are cross-listed for the undergraduate level (400s) and the graduate level (500s). The first course is PHYS-g431, Radiation Physics I. This course covers atomic and nuclear structure, series and differential-equation descriptions of radioactive decay, physical theory of the interaction of radiation with matter suitable for the discipline of health physics.

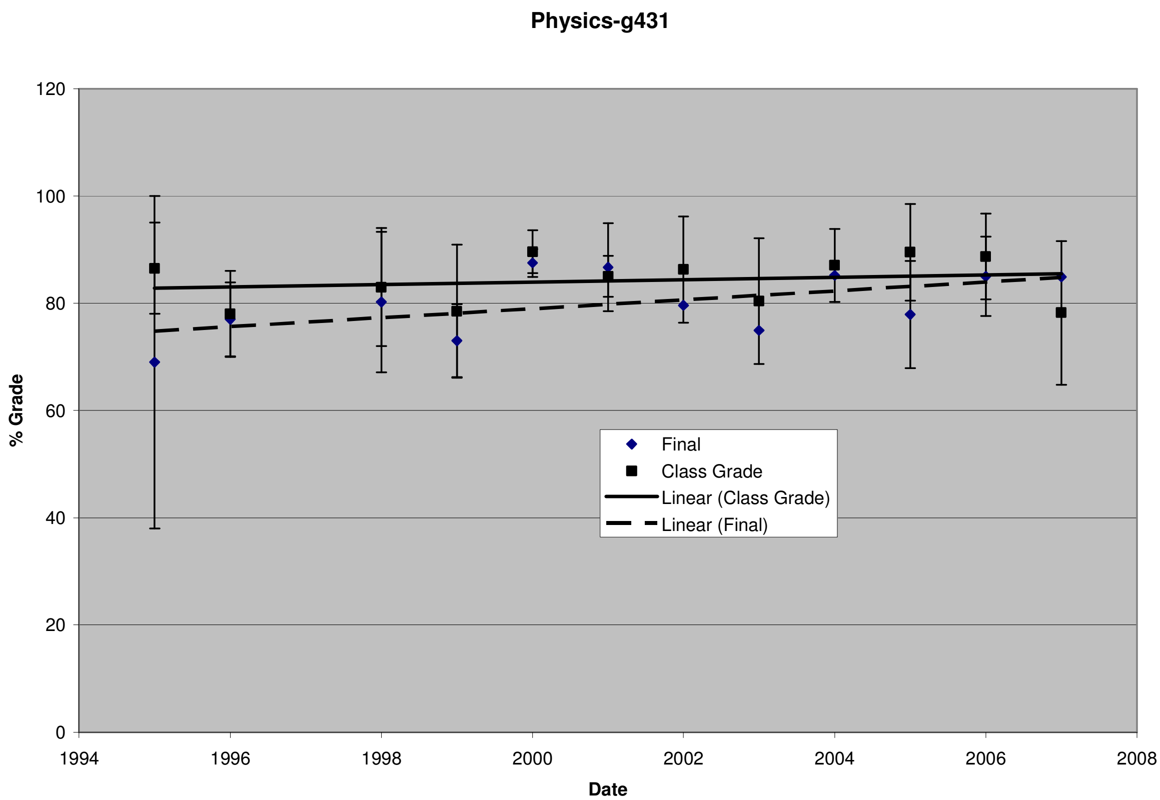


Figure (2): Average final exam and class grade for students enrolled in Radiation Protection I. A linear fit to the final exam data shows a positive correlation with time.

The second core course is PHYS-g432, Radiation Physics II. This is a continuation of PHYS-g431 and covers dosimetric quantities and units, cavity theory, theory and technology of radiation detection and measurement, and radiobiology important to an advanced understanding of radiation protection.

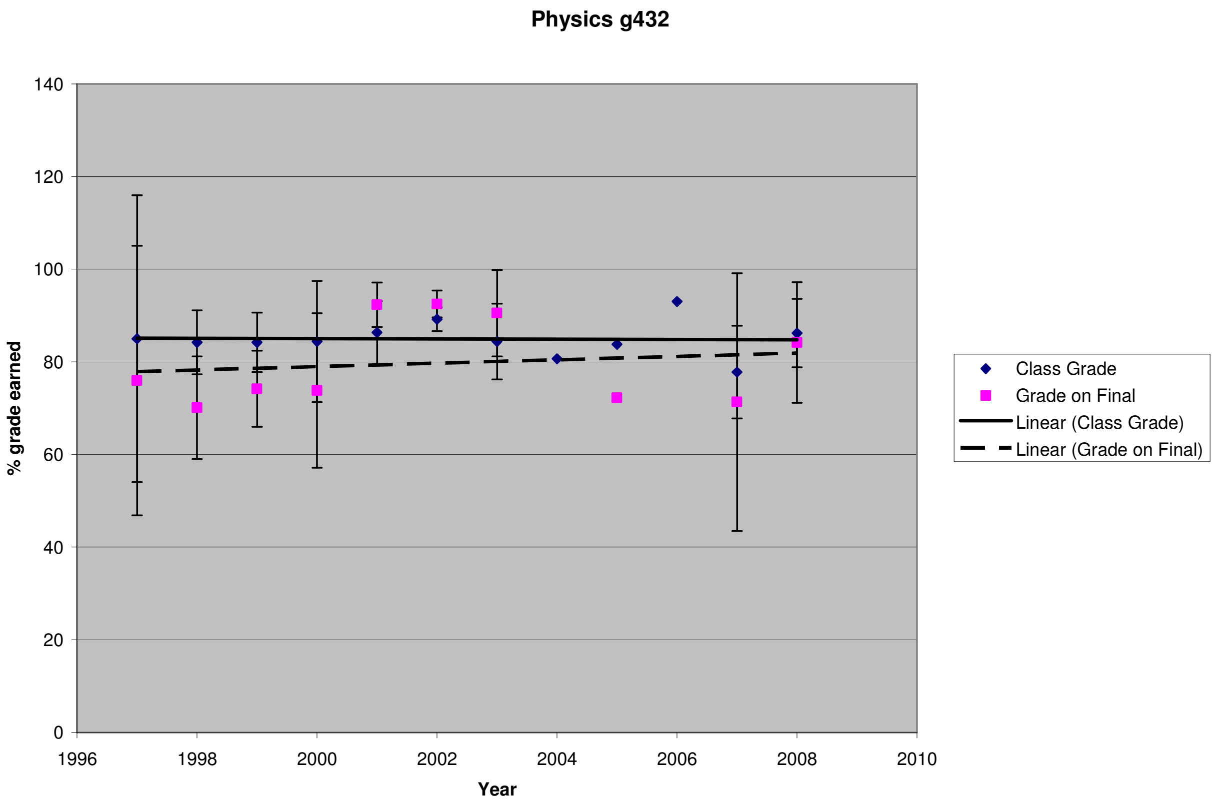


Figure (3): Average final exam and class grades for students enrolled in Radiation Physics II. A linear fit to the final exam data is also shown. This course has had several different instructors of the last few years, some of whom have left the university and hence final examination grades have not been consistently available during this time period.

Physics-g433, External Dosimetry, is a lecture course emphasizing external radiation protection including the study of point kernel techniques, Monte Carlo modeling, and NCRP-147 methods. External dosimetry measuring techniques are also covered.

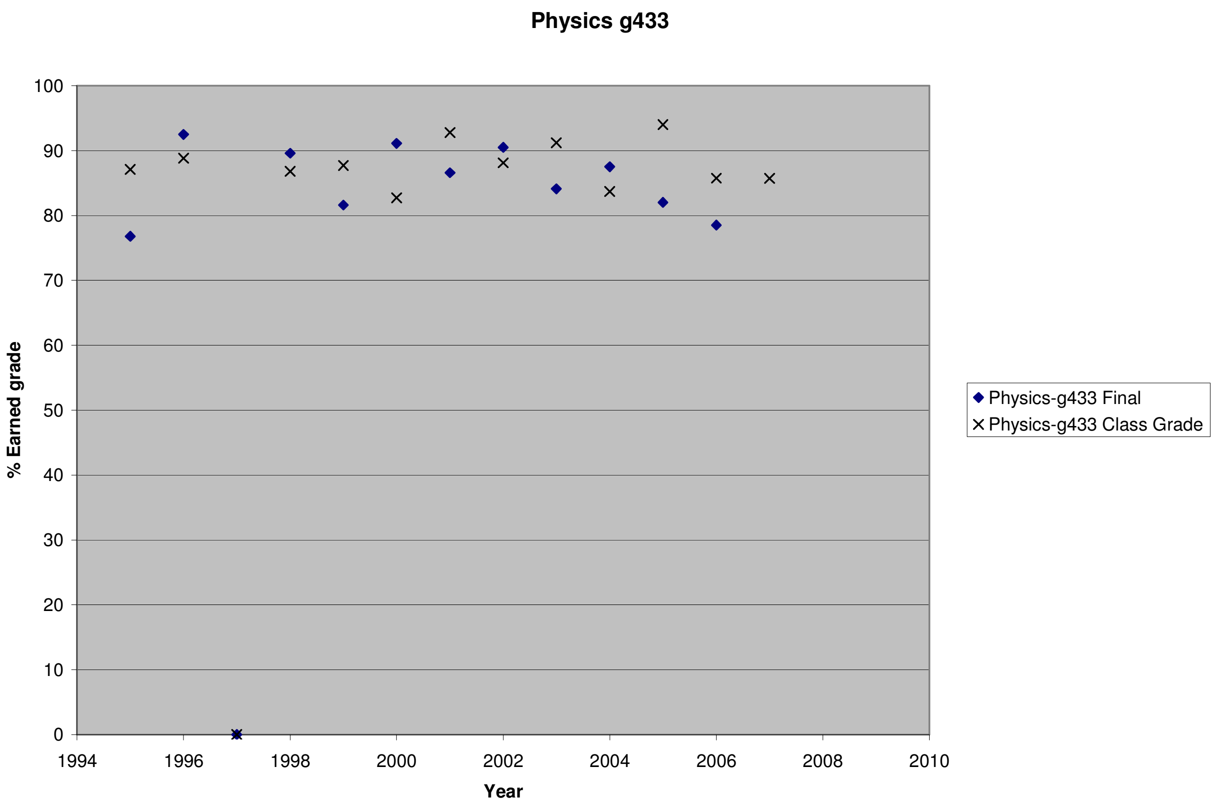


Figure (4): Average final exam and class grade for students enrolled in External Dosimetry. No trends were observed in this data set indicating flat, but high level performance.

Physics-g434, Internal Dosimetry, emphasizes internal radiation protection including studies of ICRP-2, ICRP 26 and 30, ICRP 60, 66, 67, 68, 100 and MIRD methods.

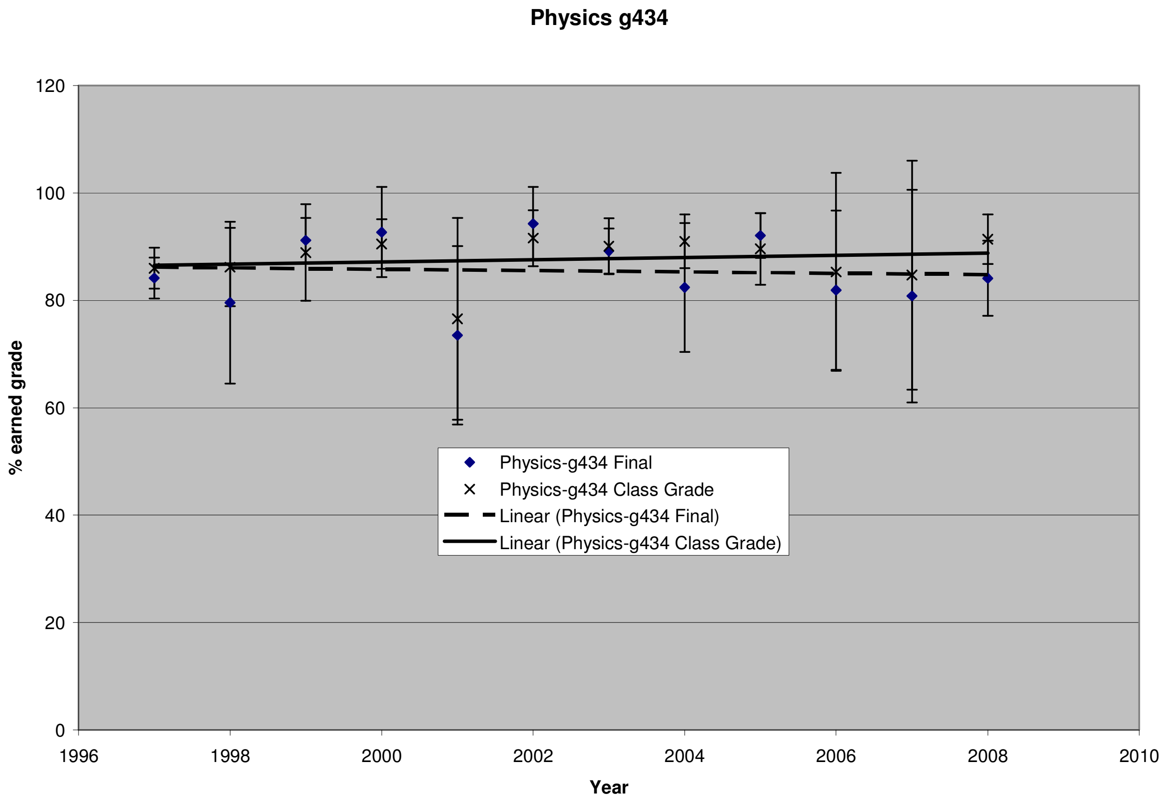


Figure (5): Average final exam and class grade for students enrolled in Internal Dosimetry. A linear fit to the final exam data is flat but at a high level of performance with a small positive slope on overall class grade with time. Given the expansion of the class to additionally cover topics within the many new ICRP models, many of which are mechanistically and mathematically much more complex than previous systems this performance is found to be reasonable.

The Radiation Detection and Measurement PHYS-g416 is a lecture/laboratory course emphasizing practical measurement techniques in nuclear physics. The class size has increased dramatically since 2005 when this course became a requirement for the Nuclear Engineering Program. This class is required of all undergraduate and graduate health physics students and physics undergraduate students. The class was for the first time simultaneously offered in Pocatello and Idaho Falls. This is an intensive class which tracks student understanding and performance through written exams, oral practical exams, and written laboratory reports.

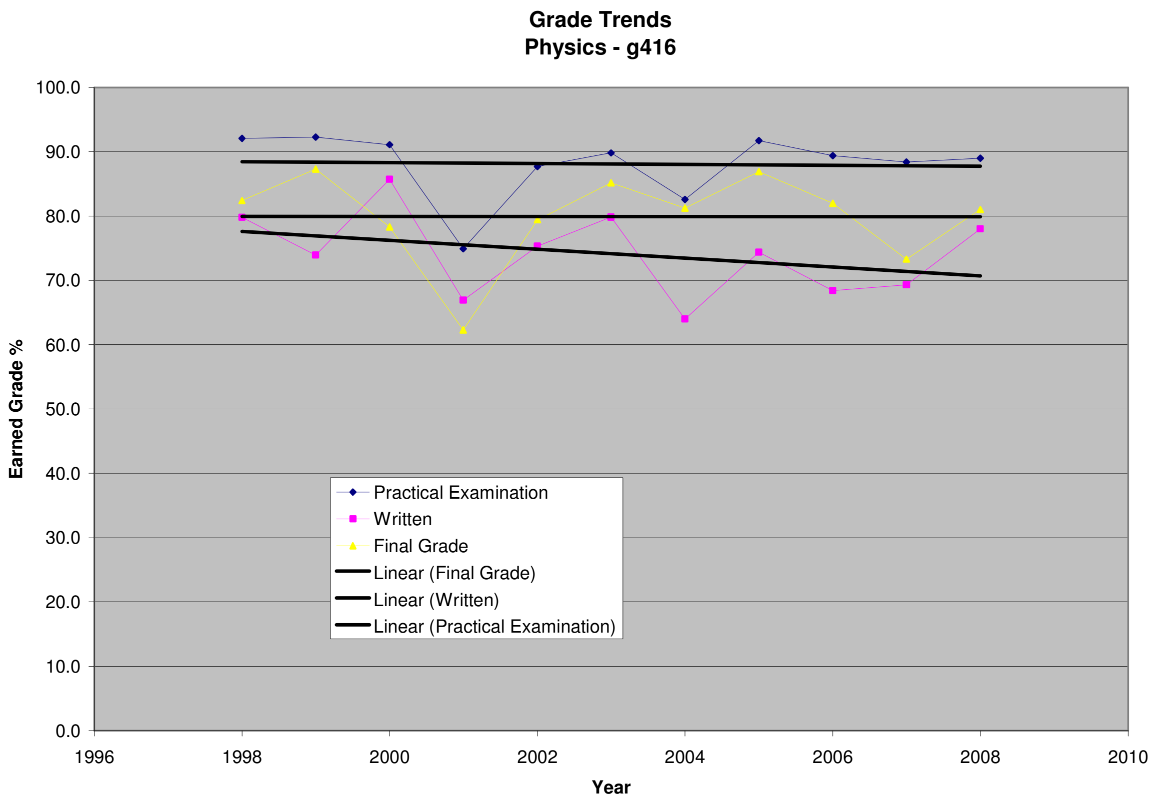


Figure (6): Average final exam grade, practical grade (second of two), lab report grade, and class grade for the Radiation Detection and Measurement class are provided. One observes relatively flat trends in the final grade assigned for the class, and grades on the practical examinations, there is a minor negative slope in the grades earned over time on the written final.

The final examination grades plotted for these core courses are perhaps the best indicator of student performance over the years as the same, or similar, examination has been used for several years running.

As mentioned, enrollment in PHYS-416 has increased dramatically over the years along with the diversity of students and pre-preparation for this class. During the spring of 2007 a questionnaire was given to the students at the end of the course in order to evaluate their preparedness for and their response to the class. Also during the spring of 2007 and the spring of 2008 focus group meetings were held with several students and the course instructors to debrief on the success and failures of the courses. Separate reports on these focus group meetings were prepared.

Responses to Assessment of Grades in Core Classes:
Though grades have shown a decreasing trend in most classes, the overall scores are still above average (letter grade C). This metric is considered to be affirmation of achieving the following objectives:

- Broad fundamental technical knowledge.
- Written and verbal communication skills.
- Professional judgment and ability to think critically.
- Practical experience in solving applied health physics problems.
- The ability to work independently.
- Professional tools and experience above that expected for the baccalaureate program.

Performance in Work/Research as Reported by Supervisor:
Appendix (2) provides raw data (i.e. student performance reports) on work/research in the EAL, EML, TSO and/or in internship situations. The following is a summary of what Roy Dunker, who supervises students in the EML, has observed:

> Students who have completed a B.S. in Health Physics are academically prepared to begin work in the Environmental Monitoring Lab at ISU. Typically, however, the exceptional student employees are those who have successfully completed the PHYS 605 and PHYS 516 courses. Generally, these students advance to work independently on research for their MS degrees or research specific to the laboratory operations. Year in and year out, the students who have successfully completed these courses are able to apply skills and knowledge learned to quickly become productive in the laboratory.
>
> Baccalaureate students who have not had these courses are equally competent and communicate effectively in the language of the profession, however, their deeper understanding or grasp of the conceptual purpose and function of instrumentation and laboratory processes is delayed due to a lack of more advanced experience or academic training.

Kevin Claver, who supervises students in the EAL, also reported that students who have taken the Radiation Detection and Measurements course (PHYS 416/516) are better prepared to work on instrumentation in the laboratory.

Students Pass Applicable Communication Courses:

1. There is an absence of information on any failure in communication classes.
2. Informal reports from instructors indicate that the Health Physics students are well regarded in ENGL-307 (see email communication in Appendix (4)).
3. The written communication skills of students anecdotally seems to be steady.

Quality of Students' Laboratory Reports:
The quality of laboratory work and reports is best represented by the trends shown in Figure (6) above.

Productivity of Professional Papers, Presentations, and Posters:
Students have always been encouraged to presented talks or posters at the Annual HPS Meeting. Following is a table detailing the number of student/faculty presentations or poster from 2000 to 2007. It should be noted that student and faculty may have presented at other meetings and published in other journals during this time as well.

Annual HPS Conference Data
based on listing for Brey, Cummings, Dunker, Farfan, Gesell, Schrader, Wells (counted only once if cross-listed)

Source	Year	No. Presentations/Posters
HP Journal Vo. 78, No. 6	June 2000	12
HP Journal Vo. 80, No. 6	June 2001	9
HP Journal Vo. 82, No. 6	June 2002	8
HP Journal Vo. 84, No. 6	June 2003	12
HP Journal Vo. 86, No. 6	June 2004	9
HP Journal Vo. 90, No. 6	June 2006	17
HP Journal Vo. 89, No. 1	July 2005	13
HP Journal Vo. 96, No. 1	July 2007	13
Not Published as of time of report	July 2008	8

Table (3): Summary of the number of talks and posters presented at the Annual HPS meeting by students and faculty. Data are based on listing in the Supplements to the Health Physics Journal for each year.

Five M.S. thesis but no Ph.D. dissertations were completed during 2007. It is anticipated that five M.S. thesis and two Ph.D. dissertations will be completed during 2008. As of May 2008, three of the anticipated five M.S. theses were already successfully defended.

General Student Performance in Problem Solving and Approaches to "Defective Problems":

1. We refer the reader to class grade trends as a metric on class room performance.
2. The value of this metric is being reconsidered as it is hard to identify trends in performance with this measure, information tends to be anecdotal. Anecdotally student performance appears to be fairly constant over the years.

Assessment of Students as Observed in Letters of Recommendation:
No faculty reported having to refuse doing a recommendation letter for a student due to academic performance. The strength of recommendation letters demonstrates obvious and expected fluctuations.

The Successful Completion of High Quality Thesis or Dissertations:
The MS Program includes additional Programmatic Educational Objectives and hence some additional Outcome Assessment Tools are employed to evaluate these Objectives. During this assessment cycle, 8 M.S. theses were completed. The defense of all these was conducted successfully.

Two theses were unofficially graded on a scale from 1-10 in several areas. The average scores are reported below:

Table (3): Average grade on thesis defense.

Oral: clarity, depth, concise, etc.	Slides: clarity, contrast, usefulness, etc.	Oral: technical quality	Written: clarity, organization, depth, etc.	Written: grammar, figures/tables, etc.	Written: technical quality
9.1	9.2	8.7	9.0	9.3	8.7

Satisfactory Performance in Upper Division and 600-Level Graduate Courses:
The following are grade trends for required upper division 600-level Health Physics courses.

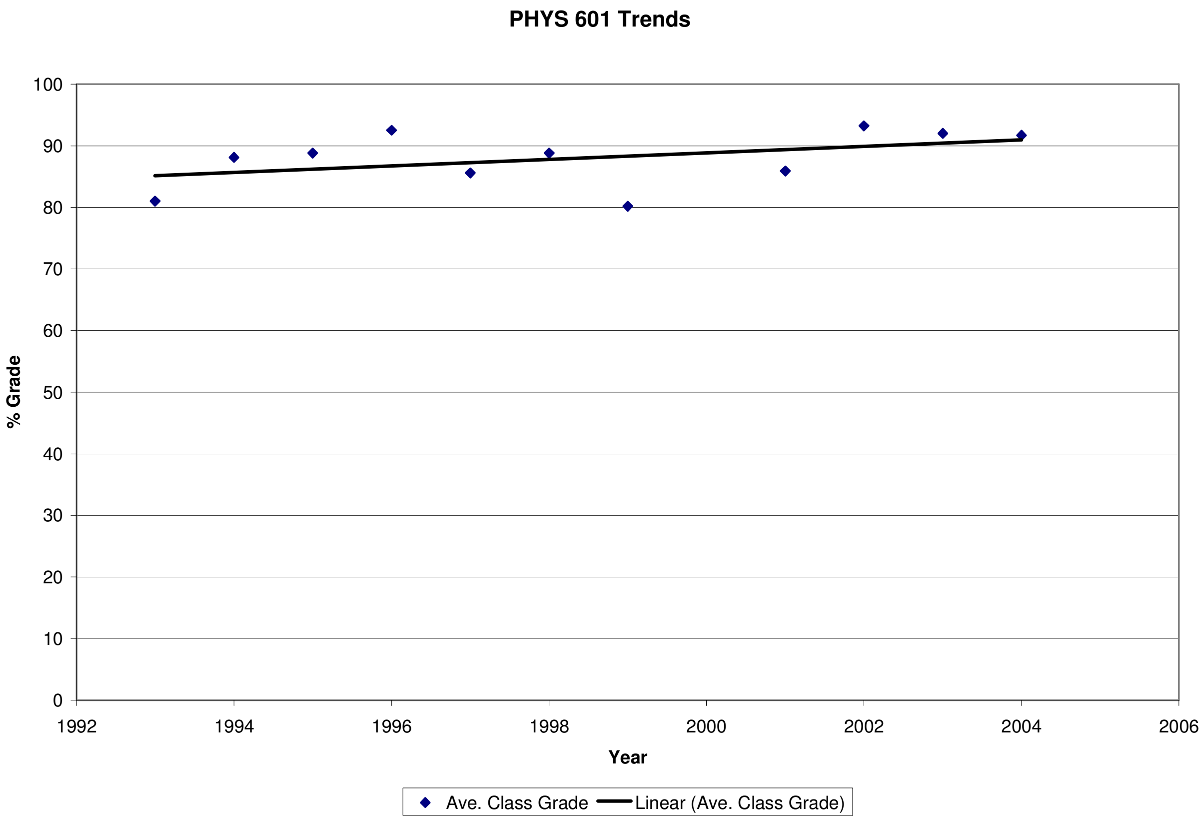


Figure (7): Quantitative Methods in Physics (PHYS-601) is a review of the principles of physics and quantitative methods used (calculus, elementary differential equations, statistics), and is designed for graduate students in the biosciences, chemistry, geology, and interdisciplinary sciences. Note that there are no data currently available after 2004.

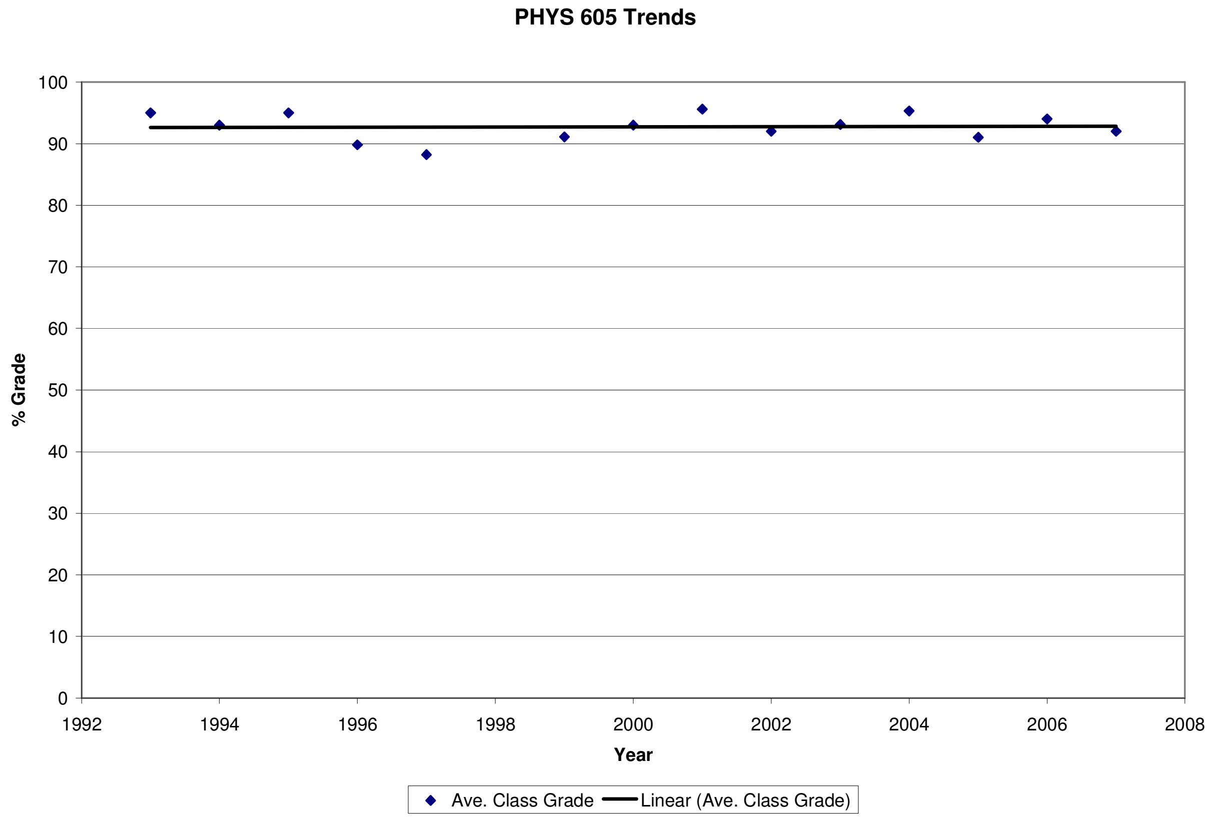


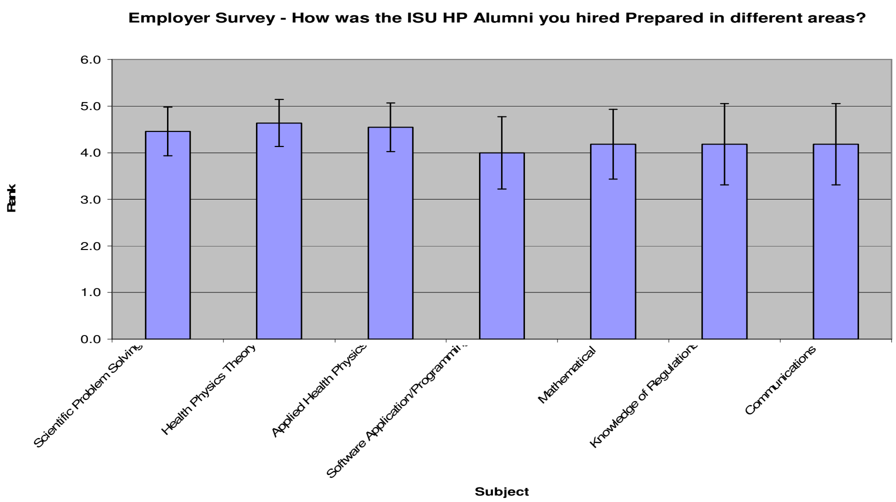
Figure (8): Radiological Environmental Monitoring and Surveillance (PHYS-605) is an advanced class that considers the design of monitoring programs. Specifically, it deals with sampling and analytical measurement programs for specific radionuclides and sources with an emphasis in quality assurance.

Radiation Regulations (PHYS-610) covers regulations of ionizing and non-ionizing radiation. The historical, biological, and legal foundations of the regulations are discussed for both federal and state level, and particular emphasis is given to: the nuclear fuel cycle, emergency response, academic/ medical facilities, transportation, accelerators, NORM/NARM, and non-ionizing radiation. The average class grade data is currently unavailable for this course.

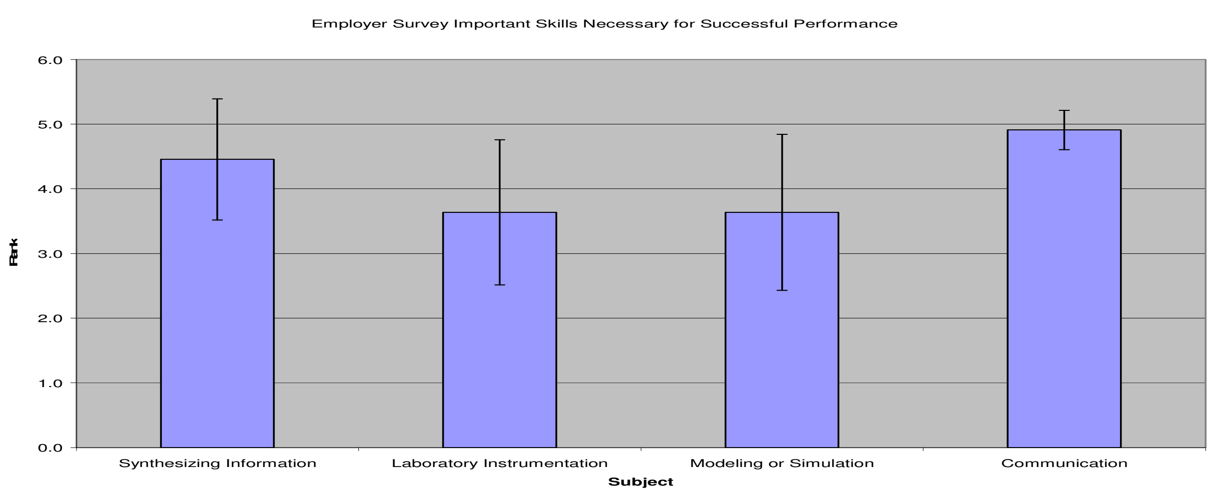
Alumni and Alumni Employer Surveys

The survey returns were very low this time and were a disappointment when compared to past years. Only 17 alumni returned surveys and only 11 alumni employer surveys were received. The survey results are easiest to summarize in graphical form.

When responding to the questionnaire for the prompt: Circle the appropriate number indication (1 low 5 high) for how well you believe your employee(s) from the ISU Health Physics Program have been prepared in each area of academic performance the following data were observed:

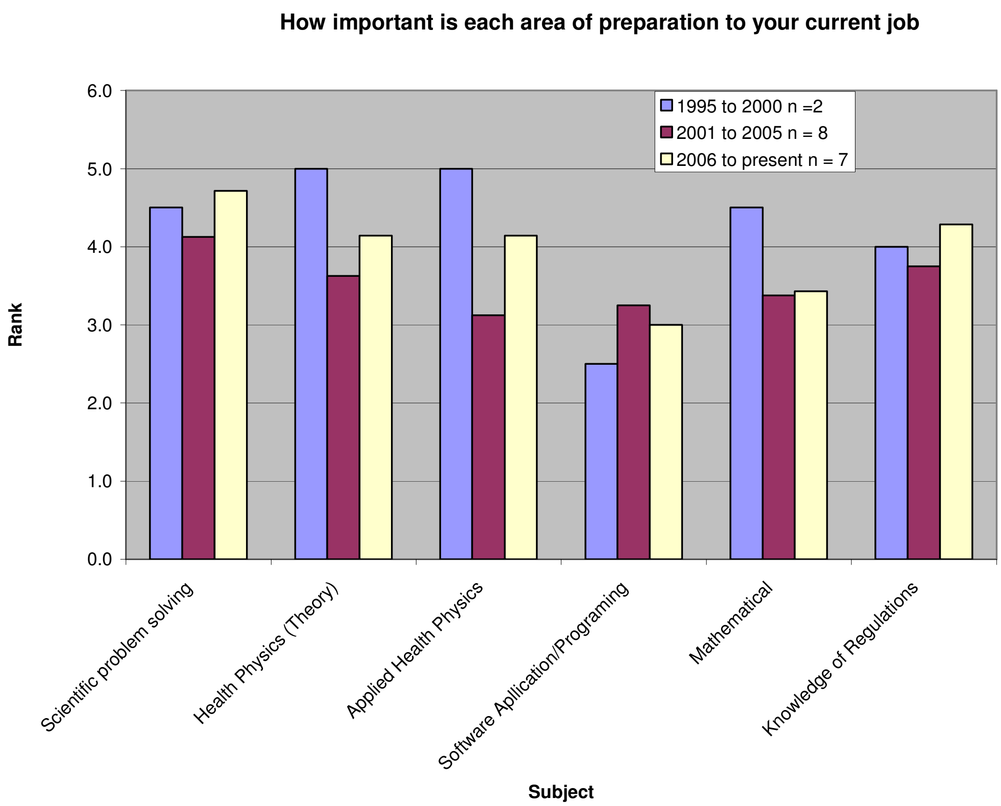


When Employers were asked “How important do you feel each professional skill is to the responsibilities and activities of your organization (one equaling low and five equaling high)” the following data were observed:

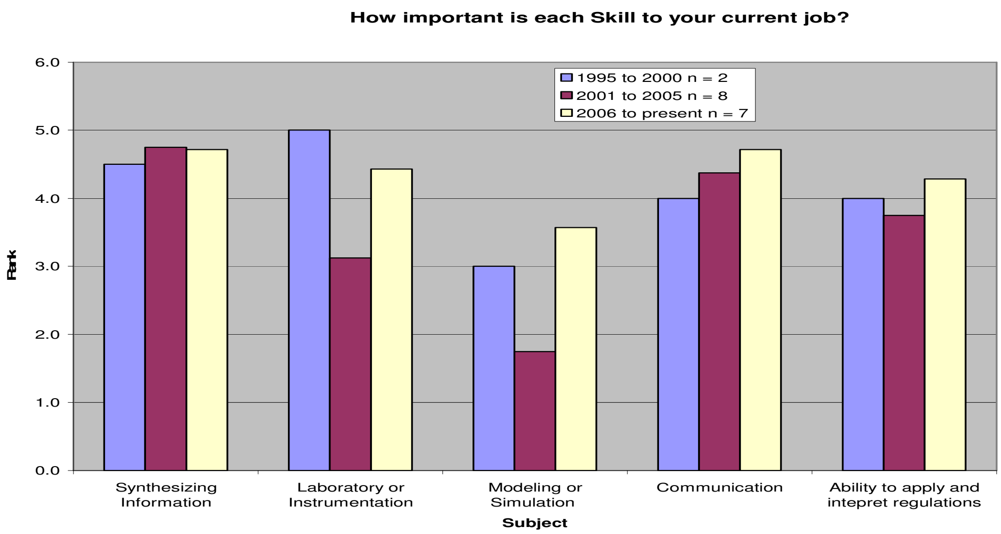


Alumni responses when grouped by year of graduation provided perhaps the most information and these are summarized in the following graphical presentations:

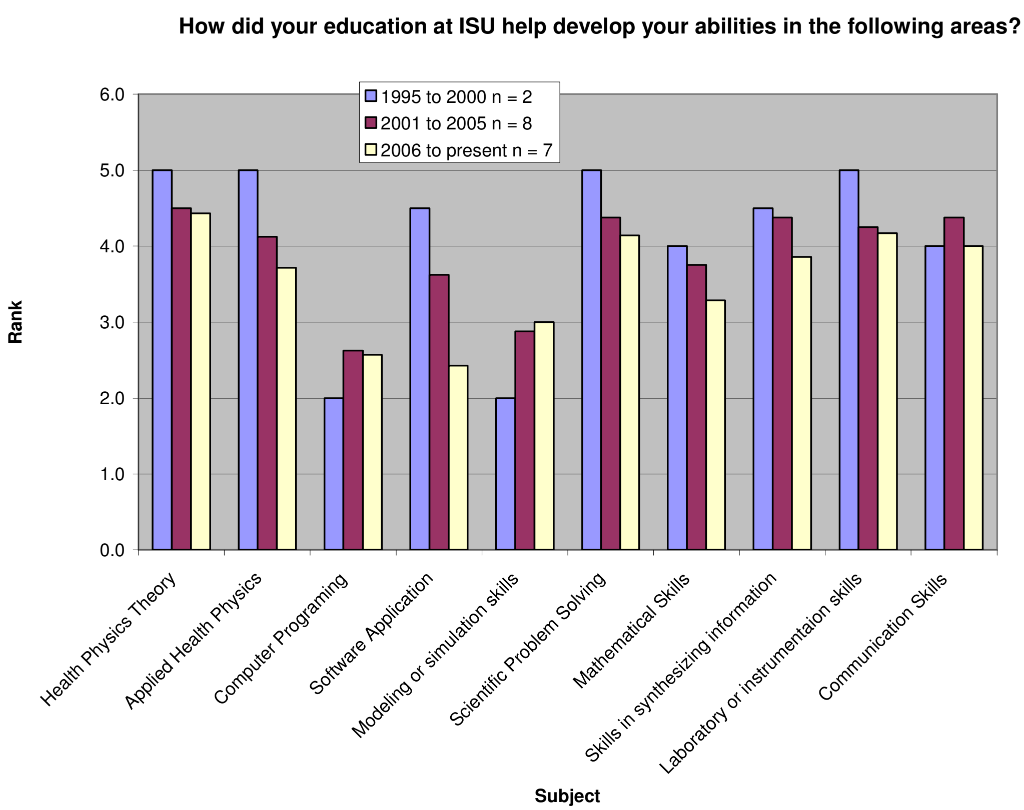
When asked: How important is each area of academic preparation to your present job responsibilities the following data were observed:



When asked how important is each of the following professional skills to your current job responsibilities, alumni responded in the following way:



When asked "How well you feel your education at ISU in the Health Physics Program helped to develop you abilities in the following areas?" the following data were observed:



Attachment 6-A to this report provides verbatim comments provided along with the surveys. These are grouped by some open ended questions. Although these are harder to quantify, they do provide insight into the nature of the interpretation of the program by alumni and their employers.

Assessment Conclusions:

Our conclusion is that the ISU Health Physics Programs are adequately satisfying each of the six published objectives for the B.S. program and the eight published objectives for the M.S. program. The Assessment Tools used to evaluate each Objective are associated with each Objective in the list that follows. The data generated for the Assessment Tool was provided above. At least two Assessment Tools were used to evaluate the accomplishment of each Objective.

The Objectives are as follows:

1) Broad Fundamental Technical Knowledge

Assessment Tools evaluated during this cycle:

- Graduates pass ABHP certification examination.
- Students pass core classes.
- Performance in work/research as reported by supervisor.
- Results of ISU administered outcome assessment examination.

2) Written and Verbal Communication Skills

Assessment Tools evaluated during this cycle:

- Professional papers, presentations, and posters.
- Students pass applicable communication courses.
- Students pass core classes.
- M.S. thesis quality

3) Professional Judgment and Ability to Think Critically

Assessment Tools evaluated during this cycle:

- Performance in work/research experience as reported by supervisor.
- Assessment of M.S. thesis.
- Performance in classes, problem solving and approaches to “defective problems”, laboratory performance.
- Results of ISU administered outcome assessment examination.
- Graduates pass ABHP certification examination.
- Students pass core classes.

4) Practical Experience in Solving Applied Health Physics Problems

Assessment Tools evaluated during this cycle:

- Performance in classes, problem solving and approached to “defective problems”, laboratory performance.
- Performance in work research experience as reported by a supervisor.
- Results of ISU administered outcome assessment examination.
- Graduates pass ABHP certification examination.
- Students pass core classes.

5) The Ability to Work Independently

Assessment Tools evaluated during this cycle:

- Performance in class, problem solving, laboratory performance.
- Performance in work research experience as reported by a supervisor.
- Students pass core classes.

6) A Professional Work Ethic

Assessment Tools evaluated during this cycle:

- Performance in work/ research experience.
- Assessment of students as observed in letters of recommendation.

As applied to Graduate students:

7) An Ability to Conduct Research

Assessment Tools evaluated during this cycle:

- Results of students' thesis defense.
- Production of student research papers and poster presentations.

8) Professional Tools and Experience above that Expected for the Baccalaureate Program

Assessment Tools evaluated during this cycle:

- Evidenced by successful completion of high quality thesis or dissertation.
- Satisfactory performance in upper division and 600 level graduate courses.
- Graduates pass ABHP certification examination.
- Students pass core classes.

Conclusions of Data Evaluation for 2007/2008 and review of 2005/2006 Action Items:

General Conclusion:

This assessment of the Idaho State University Health Physics Programs supports a statement that all measured and evaluated outcomes considered during this review provide evidence that the current Idaho State University Health Physics Program Educational Objectives for both the B.S. and M.S. programs are being attained at a satisfactory level.

Current course work is entirely appropriate and shows trends of continued improvement. There has been evidence from Alumni and Alumni Employer surveys which validates considering in greater detail the computer modeling and software applications portions of the program.

Grade Trends and Focus Groups:

Grade trend questions started an in depth evaluation of the Physics-416/516 class during the 2005/2006 cycle which continues. These have been augmented by detailed questionnaires provided to students and focus group meetings with students. As a result of this effort actions to improve the capital equipment of the Nuclear Instrumentation Laboratory Physics-g416/516 have been taken. During the 2007 and 2008 review cycle $35,000 was spent on NIM equipment. Unfortunately the time frame for the availability of funds was such that it was not possible to purchase new sources for the class during that same time period. However, such sources are to be purchased before the next class offering and it is anticipated that several additionally tens of thousands of dollars will probably be spend upgrading MCA software and equipment. Efforts are also underway to improve various aspects of this class to account for the much larger class size and larger initial knowledge diversity of the student population. This includes preparing a detailed set of lecture notes for dissemination to students, considering better text books. Also a re-evaluation of the content of several laboratory sections is underway. The idea of separating the statistical data development and analysis from the first laboratory and providing it as simply an extended homework assignment has been considered is will probably be implemented during the 2009 class offering.

Alumni and Alumni Employer Surveys:

Holistically, considering comments and survey data it appears that alumni and alumni employers as constituents view the program favorably. The problem with the present data set is the size. The lack of responses dilutes the finality of interpretation. Clearly further investigation into certain potentially weak areas identified by this survey will have to be considered in more detail by the advisory committee and during further investigation. A reconsideration of certain aspects of the program particularly with respect to computer modeling and software application may be necessary. The survey although weak and with very low statistical power due to the small sample size, may help support some observations from previous programmatic audits which heretofore have been considered by faculty but have been embraced with only limited rigor.

Review of Action Items from Last Review Cycle:

One observation in the programmatic audit of 2005/2006 (to paraphrase) was that perhaps courses could focus on applied items like:

1. Specific (unique) measurement techniques
2. Uncertainty analysis for specific problems
3. Incident investigation techniques
4. Dose reconstruction
5. Measurement techniques, analysis, and decision making relative to D&D (MARSIM)

Faculties were to explore ways these ideas might be brought into current courses/curriculum. To the extent feasible, some of these ideas have been incorporated into class structure. The idea of adding to a class a detailed discussion of Item one: "specific (unique) measurement techniques" has not yet been found to be feasible. Although class lectures discuss unique measurement problems and solutions adding an addition to the instrumentation class for instance, has not been feasible due to other ongoing changes. The second item: Uncertainty analysis for specific problems has to some extent been incorporated in to Physics 601 and to a smaller extent Physics g416. The third item: "Incident Investigation techniques, has not been incorporate into a class. Faculty were uncertain on how to provide this as a topic in any of the existing courses. Discussion is to continue on the feasibility of an elective course which might be developed around this theme. Aspects of item four: "dose reconstruction" have been woven into and hence incorporated into lecture content of Physics g434. Item five: Measurement techniques, analysis, and decision making relative to D&D (MARSIM) has been brought into lecture content to a slight degree in Physics 601 but not to a great extent, nor has it be incorporated into any undergraduate classes. Faculty were uncertain on how to provide this as a topic in any of the existing courses. Discussion is to continue on the feasibility of an elective course which might be developed around this theme.

ATTACHMENT 6-A (Comments provided by Alumni and Alumni Employers)

What is Important for Health Physics Graduates
Survey Question Answers

Question 1: *Please list what you feel to have been your MOST IMPORTANT CLASS(S):*

A. Cummings' class on Dosimetry. Well's portion of the class on Mathematics for Physicists (Differential Equations).
B. Rad. Phys. I, Internal Dosimetry, Env. Monitoring.
C. External Dosimetry
D. MATH, Internal/External Dosimetry / Chemistry / Anatomy and Phys / Nuclear Instrumentation.
E. Internal / External Dosimetry
G. Health Physics I and II, Instrumentation
I. Instrumentation, Radiobiology, Core Health Physics
K. Instrumentation, Adv. Dosimetry, Regs, HP core classes.
L. Nuclear instrumentation, external Dosimetry, advanced Dosimetry.
M. PHYS 431 and 432, PHYS 433 and 434 (although I think these were called Advanced HP) and PHYS 455 and 456.
N. HPS 416 – Instrumentation lab. External and Internal Dosimetry
O. Internal and External Dosimetry. Physics.

Question 2: *Please list what you feel to have been your LEAST IMPORTANT CLASS(S):*

A. Portion of class on regulations
C. Intro to Health Physics – It was still a good class, though.
E. Computer Science
G. Environmental.
K. got something out of all the HP classes, all important.
L. Reactor Health Physics
M. BIOS 209, General Ecology; PHYS 492, Colloquium (colloquium was / is a total waste of time)
N. Computer programming (CS 181) – Either need more programming classes, or drop the one class.
O. Intro. To Health Physics

Question 3: *What is your current job title, and what are your job responsibilities?*

A. Research Health Physicist; precision irradiations, quality assurance in health physics, program administration.

B. Health Physicist; Design Reviews Instrumentation; Training coordination.

C. Industrial Hygienist

D. Radiochemist / running National In Vivo Radiobioassy program in the government.

E. Health Physics Assistant. Rad / Bio audits, I-131 patent monitoring, Bioassays.

F. Ph. D. Student. Research Assistant.

G. Health Physicist. Training, Rad. Work authorizations, conduction surveys, reviewing surveys and authorizations. Emergency response.

H. Advisory Scientist, Safety analysis, Hazard analysis (no longer employed).

I. Radiology Resident – learn all aspects of diagnostic radiology including nuclear medicine.

J. Radiological Engineer – Internal and External Dosimetry, Alara Job reviews, Technical Basis document-writing.

K. Radiological engineer / Env. Compliance / ALARA / System Engineering, etc. / Instrumentation / Modeling

L. Medical Physicist. Accelerator QA and testing, personal Dosimetry monitoring, radiation therapy planning.

M. Sr. Biosafety / Biosurety officer – Responsible for biosafety and biosurety oversight for 3 locations across the US and their biological high containment labs.

N. Health Physicist / ROS – dose Calculations, Review protective action guidelines, administer radiation safety program.

O. Nuclear Facility Manager: Fuel conditional facility: MFC complex for Battelle energy alliance.

Question 4: *Have you successfully completed either part I or part II of he American Board of Health Physics Certification Examination?*

A. Yes, both.

C. No

D. No

E. No. But I plan to soon.

F. No

G. No

I. No

J. No

K. Will take summer '09, NRRPT successful '08.

L. No

M. I have neither applied nor taken the tests.

N. No

O. No

Question 5: *Over what time span were you enrolled in the ISU Health Physics Program?*

A. 2003 – 2007
B. 2004 – 2007
C. 1993 – 96 (BS), 1996 – 2002 (MS)
D. 1992 – 1998
E. 2002 – 2005
F. 2004 – 2007
G. 2005 - 2007
H. 1999 – 2004
I. 2000 – 2002
J. 1999 – 2002, 2002 – 2007. Still taking classes on a limited basis.
K. 1997 – 2004, 2008
L. 1997 – 2000, 2000 – 2003
M. 1994 – 1997 fulltime; 1997 – 2002 parttime.
N. 1991 – 1993, 1995
O. 1995 – 2001

Question 6: *Can you briefly describe your post ISU professional training and education experiences?*

A. N/A – recent graduate
C. Various professional development courses (respiratory, ergonomics, fall protection, heat stress, industrial ventilation, DOT-Rad material shipper – thank you, ISU!, NRC courses for materials license inspectors, certified industrial hygienist)
D. Professional Conferences. Self-Taught. Arguing with peers.
E. I have had several mandatory training classes in which nearly all of them I was familiar with the instrumentation and theory in Applied Health Physics that was discussed. I have not had any formal education classes since graduation. I feel a M.S. in Applied Health Physics would help me continue on in my career and I am mulling over returning to obtain a M.S. ISU Health Physics program provided me with a very solid foundation on which to begin my career.
F. Limited opportunities to practice / apply health physics theory. A lot of emphasis on talking rather than a strong theoretical background. It was more of a cookbook.
G. DOE Rad. Worker I and II training. 24 hr. OSHA training. CPR.
H. On Job Training only.
I. Upon graduation I went to medical school 2002 – 2006; Medical Intern 2006 – 2007; Radiology Resident 2007 to present.
J. Short courses mainly dealing with instrumentation (gamma-spec specifically). NRRPT completion.
K. Canberra OJT in: High Efficiency Neutron Counting, Gamma Spectroscopy, Tomographic gamma Scanning, Genie 2k software, NDAZK software. ResRad offside by DOE/ANL.
L. 1 week course on Radiological emergency Response operations. My health physics education complemented this course well. A lot of the classroom material I learned helped me when I really needed to "think on my feet."
M. Professional Mentoring in all aspects of Environment, Health and Safety. Additional professional training in Industrial Hygiene and biological safety,

including building, operating and maintaining high containment labs. Graduate classes in molecular biology, aerosol biology, aerosol physics, safety, virology, bacteriology, Immune systems plus many many others. Currently enrolled in a graduate MS program for Industrial Hygiene. Enrolling fall 2008 for a Masters of Public Health (MPH). Currently a Registered Biosafety Professional (RBR). Will take certification exam for Certified Biosafety Professional (CBSP) this fall, and Certified Industrial Hygienist (SIH) fall of 2009.

N. Dose Assessor during FRMAL exercises. Working on MS in Health Physics.

Additional comments:

A. Please note that as an experienced professional, the marks on the EDUCATION area above (area 3) reflect on how much ISU enhanced or developed these abilities. It is remarkable that some ratings are as high as they are, but low ratings do not reflect poorly on the program – it's just that I feel my skills in those areas would be very difficult to enhance in such a limited time. Also, the Ph.D. program does not seem to fit well with these questions in general. Also, please note on your cover letter that is says Alumni Name, it should be Alumnus Name.

Employer Perceptions of ISU Health Physics Graduates
Survey Question Answers

Question 1: *What do you think are the most important skills, or traits for a successful employee in your organization?*

A. Understanding the regulations and being able to adapt to the technical issues and real life operational situations.
B. Synthesizing information of DMB data analysis.
C. Problem solving, developing solutions that can be implemented with minimal costs associated with them. Communication skills.
D. Communication skills and ability to compromise. Also, quick witted, intelligent and personable, couples with superior technical skills. Day-to-day work with Ph.D. scientists!
E. customer service, accuracy, communication.
F. The ability to communicate is essential Must understand the limitations of models. Must be able to conduct data analysis in the context of work scope.
G. Attention to detail.
H. Ability to evaluate performance in a complex regulatory environment, identify important problems or deficiencies, and then communicate the information to management in written and oral forms.
I. Multi-tasking and effective communication, both verbal and written.
J. Ability to take a complex problem and break it into parts solving the issues from the bottom up.
K. Nuclear Operations -> Leadership

Question 2: *What date do you believe the employee in question graduated from the ISU Health Physics program?*

A. 2007
B. 2005
C. 90s
D. 2007
E. May 2005
F. ~2004
G. 2002
H. ~2004
I. 2002
J. 2003
K. 2001

Question 3: *IS the employee in question considered a junior, mid-career, or senior member of your organization?*

A. Mid-career
B. Mid-career
C. Senior
D. Junior (with lots of potential)
E. Junior
F. Junior
G. Junior
H. Senior member – subject matter expert.
I. Senior member
J. Senior member
K. Mid-career

ATTACHMENT SEVEN Focus Group Report 2007

Focus Group Report PHYSICS 416/516 Spring 2007

PHYS 416/516 Feedback Survey Discussion

To evaluate and improve the Radiation Detection and Measurement class (PHYS 416/516) at Idaho State University, a questionnaire was given to the Spring 2007 students

(see Attachment 7-A).

The responses were summarized (see Attachment 1-A) and discussed on May 22, 2007. The discussion was informal and attended by the following people:

Dr. Rich Brey (primary instructor for the class)

Maya Keller (grader for the class)

Kiran Billa (TA for the class)

Caleb Robinson (Spring 2007 Engineering student who was enrolled in the class)

Liesl Germann (Spring 2007 Health Physics student who was enrolled in the class)

Kevin Claver (helped out with several experiments)

The main points of the discussion are summarized below:

Oscilloscope pre-knowledge is okay with the digital oscilloscopes; however, it appears that the students need more emphasis during the first few classes on how to use the analog machines.

Though in-class quizzes have been given in the past, it was suggested that these be more hands-on practical quizzes with pre-announced quiz goals. These could in part relieve *some* of the requirements of the hands-on practical midterm and final exams.

Though students claimed they had worked with several radiation detection devices and radioactive material, and that they understood the basic principles of how radiation interacts with matter, it was apparent from class observations, test results and lab write-ups that the students were not uniformly well prepared. Basic radiation principles need to be introduced (briefly) in the first few lectures. In Question #6 students verified the need for more basic radiation physics (interactions, decay modes, etc.).

Another item in Questions #6 and #7 answers pointed to a weakness in propagating error; probably this is associated with a weakness in implicit differentiation. Further discussion followed by quizzes and tests on basic measurement skills (i.e. determining the correct number of significant figures; precision and accuracy; blunders, systemic, and random errors, etc.) are needed. Another way to better prepare students is to have more focused homework assignments.

To address a minor number of student comments regarding the usefulness of class lectures, a set of lab lecture notes will be provided in the future. Also, a lab debriefing that summarizes the main points that should have been learned from the exercises will be implemented.

Student comments regarding the lab TA were all positive and the lab sessions will continue to be provided with a TA.

Several technical updates and changes need to be made to the class room and equipment:

2) The vacuum manifold needs to be set-up.
3) Power needs to be installed so that there can be a minimum of 5 working stations.
4) The number of lab sections needs to be cut back to decrease the amount of time the TA is required to be available. Also, weekly "open lab" might be offered for students who miss their regularly scheduled section or simply need further time to work on an experiment.
5) New sets of button sources are needed.
6) New cables and cable ends are needed.
7) More timers, counters, pre-amps (voltage divider and charge-sensitive pre-amps), MCA cards are needed.
8) The neutron and LSC labs both need to be re-written to better reflect available equipment and to clarify student understanding of the procedures.

It was apparent from lab reports that many students do not spend enough time reading the book which is required for class. In the future, reading assignments which will be tied to the pre-lab quizzes will be required.

Laboratory notebooks are to be checked after each lab section by the TA instead of at the end of the year by the instructor. This will ease the end of year grading burden and provide better feed back for both the students and the TA/instructor about student understanding of the scientific process.

Writing lab reports is difficult for most students. Almost all complained that there are too many reports and that they are very time consuming to write. Most do not understand how such a document is to be organized and what topics it should cover. Also, many students have very poor writing skills in terms of grammar, spelling, and sentence composition. Writing lab reports is a central part of the course, and none can realistically be eliminated. Re-grouping of the lab reports is also difficult. One suggestion, which might help students improve their understanding of basic measurements skills discussed earlier, would be to have students write a separate short lab report on statistics instead of including this in the GM-tube lab group write-ups. Another suggestion is to provide a voluntary half-day workshop on writing.

Many students complained throughout the semester and on the questionnaire about the time commitment for the class. Most feel that this is not a 3 credit course. Although it is not feasible to change the number of credits associated with the course, the instructor should even more strongly emphasize on the first day that this is a difficult class that requires a lot of time and that students who already have a heavy workload for that semester should consider taking the Radiation Detection and Measurement course during an easier semester.

<u>Attachment 7-A To 2007 Focus Group report</u>

<u>Feedback Questionnaire for PHYS 416/516 Radiation Detection and Measurement</u>

<u>2007 RESPONSE SUMMARY</u>

Please give *constructive* criticism/comments on the following items:

1) Before taking this class, had you worked with electronic devices such as pre-amplifiers, amplifiers etc.? Be specific.

NO 6 YES 5
<u>COMMENTS</u>
"amplifiers"
"Very little" (counted as no)
"the Engineering circuits class gave some exposure"
"yes, a former electronics tech"
"in summer lab"
"Only in undergraduate physics lab"

A) Had you worked with an oscilloscope prior to the class?

NO 6 YES 11
<u>COMMENTS</u>
"No analog"
"many years ago"

B) Is an oscilloscope a device which you are currently comfortable using?

NO 2 YES 14
<u>COMMENTS</u>
"Digital yes, analog somewhat"
"I still don't get what triggering is doing"
"yes, no analog"
"not completely confident"

C) Did this class help you to become familiar with the use of an oscilloscope?

NO 1 YES 16
<u>COMMENTS</u>
"Yes, however they are all so different that it gets confusing at times"
"digital ones"
"more so"
"a little"
"a little"
"yes, esp. with analog oscope (only used digital before)"

2) Before taking this class, had you worked with any radiation detection devices? Be specific.

NO 11 YES 5
<u>COMMENTS</u>
"Yes, Geiger-muller counters fro portal monitoring"
"Virtually all the detectors I already knew how to use"
"just the GM detectors you use to identify If something is radioactive"
"yes, during a summer short lab class"
"yes, I had used GM detector and portable scintillators. Also some LSC work"
"I had used a personal dosimeter in college of engineering"
"I had experience working with detection devices based on semiconductor and scintillation detection devices"

3) Before taking this class, had you worked with radioactive material or radiation producing machines? Be specific.

NO 11 YES 7
<u>COMMENTS</u>
"Yes, I work at the INL in radiological areas"
"Yes, many sources"
"yes, I had worked with sealed sources"
"worked few days with ISU-AGN 201 reactor"
"I worked with calibration sources"

4) Before taking this class, did you have a class providing to you knowledge in basic radiation physics such *that you understood the properties of different types of radiation*? Be specific.

NO 6 YES 12
<u>COMMENTS</u>
"NE 402"
"Not really, had intro to Nuclear Engineering"
"Yes, radiation worker II"
"Yes, I understood the difference between alpha, beta and gamma"
"Yes, NE402 introduces the primary decay types and calculates Q values"
"Intro to nuclear engineering"
"3 or 4 classes"
"Somewhat, as I was lying to myself about my level of knowledge in this field"
"Intro to health physics"
"radiation physics I at ISU"
"NE 402 class last fall"
"I took a class that is analogous to PHYS 416/516"

5) Before taking this class, did you know how different types of radiation interact with matter? Be specific.

NO 2 YES 16

COMMENTS

"Modern Physics"

"Not a clue"

"I have taken a class where radiation and its methods of interaction were discussed."

"Advanced modern course"

"I somewhat understood, but it has been clarified more so for me"

"Yes, I was aware of ionization and the photon interactions"

"yes, photons etc. from intro to nuclear engineering"

"somewhat, but as the semester progressed I realized I did no know much"

"intro to health physics"

"learned in undergraduate lelvel"

"Know about photoelectric effect, Compton scattering, pair production. I like the statement 'radiation affects materials and materials affect radiation'"

"not completely" (counted as no)

6) Overall, did you feel that your background in radiation physics was strong enough for this class?

NO 4 YES 14

COMMENTS

"No, but I learned a great deal about radiation from this class"

"I was little bit prepared"

"yes, but not my technical skills"

"not quite. Wasn't very prepared for long class and long lab report write-up. Feel better now"

"learned much more in this class"

7) What are the areas of radiation physics in which you feel you need more preparation?

NONE 6

OTHER

"basic concepts, ie alpha, beta, gamma"

"all of it"

"uncertainty analysis"

"not rad physics necessarily, but my math was lacking for partial dif. Eq."

"detecting system (specially calliberating the system" [original spelling]

"none now, but before this class the basics of electronics was lacking"

"electronics of the detection devices"

7) Did you find class lectures useful?

NO 2 YES 15

<u>COMMENTS</u>

"Yes, extremely"

"The lecture could be half as long and still be helpful (counted as a yes)"

"disorganized and difficult to follow"

"Somewhat"

"some times"

"yes, but long"

"yes, but too long, get to the point"

"sometimes, I would have preferred more discussion relevant to the actual labs"

"helped in understanding radiation physics. Everything started to make more sense towards the end of the semester"

"needed to focus on information pertaining to actual labs, discuss the details."

8) Did you find the TA helpful? Be specific about what you did/did not get enough help in.

NO YES 18

<u>COMMENTS</u>

"Kiran needs a raise"

"Kiran was terrific"

"Kiran is really understanding and easy to work with"

"He was familiar with the procedures and equipment"

"He helped all he could, more knowledge on equipment would be nice"

"Kiran rocks!"

"Yes, he tried"

"Yes, prompt answers to all questions"

"yes, he was the best part of the class, very willing to help students learn"

"he dumbed it down for the dumb kids"

"yes, he is extremely helpful"

"excellent job. Setting the lab"

"yes, he helped us with procedure and with trouble shooting quite a bit"

"TA is the best. He has been very helpful to us/my group in exploring things and the way to work on lab. One of the main reasons, he knows the things is because he has been though the same lab procedure in the past."

"Yeah, Kiran was really helpful"

"helped in all ways"

9) Did you read Knoll's *Radiation Detection and Measurement* book which was required for class?

NO 3 YES 14

<u>COMMENTS</u>

"Some, but not as much as I should have"

"very little" counted as no

10) Did you find Knoll's book useful?

NO 3 YES 15

<u>COMMENTS</u>

"Yes, too much info though"

"absolutely"

"good text"

"the parts that were not over my head were very helpful"

"not really, his explanation of recovery time is too convoluted. Class manual was much more clear and concise"

"sometimes, too much detail"

"yes, especially for lab write-up"

"yes, difficult to understand at times"

11) Did you read any of the other books mentioned in class (Leo, Tsoulfanidis)?

NO 12 YES 6

12) Did you find these books useful?

NO 11 YES 5

<u>COMMENTS</u>

"I used it [Leo] to write a lot of my reports, vent to the point + basic."

“just OK [Tsoulfanidis]”

“[Tsoulfanidis] rarely”

“I read Leo a few times. It was good too. I had Tsoulfanidis but didn’t really study”

13) Did you have problems with equipment not working? Be specific about the type of equipment that did not work, and what was wrong with it.

NO YES 9

<u>COMMENTS</u>

“Everything sucks bad.”

“Amplifiers and counters were both a little difficult to locate. Working ones at any rate.”

“It seems like every lab we came and set up and it would take 2 hours to find working equipment. But like it was said to us, we learn from experience.”

“Yes, only the LSC lab worked correctly. The remainder of the labs had lots of broken equipment that needed to be sorted out.”

“Yes, it would be nice to have shit that works”

“Yes- proportional counter experiment counts registered w/HV turned off”

“Yes, counters and times would be tricky, i.e. the discriminator on the counter would act oddly. Also, very many lose connections in detectors.”

“I don’t think I had a lab where everything worked”

“Too numerous to list. The laboratory sessions should have enough working equipment to perform the lab with all lab groups. Usually 2 or more groups had to use one set-up. Sure, trouble shooting is a good skill to develop, but make sure that there are indeed enough working pre-amps, for instance, in the lab”

“yes, but no too bad”

“Ge detector”

“HP(Ge) detector pre-amp was crap. Timers- only 2 or 3 worked throughout the semester. NaI(Tl) only got 2 working. TLD don’t know if chips are all the same spent 2.5 hrs finding chips to provide useful data.”

“almost everything is inoperable. This class should give one credit for troubleshooting. You already know what doesn’t work and the problems associated with it.”

“early on we had problems with counters. Most of the NaI detectors didn’t work properly (weak pulse).”

"many times. Frustration started with GM counter. Did twice, still was a failure. I don't know what was wrong. I think cables and connectors. Once I had a NIM bin not working with the NaI(Tl) detector."

"every project something seem to go wrong, spent many extra hour trying to acquire data"

14) Did you find the in class quizzes useful?

NO 4 YES 14

<u>COMMENTS</u>

"Yes, to keep me on top of new things"

"yes, helped for final"

"yes, they gave us a good idea of basic concepts"

"yes, helped in final exam. Made me study time to time"

15) Were the quizzes easy?

"Not too bad"

"No"

"Not always"

"Relatively, yes"

"Yes"

"Yes"

"When I knew the material"

"about right"

"informative, about right"

"yes, no"

"if you paid attention I class and to Kiran, yes"

"they were well written. If you knew the stuff, thy were straight forward"

"ok"

"yes, mostly"

"Ok, felt kind of [illegible] because I studied materials before the quiz."

"some time"

"no"

16) Do you have any reflection on the laboratory reports?

"Fire Maya!"

"Hard to complete that many along with other work"

"Too time consuming, graded too harshly"

"I'd rather be shot in the foot and be forced to run a marathon"

"The grading of lab reports was much harsher than in previous semesters, but softened at the end"

17) Were the laboratory reports a useful exercise?

NO 2 YES 13

COMMENTS

"Yes, but could have been shorter, maybe a short 2 pages with what you did, results and significance"

"somewhat" (counted as a yes)

"absolutely"

"yes, help put concepts together. No, took too much time which just resulted in bad grades"

"if you mean exercise in futility then yes"

"yes, but the work was not worth only 3 credits!"

"I would forget the labs if there were no lab reports to do. Spent so much time on the reports, helps me to remember most stuff."

18) Did you improve your writing skills over this semester?

NO 5 YES 9

COMMENTS

"I was already a good writer"

"apparently not"

"Technical aspects of my writing improved a lot (graphs etc.)"

"I guess so. My lab grade seem to improve a bit. Also used writing center help."

19) Did you improve the organization of your writing because of the exercise of the laboratory reports?

NO 5 YES 9

COMMENTS

"Yes, I wanted above a 10%"

"tired but failed"

"no, my organization was ok"

"I think so. You would know better than me I guess"

20) Were the comments on the laboratory reports useful?

NO 5 YES 10

<u>COMMENTS</u>

"Yes, the ones I could interpret"

"No, sometimes I would be marked off for something and then the next week it would be graded differently. It was difficult to understand where I was lacking in my writing"

"yes, but when I followed them my grades increased very little"

"demoralizing is a better word"

"yes, and very detailed. Thanks, Maya!"

21) Were there too many or too few reports required?

"Just right"

"Too many" (6 people)

"Maybe one too many"

"Too many…perhaps just too long"

"TOO MANY"

"too many formal"

"no"

"TOO MANY for the time provided"

"I'm not qualified to answer that"

"ok #, some were a bit lengthy"

"no"

"no comment"

"quite enough"

22) Do you feel the *level* (not the quantity) of the work required was appropriate?

NO 2 YES 10

COMMENTS

"I think the work was on the correct level but graded too harshly"

"Fuck no"

"No, no, no, read the unv. Policy, maybe rules don't apply to you"

"Yes and no. Papers were graded harshly in the beginning. As semester went on grading softened. I'm sure my writing improved but the difference in my A papers and my C paper was not that significant"

"yes, since I'm a grad student"

"Yes. It is 400 level class. Some times I think I was not prepared for such hard work and time with 18 credit semester"

"too many reports for period of time"

23) Do you think this class should be maintained as a 3 credit class or should it be a 4 credit class?

Three Four 14

COMMENTS

"At least 4, maybe 5 or 6"

"4 credits, I put in at least that much time"

"For the work it should be 5"

"tone it down a bit"

"I thought it was a 4 credit, now I feel even more taken advantage of"

"definitely 4 due to extreme time in troubleshooting and paper writing"

"with the time and effort, 3 credit wouldn't be enough. But I don't mind that."

24) Were the practical examinations useful as a learning tool?

NO YES 16

COMMENTS

"I learned a lot from them, cleared up misunderstandings"

"Yes, very"

"Usually, however the TA in class could do much of this"

"very"

"yes, but I think only 1 was necessary, too much overlap"

“definelty”

25) Were there sufficient software tools available for you to accomplish writing the reports in an efficient manner?

NO 1 YES 14

<u>COMMENTS</u>

"? Microsoft Word?"

"yes, at home"

"? Excel etc? yes"

"Used Microsoft Word and Excel. Was good enough"

26) Did you have adequate preparation in using these software tools prior to taking this class?

NO 2 YES 14

<u>COMMENTS</u>

"Yes, I learned a lot from Excel and Word"

"I think so, I can type"

"No, but I learned"

1) Please make additional comments on any other class concerns you have which have not already been covered.

"In a real lab you quickly learn this as you go. This class is useless to people going into the field with this type of equipment"

"Maya, put away the red pen at times. Be consistent in where points are taken off and for what. It's hard to adjust to something that is always changing"

"according to campus policy we get 7.5h/week for a 3 credit class. Let us do some math:

Lecture= 3h/wk

Lab=3h/wk

Pre-lab/write-up/ [illegible]=2h/wk

Data analysis=3h/wk

Lab write-up=8h/wk (if I go 50-80% on reports, friend put in 16h and got 60-80%)

TOTAL= 19h/wk This is bad, you STOLE from me 11.5h/wk.

Everything you had us do was good, but way too much!!

Time to rethink to class. Campus policy is there to help teachers from killing their student. I feel dead.” [goes on, please see original]

“Tuesday lab section deserves consideration for working out the problems for the rest of the later labs”

“my biggest concern (other than too much work for 3 credits” was the lab manual and especially the lectures failed to address important concepts in the actual labs. For example, a final question we just had asked whether filter paper geometry affects LSC counting. In our exper, it didn’t, but I don’t recall anyone ever telling us what the reality of the situation is, so I am left wondering what I should really be seeing. This was a common problem with the class since we never went over results of lab experiments after the fact. We had to ask Kiran or Maya outside of class to determine if our results were correct and why. I think I would have learned more if I had been “de-briefed” so to speak. I’m still wondering about my results in some of the labs.”

“Sometimes, I think with the effort I put on lab report, the result I get is frustrating. I see that I have made mistakes, and I realize it, but still the grade kind of discourages me, one reason might be because I never got low grades as that in lab write-up before and this is more challenging that the ones I had before. Thank you for this challenging class”

ATTACHMENT EIGHT Focus Group Report 2008

Focus Group Report PHYSICS 416/516 Spring 2008

Focus Group Report PHYSICS 416/516 Spring 2008

To evaluate and improve the Radiation Detection and Measurement class (PHYS 416/516) at Idaho State University, a questionnaire was given to the Spring 2007 students and a focus group meting was held to discuss positive and negative aspects of the class. A second focus group meeting was held during the Spring of 2008 as a follow–up to the first meeting (but considering the opinions of the 2008 class).

What were felt to be key points of the focus group discussion conducted on May 14, 2008 are provided below. The discussion, over a few pizzas lasted for almost 3 hours. The discussion was informal and attended by the following people:

Dr. Rich Brey (primary instructor for the class)

Maya Keller (grader for the class)

Kiran Billa (TA for the class)

Dan Dale (Chair – Department of Physics)

Ben Baker (Spring 2008 Engineering student who was enrolled in the class)

James Claver (Spring 2008 Engineering student who was enrolled in the class)

Kevin Konzen (Spring 2008 Health Physics student who was enrolled in the class)

Robert English (Spring 2008 Health Physics student who was enrolled in the class)

Kevin Claver (Laboratory Supervisor helped out with several experiments)

Dan Dale (Chair – Department of Physics)

The main points of the discussion are summarized below:

Item 1: This class has been assigned 3-credits, is this sufficient?

The consensus was that the class should be worth more credits. This is the feeling of students even though it may load up their schedule. It was felt that it should be worth at least 4 credits and perhaps 5. When asked if the course should be slimmed down instead of adding credits the response was that would be nice but there were no ideas on how this could be accomplished with sacrificing something of great importance to the subject.

Item 2: Do you have any suggestions for reorganizing this class?

The first laboratory section could be reorganized. The suggestion which obtained general agreement was to separate the statistics portion form the first laboratory. Instead of asking students to generate their own data for analysis, perhaps it may be more beneficial from a learning perspective to provide a homework set of data for specific analyses. This can be reviewed in detail in lecture to make certain “everyone is starting at the right point”.

Subsequently the GM-tube section will need to be reworked. Perhaps the backscatter [portion should be tossed for something which can provide more reliable data not so subject to the strength of the source available.

The students expressed frustration with having to learn MCA software functions. It was thought that some cookbook write-up on MCA use might be developed to simplify this task which correctly has been identified as of secondary importance.

Item 3: Reviews of the laboratory sessions most recently completed were conducted this year during lecture, was this useful?

Students generally agreed that this was useful but timing of the review is very important. The logistics of the many available laboratory sections was reviewed. The bottom line is that unless the review was provided after the laboratory was performed but before the write up was complete it had less positive impact. A suggestion was to break up the lecture from one 3-hour block on Tuesday nights to two sessions; one in the beginning of the week prior to labs sections meeting and one at the end of the week, after the laboratory sections met. The logistical possibility of this will be reviewed for next spring's class.

Item 4: How can Dr. Brey improve lectures?

One suggestion was to have more "Show and Tell" during lectures. As one student pointed out that the introduction of a particular device is rather abstract until it can be seen physically. Dr. Brey notes that since the lecture was given via telecommunication from either Idaho Falls or the Pocatello Campus Library, nothing was used in demonstration during the lecture this spring.

Students thought that the practice of writing key points down during the lecture was very valuable. They suggested that Dr. Brey even provide copies of lecture notes for the instrumentation class like he does for other classes as students find these extremely valuable. Brey notes that this was a request last year, but no time was available to prepare a complete set of notes for student consumption this year.

Item 5: Some open ended questions and provided to students and students were given an opportunity to make suggestions.

How can we be more effective in teaching statistics and data analysis? No suggestions were provided.

How can we better get students to critically evaluate their own data? No suggestions were provided.

It was suggested that the pre-requisite requirements for the Physics students in the class might be reviewed. They may be starting the class with less background than the Health Physics or Nuclear Engineering students.

It was suggested that we need to obtain more and better alpha sources for the alpha spectroscopy laboratory.

ATTACHMENT NINE: Faculty *curriculum vitae*

JASON T. HARRIS
Idaho State University, Department of Physics
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EDUCATION

Ph.D., 2007, Purdue University, West Lafayette, Indiana. **Degree in Health Physics.** Dissertation: "Public Health Analysis Resulting from Nuclear Power Plant Radiological Emissions"
M.S., 2002, University of Illinois at Urbana-Champaign, Urbana, Illinois. **Degree in Nuclear Engineering.** Thesis: "Comparative Study of Commercial Nuclear Power Plant Radiological Effluents"
B.S. w/honors, 1995, University of Tampa, Tampa, Florida. **Majors: Biology and Marine Science, Minor: Chemistry**

TEACHING EXPERIENCE

Assistant Professor, 2008 – present, Idaho State University, Department of Physics, Health Physics Program, Pocatello, Idaho. Instructor for Health Physics courses. Develop course materials and curriculum. PHYS 432/532 – Radiation Physics II, Principles of Health Physics II.
Graduate Teaching Instructor, **2003 – 2007**, Purdue University, School of Health Sciences, West Lafayette, Indiana. Instructor for Health Physics and Radiological Health courses. Designed and taught laboratory experiments. Developed course materials and curriculum. HSCI 322L – Radiation Dosimetry Laboratory, HSCI 514 – Radiation Instrumentation Laboratory, HSCI 438 – Reactor Health Physics, HSCI 534 – Applied Health Physics.
Health Physics Guest Lecturer, **2004-2007**, Purdue University, School of Health Sciences, West Lafayette, Indiana. Lecturer in health physics and nuclear engineering topics for several classes at Purdue University and University of Illinois. Course examples: Introduction to Health Physics, Principles of Public Health Science, Introduction to Nuclear Engineering, Health Effects of Non-ionizing Radiation.
Graduate Teaching Assistant, **1999-2002**, University of Illinois, Department of Nuclear, Plasma, and Radiological Engineering, Urbana, Illinois. Assisted in teaching radiation protection class (NPRE 241). Tutored and advised students.

RESEARCH AND PROFESSIONAL EXPERIENCE

Consultant, 2002-present, North American Technical Center (NATC), University of Illinois, Department of Nuclear, Plasma, and Radiological Engineering, Urbana, Illinois. Act as senior consultant for nuclear power plant environmental and radioactive waste issues. Direct the NATC Public Radiation Research Program. Develop nuclear power databases.
Research Fellow, **2003**, Los Alamos National Laboratory, Luminescence Geochronology Laboratory, Earth and Environmental Sciences Division, Los Alamos, New Mexico. Performed Pu dose-rate calculations for geochronology and dosimetry applications. Performed laboratory research on thermoluminescence (TL), optically stimulated luminescence (OSL), and infrared spectra luminescence (IRSL) dating and dose rate determination techniques.
Graduate Research Assistant/Fellow, **1999-2002**. University of Illinois, Department of Nuclear, Plasma, and Radiological Engineering, Urbana, Illinois. Reviewed analyses and performed statistics on occupational dose exposure and radioactive effluent releases of commercial nuclear power plants. Developed and maintained database programs and Internet

web sites. Performed research focusing on nuclear fusion by means of inertial electrostatic confinement. Designed, constructed and conducted experiments. Compiled and drafted research reports and funding proposals.
Research Engineer/Health, Safety and Radiation Officer, **1997-1998,** Clean Energy Technologies, Inc., Sarasota, Florida. Performed research focusing on new hydrogen energy technologies, radioactive amelioration, environmental remediation, isotope separation, and polymer synthesis. Developed and implemented the Radiation Safety Program, Chemical Hygiene Plan, and Safety Program.
Environmental Scientist/Chemical Hygiene Officer, **1995-1997**, Marinco Bioassay Laboratory, Sarasota, Florida. Performed bioassay toxicity tests for marine and freshwater effluents according to U.S. EPA and FL DEP regulations. Performed statistical analyses and compiled and interpreted data for government and client reports. Developed and implemented the company Chemical Hygiene Plan and Safety Program.

AWARDS, HONORS, FELLOWSHIPS, AND SCHOLARSHIPS

Purdue University (PU) Bilsland Dissertation Fellowship, 2007-2008; PU School of Health Sciences Graduate Student Service Award, 2006-2007; Department of Energy OCRWM Fellowship, 2002-2005; PU School of Health Sciences Graduate Teaching Award, 2004-2005, 2006-2007; PU School of Health Sciences Wayne V. Kessler Award (outstanding graduate student), 2004-2005; PU Graduate School Excellence in Teaching Award, 2004-2005; International Radiation Protection Association (IRPA) -11 Congress Young Scientist Travel Award, 2004; PU Frederick N. Andrews Fellowship, 2005-2007; American Statistical Association Conference on Radiation and Health New Investigator Award, 2006; Health Physics Society (HPS) Annual Meeting Travel Award, 2000-2005; American Nuclear Society (ANS) Meeting Travel Award, 2001-2003; HPS Summer School Scholarship, 2000; University of Illinois INPO Graduate Fellowship, 1999; University of Tampa (UT) Presidential Scholarship, 1991 – 1995; UT Delo Scholarship, 1991 – 1995; UT Honors Program Fellowship, 1993 – 1995.

PROFESSIONAL AFFILIATIONS AND SERVICE

American Academy of Health Physics, Associate Member, 2006-present; ANS, 1999-present, Board of Directors, 2003-2005; American Physical Society, 2007-present; HPS, 1997-present, President, Purdue University branch, 2002-2004, Advisor, Purdue University branch, 2004-2007; HPS Hoosier Chapter; North American Young Generation in Nuclear, 2003-present; IRPA delegate for HPS, 2004-present; HPS Academic Education Committee, 2005-2008; HPS Health Physics Student DVD Ad Hoc Committee, 2007-present; RETS-REMP Workshop Steering Committee, 2004-present; North American Technical Center Public Radiation Safety Research Program Effluent Expert Committee, 2002-present; International ALARA Symposium Organizing Committee, 2000-2007.

PRESENTATIONS

Over 25 presentations since 2002 at professional symposia, workshops and conferences.

RECENT PUBLICATIONS

HARRIS, J. T. and MILLER D. W. Radiological effluents released by U.S. commercial nuclear power plants from 1995-2006. *in press*. *Health Physics Journal*, March 2008.

HARRIS, J. T., MILLER D. W., and FOSTER D. W. Tritium recapture behavior at a nuclear power reactor due to airborne releases. *in press*. *Health Physics Journal*, January 2008.

Curriculum Vitae

Thomas F. Gesell, Ph.D. (208) 282-3669
Professor of Health Physics and FAX (208) 282-4649
Director, ISU Environmental Monitoring Program gesell@physics.isu.edu
Idaho State University, Campus Box 8106
Pocatello, Idaho 83209

CURRENT DUTIES

Teaching, research, and service in radiation protection and environmental science; independent measurement and verification of environmental radiological conditions in the environs of the Idaho National Laboratory.

COURSES TAUGHT

Radiological Environmental Monitoring and Surveillance; Topics in Health Physics I & II; Accelerator Health Physics; Quantitative Methods in Physics; Non-ionizing Radiation Protection.

PREVIOUS EXPERIENCE

10/91-12/05 -- Concurrently with academic appointment, served as radiation safety officer and director of the Technical Safety Office for Idaho State University

5/88-10/91 -- Director of the DOE Radiological and Environmental Sciences Laboratory (RESL) located on the Idaho National Engineering and Environmental Laboratory (INEEL) Site. Directed several programs related to protection of health and environment. These included: environmental sampling and analysis (surveillance) for the INEEL and its environs (air, water, soil, vegetation, animals); analytical and radiochemistry; environmental, ecological and radio-ecological research; DOE laboratory accreditation programs in personnel dosimetry, bioassay and whole body counting; support of the Nuclear Regulatory Commission with radiochemical standards and analyses; measurements in support of emergency response; oversight of programs in personnel radiation dosimetry, bioassay, and meteorology.

5/87-5/88 -- Deputy Assistant Manager for Nuclear Programs, DOE Idaho Operations Office. Served as Acting Assistant Manager for Nuclear Programs, supervised the Environmental Support Office, and managed the INEEL environmental restoration program with its associated sampling and analysis. Nuclear Programs had responsibility for test reactors, nuclear fuel reprocessing, radioactive and hazardous waste management and technology development at the INEEL. The Environmental Support Office activity required close coordination with EPA and State regulatory programs.

5/81-6/87 -- Chief of the Dosimetry Branch, DOE Idaho Operations Office. Developed and implemented operational and applied research and development programs in personnel and environmental radiation dosimetry as well as a DOE-wide accreditation program in personnel radiation dosimetry. Supervised the INEEL personnel dosimetry program. Managed the development and implementation of a new dosimetry system and a new, computerized data acquisition, record-keeping and reporting system.

5/71-5/81 -- Assistant, then Associate Professor of Health Physics, University of Texas School of Public Health; Chair of the Environmental Sciences Discipline. Responsibilities included teaching, research and service in radiation protection and environmental science.

EDUCATION

B.S. in physics from San Diego State University (6/65). M.S. (6/68) and Ph.D. (6/71) in physics (with specialization in health physics) from the University of Tennessee.

PROFESSIONAL ACTIVITIES AND MEMBERSHIPS

Fellow, Health Physics Society

Distinguished Emeritus Member, National Council on Radiation Protection and Measurements (2008-present)

Vice President and member of the Board of Directors, National Council on Radiation Protection and Measurements (2003-2008)

Member, National Council on Radiation Protection and Measurements (1989-2008)

Member, National Academy of Sciences/National Research Council Committee on Development and Implementation of a DOE Cleanup Technology Roadmap (2007- present).

Member, Environment, Safety & Health Panel of the University of California President's Council on National Laboratories (1995-2007)

Member, Division Review Committee, Risk Reduction and Environmental Stewardship Division, Los Alamos National Laboratory (2003-2005)

Member, National Academy of Sciences/National Research Council Committee on Opportunities for Accelerating Characterization and Treatment of Waste at DOE Nuclear Weapons Sites (2003-2005).

Member, Board of directors, Health Physics Society (2001-2004)

Member, National Academy of Sciences/National Research Council Committee to Review the Dose Reconstruction Program of the Defense Threat Reduction Agency (2001-2003)

Member EPA Science Advisory Board, Radiation Advisory Committee (1996-2002)

Member, Division Review Committee, Environment, Safety and Health Division, Los Alamos National Laboratory (1999-2002)

Member, Health Physics Society "NORM" committee (1996-2002)

Chair, National Council on Radiation Protection and Measurements' Scientific Committee 1-9 on Skin Dosimetry (2000-2001)

Chair, National Council on Radiation Protection and Measurements' Hot Particle Committee (1988-2000)

Member, National Academy of Sciences/National Research Council "NORM" Committee (1997-1999)

Member, International Atomic Energy Agency Advisory Group on Radon in the Workplace (1994-1999)

Member, DOE Environmental Management Board "FUSRAP" Advisory Committee (1995-1999)

Member, EPA/Industry Technical Work Group pertaining to the use of radioactive phosphorus slag in construction (1992-1998)

Member, International Commission on Radiological Protection Task Group on Skin (1989-1992)

Associate Editor, Health Physics Journal (1985-1990)

SPECIAL ASSIGNMENTS

Special assignments have included: consultant to EPA Office of Radiation Programs (1974-1980); consultant, President's Commission on the Accident at Three Mile Island (1979); DOE Idaho's Liaison to the Idaho State Government (1/89-6/89); member, Secretary of Energy's Special Team assessing environmental conditions at the Rocky Flats Plant (6/89-8/89); chair, DOE fatal accident investigation committee (5/91-6/91); administrative lead, INEEL Historical Dose Evaluation (12/88-9/91); member, Monitoring Activities Review Panel for the Idaho National Engineering Laboratory Waste Management Program (1992); Consultant, General Accounting Office (2000), Consultant, Department of Veterans Affairs (2006).

PUBLICATIONS

Book

Merril Eisenbud and Thomas Gesell, Environmental Radioactivity (from Natural, Industrial and Military Sources), Edition IV, Academic Press (1997).

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H. M. Prichard, T. F. Gesell and C. R. Meyer. Liquid scintillation analyses for radium-226 and radon-222 in potable waters, *in* Liquid Scintillation Counting: Recent Applications and Development. Academic Press, New York, pp. 347-355 (1980).

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POSITIONS

July 1994-Present	Idaho State University, **Professor of Physics (2003)** *Director, Health Physics Program* *Director*, Environmental *Assessment Laboratory* ***January 2006 – Named As Radiation Safety Officer on ISU's NRC Broad Scope License 11-27380-01***
Jan. 1994 - June 1994	Purdue University School of Health Sciences *Teaching Assistant*
Aug. 1990 - Dec. 1993	Purdue University *DOE Graduate Fellow*
May 1991 - Aug. 1991	INEL, EG&G Idaho, Environmental Technology Unit *Intern*
Aug. 1989 - Aug. 1990	Purdue University School of Health Sciences *Teaching Assistant*
May 1987 - Aug. 1987	American Electric Power Service Corp., Nuclear Operations, Radiological Support Section, Columbus, OH *Intern*
July 1983 - July 1986	Indiana & Michigan Electric Company, D.C. Cook Nuclear Power Station, Bridgman, MI *Chemistry Radiation Protection Technician*

EDUCATION

Ph.D. 1994, Health Physics, Purdue University
M.S. 1990, Health Physics, Purdue University
B.S. 1988, Health Physics/Industrial Hygiene, Purdue University
A.A.S. 1983, Nuclear Power Technology, Terra Technical College

PROFESSIONAL CERTIFICATION

American Board of Health Physics – Certified Health Physicist

FIELDS OF SPECIALIZATION

Expertise in internal dosimetry; recently engaged with United States Transuranium and Uranium Registry on evaluation of historical exposures and redefining transfer coefficients using IMBA and other propriety software
Health Physics fundamentals
Radiation detection instrumentation theory
Radiation dose and dose rate effects on chemical and biological systems
The physics and modeling of hazardous material transport through porous media
ANSI/HPS N13.1-199 compliance

HONORS AND AWARDS

Awards:

Elda E. Anderson Award - A national award bestowed by the Health Physics Society

See: * Health Physics, Vol. 83, No. 6, December 2002, p815.
* The Health Physics Society Newsletter Volume XXX Number 8, August 2002, p 16

Honor Societies:

Phi Kapa Phi National Honor Society
Eta Sigma Gamma Honor Society
Golden Key National Honor Society

Fellowships and Scholarships:

DOE Environmental Restoration and Waste Management Fellowship
I.N.P.O. Graduate Fellowship & I.N.P.O. Undergraduate Scholarship
Health Physics Society Fellowship
D.C. Cook Scholarship/Internship Award

PROFESSIONAL ASSOCIATIONS

Health Physics Society
Health Physics Society Liaison/Representative to ABET 2000 - present
Health Physics Society (national) Secretary Elect (2004 - present)
Chair Academic Education Committee (1998 - 2003)
Summer School Committee (2001-2002)
Public Education Committee (1996-1997)
Eastern Idaho Chapter of the Health Physics Society & ISU Student Branch Advisor
Eastern Idaho Chapter of the Health Physics Society (EICHPS)
President (1999 - 2000)
President Elect (1998 - 1999)
Secretary (1996-1997)
American Nuclear Society and Idaho Chapter American Nuclear Society
American Industrial Hygiene Association and Teton Chapter of AIHA
American Conference of Governmental Industrial Hygienists
American Academy of Health Physics
ABET-ASAC Commissioner (at large 2007 – present)
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High Speed Laser Spectroscopy to Study Radiolytic Byproducts Soon After Generation, R. Ngazimbi, B. Mincher, R. Rodriguez, B.J. Phillips, R.V. Fox, and R.R. Brey, **Health Physics**, Vol. 89, No. 1, July 2005 S30 Supplement

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A Fricke Dosimetric Technique to Determine G-Values for Accelerator Produced Photons with Energies Between 1 and 30 MeV, J. Macklin, R. Brey, T.F. Gesell, **Health Physics**, Vol. 84, No. 6, June 2003 S192 Supplement

Calculation of Dose Coefficients for Radionuclides Produced in Spallation Neutron Sources, J. Shanahan, A. Arndt, C. Campbell, R. Brey, M. Rudin, M. Patton, **Health Physics**, Vol. 84, No. 6, June 2003 S252 Supplement

Determination of the Photonuclear Cross-Section of I-129 (gamma,n) I-128, G. Kharashvilli, R.R. Brey, D.P. Wells, J.F. Harmon, T.F. Gesell, **Health Physics**, Vol. 84, No. 6, June 2003 S252 Supplement

The Idaho State University ABET Accreditation Experience, R.R. Brey, **Health Physics**, Vol. 84, No. 6, June 2003 S271 Supplement

Investigation of the Dose Rate Response of the T4 Bacteriophage in Aqueous Suspensions, C. Campbell, R.R. Brey, L. Farrell, **Health Physics**, Vol. 84, No. 6, June 2003 S151 Supplement

Comparisons of ISDMAP Estimates of ^{137}Cs Distributions with the use of In Situ Data from Empirical and Generic Detector Characterizations, L. Tkavadze, R.R. Brey, T.F. Gesell **Health Physics**, Vol. 84, No. 6, June 2003 S158 Supplement

Qualification of Ventilation Exhauster Unit, J.E. Hawk, R.R. Brey, J.L. Alvarez, **Health Physics**, Vol. 84, No. 6, June 2003 S158 Supplement

Evaluation of Single Well Push Pull Tests Using Radiotracer Techniques and a Bench-Top Model Aquifer, W.L. Boyd, R.R. Brey, R. Starr, **Health Physics**, Vol. 84, No. 6, June 2003 S160 Supplement

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Dose response of Thermoluminescence in Tooth Enamel, M. Balzer, R. Brey, T.F. Gesell, **Health Physics**, Vol. 84, No. 6, June 2003 S164 Supplement

Examination of HPGe Efficiency for Varying Amounts of Similar Density Material, A. Arndt, R. Brey, **Health Physics**, Vol. 84, No. 6, June 2002 S161 Supplement

Radiation research Opportunities at the Idaho Accelerator Center, D.P. Wells, J.F. Harmon, R. R. Brey, **Health Physics,** Vol. 82, No. 6, June 2002 S115 Supplement

Study of the I-128, (gamma, n)I-128 Photonuclear Reaction, G. Kharashvili, R. R. Brey, D. Wells, **Health Physics,** Vol. 82, No. 6, June 2002 S116 Supplement

A Fricke Dosimetric Technique to Calculate G-Values for Accelerator Produced Photons with Energies Between 1-30 MeV, J. Macklin, R. Brey, **Health Physics** Vol. 84, No. 6, June 2002 S116 Supplement

Shielding Analysis at Two Radiation Oncology Sites, N. Gee, R. Brey, M. Davidson, **Health Physics** Vol. 84, No. 6, June 2002 S117 Supplement

A Fricke Dosimetric Technique to Calculate G-Values for Accelerator Produced Photons, J. Macklin, R. Brey, **Health Physics** Vol. 82, No. 6, June 2002 S98 Supplement

Comparison of Desiccant Materials used for Monitoring Atmospheric Tritium Concentrations in a High Tritium Background Environment J. Case, R. Dunker, L. Paulus, R. Brey, Vol. 82 No. 6, June 2002 S98 Supplement

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Examination of HPGe Efficiency for Varying Amounts of Similar Density Material, A. Arndt, R. R. Brey, **Health Physics** Vol. 84, No. 6, June 2002 S125 Supplement

Homogeneity and Self-Absorption Considerations for Small Cylinder Geometries Used During Soil Gamma Spectrometric Analysis, **Health Physics**, J. Case, R. Dunker, and R. Brey, Vol. 80, No. 6, June 2001 S98 Supplement

Quality Assurance and Control Procedures for Area Dosimeters Developed for a Shielding Integrity Survey, **Health Physics**, A. Arndt, R. Brey, Vol. 80, No. 6, June 2001 S101 Supplement

An MCNP Examination of Electron Backscattering, **Health Physics**, C. Frujinoiu, R. Brey and T. Gesell, Vol. 80, No. 6, June 2001 S101 Supplement

Calibration of High-Dose LiF Crystal Optical Dosimeters, N. Gee and R. Brey, **Health Physics** Vol. 80, No. 6, June 2001 S102 Supplement

Neutron Spectroscopy by Phantom Flux Depth Measurements for Boron Neutron Capture Therapy. C.J. Watchman, R.R. Brey, T.F. Gesell, and Y. Harker**, Health Physics** Vol. 78, No. 6, June 2000 S95 Supplement

A Review of Cavity Theory and a Proposal for a Microdosimetric Interpretation of TLD=s Cavities for the Case of Electronic Fields. C. Frujinoiu, T.F. Gesell, and R.R. Brey**, Health Physics** Vol. 78, No. 6, June 2000 S135 Supplement

Investigation of a Prototype Radiocolloid System, D.K. Garretson, R.R. Brey and T.F. Gesell, **Health Physics** Vol. 78, No. 6, June 2000 S86 Supplement

Use of the ICRP-66 Lung Model to Study the Potential Health Risks Associated with ^{210}Po Effluent at a Southeastern Idaho Elemental Phosphorous Facility, **J.J. Helms, T.F. Gesell and R.R. Brey, Health Physics** Vol. 78, No. 6, June 2000 S141 Supplement

Photon Activation Analysis of ^{129} Iodine, J.C. Seeber, R.R. Brey, J.F. Harmon, and T.F. Gesell, **Health Physics** Vol. 78, No. 6, June 2000 S86 Supplement

Investigation of Possible Correlations Between ^{222}Rn Concentrations and Gas Proportional Counter Background. K. Christensen, S. Thiemann, R.E. Dunker, R.R. Brey, and T.F. Gesell, **Health Physics** Vol. 78, No. 6, June 2000 S95 Supplement

Application of Anti-Coincidence Shielding Using a Low Energy Germanium Detector, J. B. Walker , J.F. Harmon, and R. R. Brey, **Health Physics,** Vol. 76, No. 6, June 1999 supplement

Photon Activation Analysis of Iodine-129, J.C. Seeber, R.R. Brey, J.F. Harmon, and T.F. Gesell, **Health Physics,** Vol. 76, No. 6, June 1999 supplement

Developing a Methodology for Analysis of Sr-90 in Milk Using 3M Empore Rad Discs, K.T. Claver, R.R. Brey, and T.F. Gesell, **Health Physics,** Vol. 76, No. 6, June 1999 supplement

Improving Sampling and Counting Methodologies to Decrease The MDC of Environmental Radiological Air Samples, P.A. Jenkins, T.F. Gesell, R.R. Brey, D.P. Wells, and A..J. Schilk, **Health Physics,** Vol. 76, No. 6, June 1999 supplement

An Investigation of Po-210 Fate and Transport, J.J. Helms, T.F. Gesell, and R.R. Brey, **Health Physics,** Vol. 76, No. 6, June 1999 supplement

Investigation of Radiocolloid Transport Parameters, D. K. Garretson, R. R. Brey, and T.F. Gesell, **Health Physics,** Vol. 76, No. 6, June 1999 supplement

Cavity Effects in the Case of Measurements of Personal Absorbed Dose from Beta Particles using TLDs, C. Frujinoiu, R. Cummings, T.F. Gesell, and R.R. Brey, **Health Physics,** Vol. 76, No. 6, June 1999 supplement

Comparison of a Mathematical Specific Absorbed Fraction Model for a Pregnant Woman at Three-Months Gestation with Experimental Results, D. L. Georgeson, R. R. Brey, T.F. Gesell, R.D. Spall, and M. Rudin, **Health Physics,** Vol. 76, No. 6, June 1999 supplement

Polyvinyl Alcohol film dyed with Congo Red as a simple dose indicator for use in industrial irradiation facilities**.** L. G. Backstrom, R. R. Brey, F. J. Harmon, **Health Physics** Vol. 74 sup. No. 6, June 1998. s30 supplement

Developing a Methodology for Strontium-90 Analysis in Milk Using 3M Empore Rad Discs. K.T. Claver, R.R. Brey, T.F. Gesell, R. Rodriguez, **Health Physics** Vol. 74 sup. No. 6, June 1998. s27 supplement

Investigation of Radiation Doses Lethal to Viruses. K.R. Marlow, R.R. Brey, L.D. Farrell, J.F. Harmon, R.D. Spall **Health Physics** Vol. 74 sup. No. 6, June 1998. P-s30 supplement

Average Beta Energy Estimation, G. Gibbons, R.R. Brey, L. Paulus, K. Claver, P. Jenkins, Department of Physics - Health Physics Program, **Health Physics** Vol. 74 sup. No. 6, June 1998. s341 supplement

The Idaho State University Environmental Assessment Laboratory P.A. Jenkins, R.R. Brey, L.R. Paulus, and K.T. Claver **Health Physics** Vol. 74 sup. No. 6, June 1998. s27 supplement

Photon Activation Analysis of Iodine-129, T.D. Henderson, F.J. Harmon, R.R. Brey **Health Physics** Vol. 74 sup. No. 6, June 1998. s41 supplement

Kinetics of the Distribution of I-125 in Bovine Milk during Aging; Nasreen Parvin, R. R. Brey, R. W. McCune and Thomas F. Gesell, **Health Physics**, Supplement to Vol. 72, No.6, June 1997 s29 supplement

Investigation of Radiation Doses Lethal To Viruses Populations; K.R. Marlow, R.R. Brey, L.D. Farrell, J.F. Harmon, R.D. Spall, **Health Physics**, Supplement to Vol. 72, No.6, June 1997 s47 supplement

Iodine Neutron Capture Therapy; K.F. Ahmed; A.G. Stephens, R.D. Spall, R.R. Brey and J.S. Bennion, **Health Physics**, Supplement to Vol. 72, No.6, June 1997 s46 supplement

The Effectiveness of Molecular Sieve Adsorbents in the Collection of Tritium Water Vapor in Air; L.J. Davis, T.F. Gesell and R.R. Brey, **Health Physics**, Supplement to Vol. 72, No.6, June 1997 s30 supplement

Radionuclides in Eggshells From Barn Swallows Nesting Near Radioactive Liquid Waste Leaching Ponds; H.C. Hulse, R. R. Brey, R.G. Mitchell, R.W. Warren and T. F. Gesell, **Health Physics**, Supplement to Vol. 72, No.6, June 1997 s28 supplement

Evaluation of the Alnor RAD-101 Electronic Personal Dosimeter; D. L. Collaer, H. D. Snowder, T. F. Gesell, and R. R. Brey, **Health Physics** Supplement to Vol. 72, No.6, June 1997 s31 supplement

Evaluation of a Low Background Proportional Counter for Detection of High Energy Beta Particles with Application to ^{90}Sr Surface Contamination; K.T.S. Islam, L. Johnson, C. McIsaac, R.R. Brey, T.F. Gesell, **Health Physics** Vol. 70 sup. No. 6, June 1996 s17 supplement

The Efficiency Calibration and Development of Correction Factors for an IN-SITU Well Logging System; J.R. Giles, R.R. Brey, T.F. Gesell, **Health Physics** Vol. 70 sup. No. 6, June 1996 s66 supplement

A Field Study Comparing Two Methods of Transportation Risk Assessment; M.F. Harmon, S.G. Oberg, R.R. Brey, **Health Physics** Vol. 70 sup. No. 6, June 1996 p-s9 supplement

Independent Evaluation of the Temperature and Energy Dependence of a Bubble Dosimeter; R.D. Boston, R.R. Brey, T.F. Gesell, **Health Physics** Vol. 70 sup. No. 6, June 1996 s23 supplement

An Evaluation of ^{222}Rn Concentrations in Idaho Ground Water; L.R. Paulus, T.F. Gesell, R.R. Brey, D.J. Parliman, **Health Physics** Vol. 70 sup. No. 6, June 1996 s79 supplement

Published National Laboratory Report

Field Lysimeter Test Results, Low-Level Waste Data Base Development Program: Test Results for Fiscal Year 1990, 1991,1992, and 1993; J.W. McConnell, Jr., R.D. Rogers, J.D. Jastrow, D.S. Wickliff-Hicks, W.E. Sanford, R.R. Brey, T.M. Sullivan, R.M Neilson, Jr., L.D. Hilton, NUREG/CR-6256, INEL-95/0073, Volumes 1 and 2.

Field Lysimeter Investigation; Low-Level Waste Data Base Development Program for fiscal year 1991. J.W. McConnell, R.D. Rogers, J.D. Jastrow, D.S. Wickliff, R.R. Brey. NUREG/CR-5229, EGG-2577 Vol. 4.

Evaluation of EPICOR-II Resin/Liner Lysimeter Investigation Data Using AMIXBATH,@ a One-Dimensional Transport Code; J.W. McConnell, R.R. Brey, T.M. Sullivan, R.D. Rogers, EGG-M-91452

Recent Invited Talks

Threats from Ionizing Radiation; *the Acute Effects of Ionizing radiation Exposure*: R.R. Brey, The Idaho Bioterrorism Awareness and Preparedness Program (IBAPP) and Telehealth Idaho Telecommunicated to Coeur d' Alene, Boise, Idaho Falls, Pocatello, Twin Falls Idaho on Wednesday 29 November, 2007.

On OSL Dosimetry: R.R. Brey, The Idaho National Laboratory Surveillance Programs Bi-Monthly Meeting, Idaho Falls, ID Thursday 30, November, 2007.

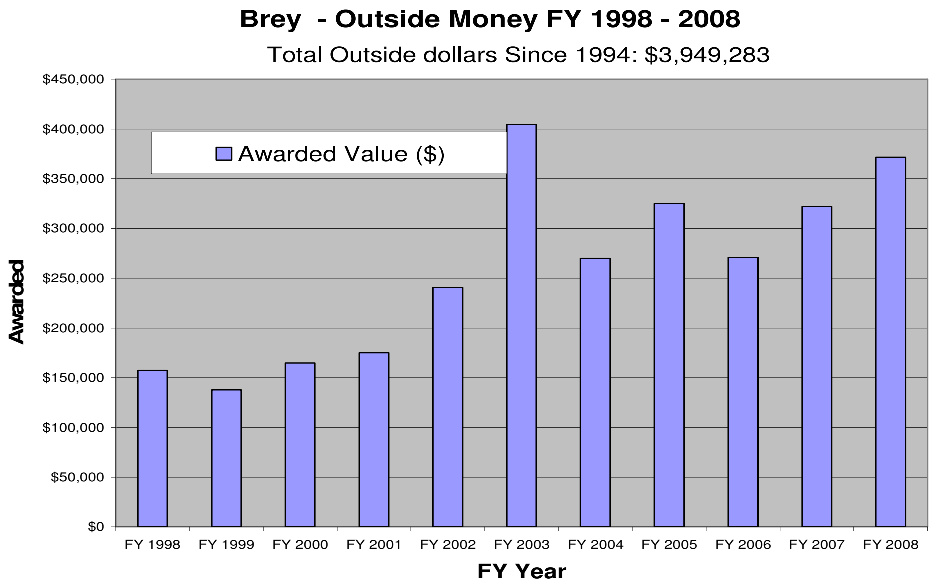
Academic Education and the Health Physics Society: R. Brey, AAHP Special Session on Health Physics Education: Funding and Accreditation of Academic Programs Tuesday, 10 July, 2007 (Noted: Abstracted Published in **Health Physics** Vol. 93, No. 1, July 2007, S55 as noted above.)

Current Transferable Contracts:

United States Transuranium and Uranium Registries, FY 2007/2008: $106,000, for Health Physics Research and Support

S.M. Stoller Inc. FY/CY 2008: $265,666, for Radioanalytical work in support of the Department of Energy off-site surveillance program

Outside Research Supported while at ISU since 1998:



Courses Developed (D) Instructed (I) and Their Periodicity
(g indicates dual level upper division undergraduate and graduate course)

PHYS 218 Fundamentals of Radiation Protection Physics 3 credits (D), (I), Annual (last provided 2005 by Brey)
Atomic structure, nuclear structure, fission and fusion, radioactive decay, types of radiation, decay schemes, decay kinetics, interaction of radiation with matter, inverse square, attenuation, shielding, sources of radiation, reactors; accelerators, X-ray machines, units and terminology. Developed for Associated Degree Program

PHYS g411 Accelerator Health Physics 3 credits. (D), (I), Once Every Three Years (Currently Providing)
Fundamentals of particle accelerator design and operation. Examination of the potential radiation environment associated with accelerators and health and safety issues of their operation.

PHYS g413 Fundamentals of Industrial Hygiene 3 credits. (D), (I), Once Every Three Years (2005)
Overview on the recognition, evaluation, and control of hazards arising from physical agents in the occupational environment. The exposure consequences associated with agents of major occupational health concerns are considered.

PHYS g416 Radiation Detection and Measurement 3 credits. (D), (I), Annual (provided 2007Spring by Brey)
Lecture/laboratory course emphasizing practical measurement techniques in nuclear physics.

PHYS g417 Industrial Ventilation and Aerosol Physics 3 credits. (D), (I), Once Every Three Years (2005)
This course focuses on two distinct subject areas: an elaboration on the details of the ACGIH method of local exhaust-system design, and a study of applied aerosol physics based upon trajectory analysis.

PHYS g418 Nonionizing Radiation Protection 3 credits. (D), (I), Once Every Three Years (2006)
Occupational safety and health issues of human exposure to Nonionizing radiation. Topics include health concerns and safety strategies developed for extremely low frequency, microwave, radio-frequency, ultraviolet, infrared, laser radiation, and sound waves.

PHYS g420 Reactor Health Physics 3 credits. (D), (I), Once Every Three Years (2007)
Introduction to reactor physics; nuances peculiar to reactor health physics; reactor designs. Critiques of exposure pathways, accidents, decommissioning, contamination control, and emergency planning examine radiation safety approaches within the nuclear fuel cycle.

PHYS g431 Radiation Physics I 3 credits. (D), (I), Annual (Currently provided 2007 Fall by Brey)
Atomic and nuclear structure, series and differential-equation descriptions of radioactive decay, physical theory of the interaction of radiation with matter suitable for the discipline of Health Physics.

PHYS g432 Radiation Physics II 3 credits. (D), (I), Annual (provided 2005 Spring by Brey)
Continuation of PHYS g431 considering dosimetric quantities/units, theory and technology of radiation detection and measurement, and radiobiology important to an advanced understanding of radiation protection.

PHYS g433 External Dosimetry 3 credits. (D), (I), Annual (provided 2005 Fall by Brey)
Lecture course emphasizing external radiation protection including study of point kernel techniques, Monte Carlo modeling and NCRP-49/NCRP 147 methods. Also discussed are external dosimetry measurement techniques.

PHYS g434 Internal Dosimetry 3 credits. (D), (I), Annual (provided 2007 Spring by Brey)
A lecture course emphasizing internal radiation protection including studies of ICRP□2, ICRP26&30, ICRP 60&66, and MIRD methods of internal dosimetry.

PHYS g490 ABHP Review 3 credits. (I), Bi-Annual (provided 2004 Spring by Brey)A course for practicing professionals aimed at the development and improvement of skills. May not be applied to undergraduate or graduate degrees.

Current Thesis or dissertation supervision

The following students were under my supervision or partially under my supervision for their research work during 2006

Kiran Billa (Ph.D.)
Larry Burke (M.S.)
John Macklin (M.S.)
Kevin Claver (M.S.)
George Kharashvili (Ph.D..)
Levan Tkavadze (Ph.D.)
John Miller (Ph.D.)
Shane Powell (M.S.)
Vivek Manickam (M.S.)
Jeff Cady (M.S.)
Robert Acha (Ph.D.)
Travis Matthews (M.S.)
Royal Ngazimbi (M.S.)
Eric Anderson (M.S.)
Thayne Butikofer (M.S.)
Khulood Naser (M.S.)
Maya Keller (M.S.)
Stacey McCord (M.S.)
Dan Mecham (M.S.)
Liesl Germann (M.S.)
Nino Chelidze (Ph.D.)
Maia Avtandilashvill (Ph.D.)
Neba Robinson Neba (Ph.D.)

15 MS students
8 Ph.D. students

The following student have completed their thesis projects under my supervision or joint supervision this year:

Maya Keller (M.S.)
Khulood Nasher (M.S.)
Vivek Manickam (M.S.)
Stacey McCord (M.S.)

Service on **several** departmental and non-departmental thesis committees.

PROFESSIONAL SERVICE

A. *Public*

* Secretary Health Physics Society
* Past President of EICHPS with continued executive committee responsibility - Board of Directors
* Chair of the Health Physics Society AEC=s Committee on Accreditation.
* Co-chair Health Physics Program Directors Organization
* CRDF Grant Review Sub-Committee Chair
* Associate Editor for HP Web Page Service - Ask the Expert for area of Careers in Health Physics
* Peer Reviewer

14 papers for the Journal Health Physics over last 2 years

*ABET Applied Science Accreditation Commission - Commissioner appointed by Health Physics Society

* ABET Applied Science Accreditation Commission - Commissioner appointed at Large

B. *University, college, department*

University

1) Accelerator Safety Committee - member
2) Reactor Safety Committee - member
3) Chair Laser Safety Committee – member
4) Director ISU Technical Safety Office and RSO

I now have a 0.5 FTE administrative appointment as Director of the Idaho State University Technical Safety Office/RSO and a 0.5 FTE academic appointment.

5) Faculty Senate Grievance Panel – Provost and Academic Vice President's Appointment

College

- Faculty Advisor - EICHPS ISU Student Branch
- College Promotion and Tenure Committee member

Department

* HP program accreditation team

Douglas P. Wells
Idaho State University
Department of Physics and Health Physics, Campus Box 8106
Pocatello, ID 83209-8106
Phone: 208-236-3986, E-mail: wells@physics.isu.edu

Education and Professional Certifications:

CHP, American Board of Health Physics, 1997
Ph.D., Experimental Nuclear Physics, University of Illinois, 1990
M.S., Physics, University of Illinois, 1985
M.S., Mathematics, University of Virginia, 1984
B.A., Physics, Rutgers University, 1982

Professional Positions:

2002-present: Associate Professor of Physics, (tenured), Department of Physics, Idaho State University, ID.
1997 - 2002: Assistant Professor of Physics, (tenure-track), Department of Physics, Idaho State Univ. ID.
1996 - 1997: Associate Professor of Health Physics, (non-tenure-track) Department of Physics, ISU, ID.
1993 - 1996: Radiation Health Physicist, Washington State Department of Health, Olympia, WA.
1990 - 1992: Post-Doctoral Research Associate, Department of Physics, University of Washington, Seattle

Experience and Interests:

Current research spans several areas of health physics and applied physics. These include nuclear waste assay and imaging using accelerator-based XRF and Positron Annihilation Analysis, environmental health physics, production of Compton-backscattered X-ray beams, and isomeric photo-nuclear physics, particularly in the areas of metal assays and non-exponential decay. I am currently funded for three projects. These are (as one of 5 Co-PIs) Applications of Radiation Science and Accelerator Technology, $996,000, **Funded** July of 2001, Co-PI with Dr. Frank Harmon for a two-year $150,000 grant for Compton Back-Scattered Photons: Development of an Intense Source of Polarized X-rays, **Funded** from August, 2000 to August 2002, and PI for a three-year $180,000 grant to study Non-Destructive Assay and Imaging with Accelerator-based X-ray Fluorescence for Sub-Surface Science, **Funded** from September, 2000 to September 2003.

Selected Recent Publications: *(There are a total of 53 publications since my arrival as a non-tenure track faculty in 1996).*

J. L. Alvarez, R. Geddes, J. E. Rice, T. F. Gesell, and D. Wells, *Elemental Phosphorous Slag Exposure Study in Southeastern Idaho,USA*, 5th International Conference on High Levels of Natural Radiation and Radon, 2002.

D.P. Wells, D.P., F. A. Selim, J. F. Harmon, W. Scates, J. Kwofie, R. Spaulding, S.P. Duttagupta, J.L. Jones, T. White and T. Roney, *Development of Accelerator–Based X-ray Fluorescence for Large Sample Assay*, Advances in X-Ray Analysis, Volume 45 (2002).

F. A. Selim, D.P. Wells, J. F. Harmon, W. Scates, J. Kwofie, R. Spaulding, S.P. Duttagupta, J.L. Jones, T. White, and T. Roney, *Doppler Broadening Measurements of Positron Annihilation Using Bremsstrahlung Radiation* Nuclear Instruments & Methods B, Vol. 192, p. 197, May 2002.

F. A. Selim, D.P. Wells, F. J. Harmon, J. Kwofie, R. Spaulding, G.Erickson, and T. Roney, *Bremsstrahlung -induced non destructive probes for chemical assays and defect analysis,* Accepted for publication in Nuclear Instruments & Methods A, June 2002.

D.P. Wells, J.F. Harmon and R. Brey, *Radiation Research Opportunities and the Idaho Accelerator Center*, 2002 American Radiation Safety Conference and Exposition, HPS 47th Annual Meeting, Tampa, June 2002.

F. A. Selim, D.P. Wells, F. J. Harmon, J. Kwofie, R. Spaulding, G.Erickson, and T. Roney, *New positron annihilation spectroscopy techniques for thick samples*, Invited talk at the 7th international positron and positronium chemistry conference, July 2002, Knoxville, TN (Paper to be published in Radiation Physics & Chemistry, 2002).

F. A. Selim, D.P. Wells, F. J. Harmon, J. Kwofie, R. Spaulding, G.Erickson, and T. Roney, *Stress analysis using bremsstrahlung radiation*, Talk at the 51 Denver X-ray conference, July 2002, Co Spring, Co, Paper to be published in X-ray Analysis proceedings, July 2002.

F. A. Selim, D.P. Wells, F. J. Harmon, J. Kwofie, W. Scates, R. Spaulding, G.Erickson, S.A. Parke, S.P. Duttagupta, J.L. Jones, T. White and T. Roney, *Applications of nuclear isomers in subsurface research*, Paper to be published at Inland Northwest Reseach Alliance Subsurface Science Symposium, Sept. 2002.

J. Kwofie, D.P. Wells, F. A. Selim, F. J. Harmon, S.P. Duttagupta, J.L. Jones, T. White and T. Roney , *Accelerator-based Waste Assays*, 2002 American Radiation Safety Conference and Exposition, HPS 47th Annual Meeting, Tampa, June 2002

J. Kwofie, D.P. Wells, F. A. Selim, F. J. Harmon, S.P. Duttagupta, J.L. Jones, T. White and T. Roney, *Accelerator Based Subsurface Science Probes*, To be published in prceedings of the INRA Subsurface Science Symposium Boise, October 2002.J.

Kwofie, D.P. Wells, F. A. Selim, F. J. Harmon, S.P. Duttagupta, J.L. Jones, T. White and T. Roney, *Bremstrahlung-Based Assays of Process and Waste Streams*, CAARI 2002: Seventeenth International Conference on the Application of Accelerators in Research and Industry, Denton, Texas, 2002.

K. Chouffani, D.P. Wells, J.F. Harmon, J.L. Jones and G. Lancaster, *Laser-compton scattering from a 20 MeV electron beam,*

Submitted to Nuclear instruments and methods in physics research A (2002).
K. Chouffani, D.P. Wells, J.F. Harmon, J.L. Jones and G. Lancaster, *Laser-compton scattering as a potential electron beam monitor*, Presented at the International Beam Intrumentation Workshop, Brookhaven, NY (2002).
D.P. Wells, K. Chouffani, J.F. Harmon, J.L. Jones and G. Lancaster, Development of a New, Tunable and Monochromatic X-ray Source, Talk at the 51 Denver X-ray conference, July 2002, Co Spring, Co, (Paper to be published in X-ray Analysis proceedings), July 2002.
K. Chouffani, D.P. Wells, J.F. Harmon, J.L. Jones and G. Lancaster, *Laser-compton scattering from a 20-22 MeV electron beam*, Presented at the European Particle Accelerator Conference, June 3-7, 2002 Paris, France (2002).
K. Chouffani, D.P. Wells, J.F. Harmon, J.L. Jones and G. Lancaster, *Laser-Compton scattering as a potential x-ray source and electron beam monitor*, Submitted to NIM A, 2002.
K. Chouffani, D.P. Wells, J.F. Harmon, J.L. Jones and G. Lancaster, *Exotic X-ray Sources from Low-Energy Relativistic Electron Beams*, To be published in Proceedings of CAARI 2002.
F. A. Selim, D.P. Wells, J. F. Harmon, J. Kwofie, G. Erickson, J.L. Jones, T. White, and T. Roney, *Bremsstrahlung-based Positron Annihilation Spectroscopy for Material Defect Analysis*, To be published in Proceedings of CAARI 2002.
J. Kwofie, D.P. Wells, F. A. Selim, F. J. Harmon, S.P. Duttagupta, J.L. Jones, T. White and T. Roney, *Bremstrahlung-Based Assays of Process and Waste Streams*, To be published in Proceedings of CAARI 2002.
Wade Scates, D.P. Wells, J.F. Harmon, *A Test of Non-Exponential Decay in Quantum Systems, To* be published in Proceedings of CAARI 2002.
M. Reda, J.F. Harmon, W. Scates and D.P. Wells, *Accelerator-Based photo-neutron sources for Sub-Critical Nuclear Reactors*, To be published in Proceedings of CAARI 2002.
J.F. Harmon, D.P. Wells, R. Brey, *Pure and Applied Research Opportunities at the Idaho Accelerator Center*, To be published in Proceedings of CAARI 2002.
D.P. Wells, J.F. Harmon and M. Reda, *Cabinet-Safe, Portable Electron Linac Systems*, To be published in Proceedings of CAARI 2002.
K. Chouffani, D.P. Wells, J.F. Harmon, J.L. Jones and G. Lancaster, *Laser-Compton experiments at the Idaho Accelerator Center*, Workshop on Novel Photon Sources From Relativistic Electron Beams, November 29 –30, 2001. Idaho Accelerator Center, Pocatello Idaho (2001).
F. A. Selim, D.P. Wells, F. J. Harmon, J. Kwofie, W. Scates, R. Spaulding, G.Erickson, S.A. Parke, S.P. Duttagupta, J.L. Jones, T. White and T. Roney, *Development of Bremsstrahlung-based Positron Probe for Assay and Defect Analysis*, Published in Inland Northwest Research Alliance Subsurface Science Proceedings, Nov. 2001.
D.P. Wells, J.L. Jones, W.Y. Yoon and F. Harmon, "Cabinet-Safe" Study of 1-8 MeV Electron Accelerators, Nuclear Instruments and Methods in Physics Research **A 463**, 118 (2001).
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List of Requested Tables

Note: Not all Tables provided in this section of the report are specifically discussed in the body of the report. Instead this information is provided as appropriate.

Table 5-1 Undergraduate (Associate or Baccalaureate)

Bachelor of Science in Physics (Emphasis: Health Physics)

Year; Semester or Quarter	Course (Department, Number, Title)	Category (Credit Hours)			
		Math & Basic Sciences	Professional Program Topics	General Education	Other
s	Biol 101/101LGen Biology	4		4	
s	Bios 209 (BST) Gen Ecology	4			
y	Bios 301, 302 Anatomy & Physiology	4 each			
s	Bios g488 Radiobiology		3		
y	Chem 111, 112 Gen Chemistry	5/4		5/4	
s	Chem 102 Essentials Chemistry II	5		5	
s	CS 181 or CIS 220 Computer	3			
s	Engl 307 Professional Writing				3
s	Math 147 Precalculus	5			
s	Math 160 (BST) Brief Calculus	3		3	
s	Math 170 (APT) Calculus I	4		4	
s	Math 175 (APT) Calculus II	4			
s	Math 275 (APT) Calculus III	4			
s	Math 352 (APT) or Bios 315 (BST)	3			
y	Phys (111,113)(112,114) (BST) Gen.	(4)(4)		(4)(4)	
y	Phys 211,213,212,214 (APT) Engr	(5)(5)		(5)(5)	
s	Phys g416 Intro Nuclear Measurement		3 each		
y	Phys g431, g432 Radiation Physics		3 each		
y	Phys g433, g434 External/Internal		3 each		
y	Phys 455, 456 Topics in H.P. I, II		2 each		

s	Phys 480 Health Physics Capstone	3
s	Phys g492 Colloquium in Physics	1 each (taken twice)

Note that instructional material and student work verifying course compliance with ABET criteria for the categories indicated above will be required during the campus visit.

Table 5-1B. Graduate Level Curriculum (MS)

Master of Science in Physics (Health Physics Emphasis)

Year; Semester or Quarter	Course (Department, Number, Title)	Category (Credit Hours)			
		Math & Basic Sciences	Professional Program Topics	General Education	Other
s	Phys 601 Quantitative Methods in Physics		3		
s	Phys 605 Rad. Environ. Monitoring and Surveillance		3		
s	Phys 610 Radiation Regulations		3		
s	Physics g488 Advanced radiobiology		3		
s	Phys 650 Thesis		6		

Table 5-2. Course and Section Size Summary

Bachelor's and Master's Degree in Physics (Health Physics Emphasis) 2007-2008

Course No.	Title	No. of Sections offered in Current Year	Avg. Section Enrollment	Type of Class1			
				Lecture	Laboratory	Recitation	Other
Phys 411/511	Accelerator Health Physics	4	2	90%		10%	
Phys 413/513	Fundamentals of Industrial Hygiene	4	2	90%		10%	
Phys 416/516	Introduction to Nuclear Measurements	5	6	50%	50%		
Phys 431/531	Radiation Physics I	2	5	80%		20%	
Phys 432/532	Radiation Physics II	2	5	80%		20%	
Phys 433/533	External Dosimetry	4	5	80%		20%	
Phys 434/534	Internal Dosimetry	4	5	80%		20%	
Phys 455/555	Topics in Health Physics I	2	2	60%		40%	
Phys 456/556	Topics in Health Physics II	2	2	60%		40%	
Phys 490/590	ABHP Certification	4	2	100%			
Phys 601	Quantitative Methods	1	10	80%	10%	10%	
Phys 605	Rad Enviro. Monitoring & Surveillance	2	5	90%		10%	
Phys 610	Radiation Regulations	2	10	100%			

Table 6-1. Faculty Workload Summary

Bachelor's and Master's Degree in Physics (Health Physics Emphasis)

Faculty Member	FT or PT[4]	Classes Taught (Course No./Credit Hrs.) Term and Year[1]	Total Activity Distribution[2]		
			Teaching	Research	Other[3]
Richard R. Brey	FT	Spring Semester 2003	89%	10%	1%
		Phys 300/321 (2/2)			
		Phys 432/532 (3)			
		Phys 416/516 (3)			
		Phys 434/534 (3)			
		Phys 418/518 (3)			
		Phys 459 (3)			
		Fall Semester 2003	55.6%	40%	4.4%
		Phys 431/531 (3)			
		Phys 433/533 (3)			
		Phys 218 (3)			
		Phys 459 (3)			
		Spring Semester 2004	95%	4%	1%
		Phys 300/321 (4)			
		Phys 332/532 (3)			
		Phys 416/516 (3)			
		Phys 434/534 (3)			
		Phys 420/520 (3)			
		Phys 459 (3)			

Table I-3. Faculty Workload Summary

Bachelor's and Master's Degree in Physics (Health Physics Emphasis)

Faculty Member	FT or PT[4]	Classes Taught (Course No./Credit Hrs.) Term and Year[1]	Total Activity Distribution[2]		
			Teaching	Research	Other[3]
Brey (cont.)		Fall Semester 2004	55.6%	40%	4.4%
		Phys 431/531 (3)			
		Phys 434/534 (3)			
		Phys 411/511 (3)			
		Phys 218 (3)			
Brey		Spring Semester 2005	89%	10%	1%
		Phys 300/321 (4)			
		Phys 332/532 (3)			
		Phys 416/516 (3)			
		Phys 434/534 (3)			
		Phys 413/513 (3)			
Brey		Fall Semester 2005	20%	79%	1%
		Phys 431/531 (3)			
		Phys 417/517 (3)			
		Phys 218 (3)			
		Phys 459 (3)			

Faculty Member	FT or PT[4]	Classes Taught (Course No./Credit Hrs.) Term and Year[1]	Total Activity Distribution[2]		
			Teaching	Research	Other[3]
Brey (cont.)		Spring Semester 2006	40%	30%	30%
		Phys 434/534 (3)			
		Phys 416/516 (3)			
		Phys 300/321 (4)			
		Phys 459 (3)			
		Fall Semester 2006	30%	40%	30%
		Phys 431/531 (3)			
		Phys 459 (3)			
Brey		Spring Semester 2007	40%	30%	30%
		Phys 300 (2)			
		Phys 420/520 (3)			
		Phys 416/516 (3)			
		Phys 434/534 (3)			

Faculty Member	FT or PT[4]	Classes Taught (Course No./Credit Hrs.) Term and Year[1]	Total Activity Distribution[2]		
			Teaching	Research	Other[3]
Brey (con't)		Fall Semester 2007	40%	20%	30%
		Phys 431/531 (3)			
		Phys 601 (3)			
		Phys 411/511 (3)			
Brey		Spring Semester 2008	60%	10%	30%
		Phys 434/534 (3)			
		Phys 416/516 (3)			
		Phys 300 (2)			
		Phys 413/513 (3)			
Eduardo Farfan	FT	Fall Semester 2005	70%	29%	1%
		Phys 433/533 (3)			
		Phys 601 (3)			

Faculty Member	FT or PT[4]	Classes Taught (Course No./Credit Hrs.) Term and Year[1]	Total Activity Distribution[2]		
			Teaching	Research	Other[3]
Farfan (con't)		Spring Semester 2006	20%	70%	10%
		Phys 432/532 (3)			
		Phys 418/518 (3)			
		Fall Semester 2006	10%	80%	10%
		Phys 601 (3)			
Maya Keller	FT	Fall Semester 2006	100%		
		Phys 433/533 (3)			
		Phys 218 (3)			
		Phys 455 (2)			

Table I-3. Faculty Workload Summary

Bachelor's and Master's Degree in Physics (Health Physics Emphasis)

Faculty Member (Name)	FT or PT[4]	Classes Taught (Course No./Credit Hrs.) Term and Year[1]	Total Activity Distribution[2]		
			Teaching	Research	Other[3]
Keller (cont.)		Spring Semester 2007	100%		
		Phys 432/532 (3)			
		Phys 416/516 (team taught) (3)			
		Phys 321 (2)			
		Phys 456/556 (2)			
Keller		Fall Semester 2007	100%		
		Phys 433/533 (3)			
		Phys 218 (3)			
		Phys 455 (2)			
Keller		Spring Semester 2008	100%		
		Phys 416/516 (team taught) (3)			
		Phys 321 (2)			
		Phys 456/556 (2)			
		Spring Semester 2008	30%	60%	10%
Jason Harris		Phys 432/532 (3)			

Faculty Member (Name)	FT or PT[4]	Classes Taught (Course No./Credit Hrs.) Term and Year[1]	Total Activity Distribution[2]		
			Teaching	Research	Other[3]
Douglas Wells	FT	Spring Semester 2003	10%	80%	10%
		Phys 416/516 team taught (3)			
		Fall Semester 2003	20%	75%	5%
		Phys 610			
		Phys 601			
Wells		Spring Semester 2004	25%	70%	5%
		Phys 416/516 Team Taught (3)			
Wells		Fall Semester 2004	10%	80%	5%
		Phys 601			
Wells		Spring Semester 2005	25%	75%	5%
		Phys 416/516 Team Taught (3)			
Wells		Fall Semester 2005	10%	25%	10%
		Phys 610 (3)			
Wells		Spring Semester 2006			
Wells		Fall Semester 2006			
Wells		Spring Semester 2007			
Wells		Fall Semester 2007			
Wells		Spring Semester 2008			
Thomas F. Gesell	FT				
		Spring 2003			
		Phys 605 (3)			
		Phys 456/556 (2)			

Faculty Member (Name)	FT or PT[4]	Classes Taught (Course No./Credit Hrs.) Term and Year[1]	Total Activity Distribution[2]		
			Teaching	Research	Other[3]
Gesell (con't)		Fall 2003			
		Phys 601 Team Taught (3)			
		Phys 455/555 (2)			
Gesell		Spring 2004			
		Phys 605 (3)			
		Phys 456/456 (2)			
Gesell		Fall 2004			
		Phys 601 Team Taught (3)			
		Phys 455/555 (2)			
Gesell		Spring 2005			
		Phys 605 (3)			
		Phys 456/456 (2)			
Gesell		Fall 2005			
		Phys 455/456 (2)			
Gesell		Spring 2006			
		Phys 605 (3)			
		Phys 456/556 (2)			
Gesell		Fall 2006			
Gesell		Spring 2007			
		Phys 605 (3)			
Gesell		Fall 2007			
Gesell		Spring 2008			
		Phys 605 (3)			

Notes: Cummings taught Physics-648 every fall semester of odd numbered years during the 2003 through 2008 time period.

Schrader taught Physics 490/590 every spring semester of odd numbered years during the 2003 through 2008 time period. Schrader also taught Physics 412/512 during the fall semesters of 2003 and 2006. Schrader taught Physics 419/519 during the Spring semesters of 2004 and 2007.

Table I-4. Faculty Analysis Department of Physics (Health Physics Program)

Name	Rank	Type of Academic Appointment TT, T, NTT	FT or PT	Highest Degree	Institution from which Highest Degree Earned & Year	Years of Experience			Professional Registration Certification	Level of Activity (high, med, low, none) in:		
						Govt./ Industry Practice	Total Faculty	This Institution		Professional Society	Research	Consulting /Summer Work in Industry
Richard Brey	P	T	FT	Ph.D.	Purdue University 1994	4 years	8 years	14 years	C.H.P.	High	High	Medium
Thomas Gesell	P	T	FT	Ph.D.	University of Tennessee 1971	11 years	21 years	11 years		High	Medium	Medium
Douglas Well	P	T	FT	Ph.D.	University of Illinois 1990	6 years	6 years	6 years		Medium	High	None
Jason Harris	AP	TT	FT	Ph.D.	Purdue University Ph.D. 2007	4 years	4 years	4 years		High	High	Medium
Maya Keller	I	NTT	FT	M.S.	Idaho State University	none	2 years	2 years		Medium	None	Low

Table 8-1. Support Expenditures Department of Physics (Health Physics Program)%

	1	2	3
Fiscal Year	2005 - 2006	2006 - 2007	2007 – 2008
Expenditure Category			
Operations (1) * (not including staff)	$5,000	$5,000	$5,000
Travel (2) **	0	0	$3,000
Equipment (3)	$0	$0	$35,000
(a) Institutional Funds	$7,000	$7,000	$7,000
(b) Grants and Gifts (4)	$700,000	$700,000	$700,000
Graduate Teaching Assistants	$38,575	$40,429	$34,846
Part-time Assistance (5) (other than teaching)	$16,995	$16,995	$17,050
Faculty Salaries	$144,000	$187,900	$205,000

% Figures reflect 30-33% of total Departmental budget for BS & MS Programs.

* Average balance based on Health Physics faculty representation in the department.

** All travel for Health Physics faculty is facilitated through grants and contracts, with exception of trip in 2008 for instructor to HP annual meeting..

Notes:

1. Categories of general operating expenses
2. Institutionally sponsored, excluding special program grants.
3. Major equipment, excluding equipment primarily used for research. Note that the expenditures (a) and (b) under "Equipment" should total the expenditures for Equipment. If they don't, please explain.
4. Including special (not part of institution's annual appropriation) non-recurring equipment purchase programs.
5. Do not include graduate teaching and research assistant or permanent part-time personnel.

Table II-1 Faculty and Student Count for Institution

School Year: For Fall Semester 2007

	HEAD COUNT		FTE	Total Student Credit Hours
	FT	PT		
Tenure Track Faculty	180	3	109.02	
Other Teaching	509	167	565.78	
Student Teaching	0	260	87.72	
*Undergraduate Students	7535	3632	7,013.6	105,204
*Graduate Students	663	1603	1,151.7	13,805
*Professional Degree	207	23	278.7	3,344

* Fall 2007 data only
Data provided by IPEDS Human Resources - Fall 2007
Sources: PSR-1: Total Student Enrollment – Fall 2007 (10th day)

Table II-4 Supporting Academic Departments

For Academic Year: 2007/2008

Department or Unit	Full-time Faculty Head Count	Part-time Faculty Head Count	FTE Faculty	Teaching Assistants	
				Head Count	FTE
Chemistry	11	3	12.5	10	5
Biology	42	7	45.5	21	10.5
Math	17	25	54.5	6	3
English	29	42	50	11	5.5
Engineering (CS)	18	13	24.5	7	3.5
Business (CIS)	8	1	8.5	5	2.5

Table II-5 Personnel and Students
Bachelor and Master Degree in Physics (Health Physics Emphasis)
Year F 2008

	HEAD COUNT		FTE (see Note 1)	RATIO TO FACULTY (See Note 2)
		PT		
Administrative		2	1.5	
Faculty (tenure track)		4	2	
Other Faculty (excluding student assistants)		3	1	
Student Teaching Assistants		3	3	1.0
Student Research Assistants		14	14	0.21
Technical/Specialists		3	3	1.0
Office/Clerical Employees		1	1	0.33
Others (Post Docs)		-	-	-
Undergraduate Student enrollment includes Freshman		19	-	6.33
Graduate Student enrollment		41	-	13.7

Notes:

1. For student teaching and research assistants, 1 FTE equals 20 hours per week of work (or service).
2. Equals FTE in each category divided by total FTE faculty.

Table D-5 Faculty Salary Date
Idaho State University
Academic Year ___2007/2008

For the Institution as a Whole
Based on Nine-Month Contract

	Professor	Associate Professor	Assistant Professor	Instructor
Number	149	105	139	19
High	$150,373	$114,525	$92,706	$57,866
Mean	$70,574	$55,827	$47,861	$39,354
Low	$43,493	$42,016	$37,025	$28,205