

**IDAHO STATE BOARD OF EDUCATION  
ACADEMIC/PROFESSIONAL-TECHNICAL EDUCATION  
NOTICE OF INTENT**

**To initiate a  
New, Expanded, Cooperative, Discontinued, program component or Off-Campus Instructional  
Program or Instructional/Research Unit**

Institution Submitting Proposal: University of Idaho

Name of College, School, or Division: College of Science

Name of Department(s) or Area(s): Department of Physics

Indicate if this Notice of Intent (NOI) is for an Academic or Professional Technical Program  
Academic X Professional - Technical \_\_\_\_\_

This is a New, Expanded, Cooperative, Contract, or Off-Campus Instructional Program, or  
Administrative/Research Unit (circle one) leading to:

[Create two emphases in the Physics Major \(B.S.\): General Physics Emphasis and Applied  
Physics Emphasis](#)

(Degree or Certificate)

Proposed Starting Date: August 23, 2010

**For New Programs:**

**For Other Activity:**

\_\_\_\_\_  
Program (i.e., degree) Title & CIP 2000

- Program Component (major/minor/option/emphasis)
- Off-Campus Activity/Resident Center
- Instructional/Research Unit
- Addition/Expansion
- Discontinuance/consolidation
- Contract Program
- Other

**Dean's signature on file** 10/13/09

College Dean (Institution) \_\_\_\_\_ Date

VP Research & Graduate Studies \_\_\_\_\_ Date

Chief Fiscal Officer (Institution) \_\_\_\_\_ Date

State Administrator, SDPTE \_\_\_\_\_ Date

Chief Academic Officer (Institution) \_\_\_\_\_ Date

Chief Academic Officer, OSBE \_\_\_\_\_ Date

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President

Date

SBOE/OSBE Approval

Date

**Before completing this form, refer to Board Policy Section III.G., Program Approval and Discontinuance.**

1. Briefly describe the nature of the request e.g., is this a new program (degree, program, or certificate) or program component (e.g., new, discontinued, modified, addition to an existing program or option).

The request is for restructuring the existing (undergraduate) Physics B.S. to include two emphases, namely the “*General Physics Emphasis*” (GPE) and the “*Applied Physics Emphasis*” (APE), in the Department of Physics at the University of Idaho. The GPE is identical to the present Physics B.S. and, thus, no new program. The present Physics B.S. will just be renamed GPE to distinguish it from the newly introduced APE. Therefore, the remainder of this NOI is focused on the APE. The APE is designed to foster interdisciplinary undergraduate education in the sciences and engineering, with emphasis and preparation in the applied sciences. Students in APE will gain basic and well-rounded knowledge in physics, mathematics, and chemistry as well as engineering that will prepare them to be valuable members and future leaders in the hi-tech industry. The APE is tailored to provide a well-balanced educational module that encompasses both fundamentals and practical applications of the sciences and engineering, with focus on educating students in specific application areas such as solid-state physics, materials science engineering, semiconductor devices and technologies, and fluid dynamics in mechanical engineering. This focus will allow the graduating students to pursue both better high tech job opportunities as well as pursue further higher education, if they choose to do so, in disciplines such as Applied Solid State Physics and Material Science and Engineering.

The APE curriculum is entirely based on existing active courses, and no new resources are needed. Besides the general requirements of the university class curricula, the students enrolled in the APE will have to complete additional **81 credits** from the sciences and engineering in the following manner:

- 54 credits are from the **APE required courses\*** (Chemistry, Mathematics, and Physics).
- 27 credits are from the **APE electives\*** (Physics, Materials Science and Engineering, Electrical Engineering, and Mechanical Engineering).

The electives will be chosen by a student in accordance to her/his interdisciplinary educational interest. The plan of study will be developed and tailored by the APE undergraduate academic advisor.

2. Provide a statement of need for program or a program modification. Include student and state need, demand, and employment potential. **Attach a Scope and Sequence, SDPTE Form Attachment B, for professional-technical education requests.** (Use additional sheets if necessary.).

The *Applied Physics Emphasis* (APE) will provide a new high-quality educational choice at the University of Idaho which will give the opportunity for undergraduate students to acquire education in the interdisciplinary field of science and engineering, with an emphasis on firmly educating students in specific application areas such as solid-state physics, materials science engineering, semiconductor devices and technologies, and fluid dynamics in mechanical engineering. There is increasing demand in the high tech industry for well-qualified and cross-disciplinary men and women: the APE provides a timely and highly desirable educational endeavor for addressing that demand. In the state of Idaho, the graduates may find career-making jobs at Micron Technology, Inc. at Idaho National Lab, and in addition may contribute to small business in the science/engineering industries. Thus the APE answers the strong need for an applied cross-disciplinary science curriculum that better prepares students for high tech job opportunities, and moreover will enable increased outreach and partnerships with local industry.

By creating the APE which has a significant science component yet is practical in nature, the prediction and expectations are that it will draw numerous qualified students, and so will increase student enrollment in classes in the Department of Physics as well as other science and engineering departments. The expected increase in students and the cross-disciplinary nature of the new emphasis will strengthen the stature of the Department of Physics and that of the University of Idaho in the education and research community.

- Briefly describe how the institution will ensure the quality of the program (e.g., accreditation, professional societies, licensing boards, etc.).

All classes for the Applied Physics Emphasis (APE) are existing, active, and university approved. The quality of the emphasis as a whole will be monitored by the APE committee at the Department of Physics that currently consists of Dr. Leah Bergman (Committee chair), Dr. David McIlroy, and Dr. Wei Jiang Yeh. When a new student enters this program, one committee member in collaboration with the student and his/her advisor will develop an individual study plan for the student and monitor the progress every semester.

- Identify similar programs offered within the state of Idaho or in the region by other colleges/universities. If the proposed request is similar to another program, provide a rationale for the duplication. This may not apply to PTE programs if workforce needs within the respective region have been established.

The Physics Department at ISU offers a B.S. in Health Physics, which may be perceived as a B.S. degree in an area of applied physics. However, the APE we are proposing in this NOI is very different in its contents as compared to the Health Physics B.S. of ISU. Therefore, the APE is not a duplication of an existing program in the state of Idaho.

We further note that a general B.S. in Physics is offered at BSU and ISU.

Enrollment and Graduates (i.e., number of majors or other relevant data)  
 By Institution for the Proposed Program  
 Last three years beginning with the current year and the 2 previous years

Institution	Relevant Enrollment Data			Number of Graduates		
	Current	Previous Year	Previous Year	Current	Previous Year	Previous Year
BSU						
CSI						
CWI						
EITC						
ISU						
LCSC						
NIC						
UI						



Degrees offered by school/college or program(s) within disciplinary area under review

Institution and Degree name	Level	Specializations within the discipline (to reflect a national perspective)	Specializations offered within the degree at the institution
BSU			
CSI			
CWI			
EITC			
ISU			
LCSC			
NIC			
UI			

5. Describe how this request is consistent with the State Board of Education's policy or role and mission of the institution. (i.e., centrality).

The creation of an Applied Physics Emphasis, with its emphasis on interdisciplinary scholarship and practical applications in science and engineering in areas such as solid-state physics and semiconductor technologies, will promote competitive advantage in the high-tech industry as well as enable increased outreach and partnerships with state industry. Students will not only acquire broader and integrated exposure to science as it applies to applications and technologies in today's society, but will also be better prepared for high-quality job opportunities and further scientific education. In addition it is anticipated that the cross-disciplinary applied emphasis will increase student enrollment and active participation in physics as well as the sciences. The Applied Physics Emphasis is thus highly consistent with and advances the mission of the State Board of Education as well as the strategic plan for the University of Idaho.

6. Is the proposed program in the 8-year Plan? Indicate below.

Yes  No

If not on 8-year plan, provide a justification for adding the program.

This degree emphasis is being created in accordance with the departmental strategic plan. That strategic plan, in turn, was developed in response to last year's discussion of viability of the Physics undergraduate program. Specifically, there was a perceived need to boost enrollment in upper-division undergraduate Physics courses. This degree emphasis is intended to widen the audience to which the undergraduate Physics program will appeal, thus boosting enrollments in those courses. These are existing courses that presently have capacity for enrollment growth. Creating this new emphasis within the Physics B.S. will thus serve the interests of employers and students as well as increase the efficiency of the university.

8. Resources--Faculty/Staff/Space Needs/Capital Outlay. (Use additional sheets if necessary.):

Estimated Fiscal Impact	FY <u>11</u>	FY <u>12</u>	FY <u>13</u>	<u>Total</u>
<b>A. Expenditures</b>	\$0.00	\$0.00	\$0.00	\$00.00
1. Personnel				
2. Operating				
3. Capital Outlay				
4. Facilities				
<b>TOTAL:</b>				
<b>B. Source of Funds</b>				
1. Appropriated-reallocation				
2. Appropriated – New				
3. Federal				
4. Other:				
<b>TOTAL:</b>				
<b>B. Nature of Funds</b>				
1. Recurring *				
2. Non-recurring **				
<b>TOTAL:</b>				

\* Recurring is defined as ongoing operating budget for the program, which will become of the base.

\*\* Non-recurring is defined as one-time funding in a fiscal year and not part of the base.

There are no expenditures, because the APE does not require the creation or offering of any new courses; instead students in the APE will be filling currently unused capacities in existing courses.

**IDAHO STATE BOARD OF EDUCATION  
ACADEMIC/PROFESSIONAL-TECHNICAL EDUCATION  
FULL PROPOSAL**

**to initiate a  
NEW, EXPANDED, COOPERATIVE, DISCONTINUED, PROGRAM COMPONENT OR OFF-CAMPUS  
INSTRUCTIONAL PROGRAM OR ADMINISTRATIVE/RESEARCH UNIT**

Submitted by:

University of Idaho

INSTITUTION SUBMITTING PROPOSAL

College of Science

Department of Physics

Name of College, School, or Division

Name of Department(s) or Area(s)

A New, Expanded, Cooperative, Contract, or Off-Campus Instructional Program Leading to:

Degree/Certificate & 2000 CIP

Program Change, Off-Campus Component

August 23, 2010

PROPOSED STARTING DATE

This proposal has been approved by:

Chief Fiscal Officer (Institution) Date

SBOE/OSBE Approval Date

Chief Academic Officer (Institution) Date

President Date

**Before completing this form, refer to "Board Policy Section III.G. Program Approval and Discontinuance.**

1. Describe the **nature of the request**. For example, is this a request for a new on-campus program? Is this request for the expansion or extension of an existing program, or a new cooperative effort with another institution or business/industry or a contracted program? costing greater than \$150,000 per year? Is this program to be delivered off-campus or at a new branch campus? Attach any formal agreements established for cooperative efforts, including those with contracting party(ies). Is this request a substantive change as defined by the NWASC criteria?
2. **Quality** – this section must clearly describe how this institution will ensure a high quality program. It is significant that the accrediting agencies and learned societies which would be concerned with the particular program herein proposed be named. Provide the basic criteria for accreditation and how your program has been developed in accordance with these criteria. Attach a copy of the current accreditation standards published by the accrediting agency.

Further, if this new program is a doctoral, professional, or research, it must have been reviewed by an external peer-review panel (see page 7, "Guidelines for Program Review and Approval). A copy of their report/recommendations must be attached.

- a. Curriculum – describe the listing of new course(s), current course(s), credit hours per semester, and total credits to be included in the proposed program.
  - b. Faculty – include the names of full-time faculty as well as adjunct/affiliate faculty involved in the program. Also, give the names, highest degree, rank and specialty. In addition, indicate what percent of an FTE position each faculty will be assigned to the program. Are new faculty required? If so, explain the rationale including qualifications.
  - c. Student – briefly describe the students who would be matriculating into this program.
  - d. Infrastructure support – clearly document the staff support, teaching assistance, graduate students, library, equipment and instruments employed to ensure program success.
  - e. Future plans – discuss future plans for the expansion or off-campus delivery of the proposed program.
3. **Duplication** – if this program is unique to the state system of higher education, a statement to that fact is needed. However, if the program is a duplication of an existing program in the system, documentation supporting the initiation of such a program must be clearly stated along with evidence of the reason(s) for the necessary duplication..

Describe the extent to which similar programs are offered in Idaho, the Pacific Northwest and states bordering Idaho. How similar or dissimilar are these programs to the program herein proposed?

4. **Centrality** – documentation ensuring that program is consistent with the Board's policy on role and mission is required. In addition, describe how the proposed program relates to the Board's current Statewide Plan for Higher Education as well as the institution's long-range plan.
5. **Demand** – address student, regional and statewide needs.
  - a. Summarize the needs assessment that was conducted to justify the proposal. The needs assessment should address the following: statement of the problem/concern; the assessment team/the assessment plan (goals, strategies, timelines); planning data collection; implementing date collection; dissemination of assessment results; program design and on-going assessment. (See the Board's policy on outcome assessment.)
  - b. Students – explain the most likely source of students who will be expected to enroll (full-time, part-time, outreach, etc.). Document student demand by providing information you have about student interest in the proposed program from inside and outside the institution.

Differentiate between the projected enrollment of new students and those expected to shift from other program(s) within the institution.

c. Expansion or extension – if the program is an expansion or extension of an existing program, describe the nature of that expansion or extension. If the program is to be delivered off-campus, summarize the rationale and needs assessment.

6. **Resources** – fiscal impact and budget

On this form, indicate the planned FTE enrollment, estimated expenditures, and projected revenues for the first three fiscal years (FY) of the program. Include both the reallocation of existing resources and anticipated or requested new resources. Second and third year estimates should be in constant dollars. Amounts should reflect explanations of subsequent pages. If the program is a contract related, explain the fiscal sources and the year-to-year commitment from the contracting agency(ies) or party(ies).

I. PLANNED STUDENT ENROLLMENT

	FY _____		FY _____		FY _____	
	FTE	Headcount	FTE	Headcount	FTE	Headcount
A. New enrollments	_____	_____	_____	_____	_____	_____
B. Shifting enrollments	_____	_____	_____	_____	_____	_____

II. EXPENDITURES

	FY _____		FY _____		FY _____	
	FTE	Cost	FTE	Cost	FTE	Cost
A. Personnel Costs	_____	_____	_____	_____	_____	_____
1. Faculty	_____	_____	_____	_____	_____	_____
2. Administrators	_____	_____	_____	_____	_____	_____
3. Adjunct faculty	_____	_____	_____	_____	_____	_____
4. Graduate/instructional assistants	_____	_____	_____	_____	_____	_____
5. Research personnel	_____	_____	_____	_____	_____	_____
6. Support personnel	_____	_____	_____	_____	_____	_____
7. Fringe benefits	_____	_____	_____	_____	_____	_____
8. Other: _____	_____	_____	_____	_____	_____	_____
<b>Total FTE Personnel And Costs;</b>	_____	_____	_____	_____	_____	_____

	FY _____		FY _____		FY _____	
B. Operating expenditures						
1. Travel	_____		_____		_____	
2. Professional services	_____		_____		_____	
3. Other services	_____		_____		_____	
4. Communications	_____		_____		_____	
5. Utilities	_____		_____		_____	
6. Materials & supplies	_____		_____		_____	
7. Rentals	_____		_____		_____	
8. Repairs & maintenance	_____		_____		_____	
9. Materials & goods for manufacture & resale	_____		_____		_____	
10. Miscellaneous	_____		_____		_____	
<b>Total Operating Expenditures:</b>	_____		_____		_____	

	FY _____	FY _____	FY _____
C. Capital Outlay			
1. Library resources	_____	_____	_____
2. Equipment	_____	_____	_____
Total Capital Outlay:	_____	_____	_____
D. Physical facilities			
Construction or major			
Renovation	_____	_____	_____
E. Indirect costs (overhead)	_____	_____	_____
<b>GRAND TOTAL</b>			
<b>EXPENDITURES:</b>	_____	_____	_____

III. REVENUES

	FY _____	FY _____	FY _____
A. Source of funds			
1. Appropriated funds --			
Reallocation – MCO	_____	_____	_____
2. Appropriated funds --			
New – MCO	_____	_____	_____
3. Federal funds	_____	_____	_____
4. Other grants	_____	_____	_____
5. Fees	_____	_____	_____
6. Other: _____	_____	_____	_____
<b>GRAND TOTAL</b>			
<b>REVENUES:</b>	_____	_____	_____

	FY _____	FY _____	FY _____
B. Nature of Funds			
1. Recurring*	_____	_____	_____
2. Non-recurring**	_____	_____	_____
<b>GRAND TOTAL</b>			
<b>REVENUES:</b>	_____	_____	_____

- \* Recurring is defined as ongoing operating budget for the program which will become part of the base.
- \*\* Non-recurring is defined as one-time funding in a fiscal year and not part of the base.

a. Faculty and Staff Expenditures

Project for the first three years of the program, the credit hours to be generated by each faculty member (full-time and part-time), graduate assistant, and other instructional personnel. Also indicate salaries. After total student credit hours, convert to an FTE student basis. Please provide totals for each of the three years presented. Salaries and FTE students should reflect amounts shown on budget schedule.

Name, Position, And Rank	Annual Salary Rate	FTE Assignment to this Program	Program Salary Dollars	Projected Student Credit Hours	FTE Students
--------------------------------	--------------------------	---	------------------------------	---	-----------------

Project the need and cost for support personnel and any other personnel expenditures for the first three years of the program.

b. Administrative Expenditures

Describe the proposed administrative structure necessary to ensure program success and the cost of that support. Include a statement concerning the involvement of other departments, colleges, or other institutions and the estimated cost of their involvement in the proposed program

Name, Position, And Rank	Annual Salary Rate	FTE Assignment to this Program	Program Salary Dollars	Percent of Salary Dollars to Program
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c. Operating Expenditures (travel, professional services, etc.) Briefly explain the need and cost for operating expenditures.

d. Capital Outlay

(1) Library resources

- (a) Evaluate library resources, including personnel and space. Are they adequate for the operation of the present program? If not, explain the action necessary to ensure program success.
- (b) Indicate the costs for the proposed program including personnel, space, equipment, monographs, journals, and materials required for the program.
- (c) For off-campus programs, clearly indicate how the library resources are to be provided.

(2) Equipment/Instruments

Describe the need for any laboratory instruments, computer(s), or other equipment. List equipment, which is presently available and any equipment (and cost) which must be obtained to support the proposed program.

e. Revenue Sources

- (1) If funding is to come from the reallocation of existing state appropriated funds, please indicate the sources of the reallocation. What impact will the reallocation of funds in support of the program have on other programs?
- (2) If an above Maintenance of Current Operations (MCO) appropriation is required to fund the program, indicate when the institution plans to include the program in the legislative budget request.

- (3) Describe the federal grant, other grant(s), special fee arrangements, or contract(s) to fund the program. What does the institution propose to do with the program upon termination of those funds?

## **Full Proposal**

### ***Applied Physics Emphasis (APE)***

#### **1. Nature of the Request.**

The request is for establishing a new B.S. undergraduate emphasis entitled “*Applied Physics Emphasis*” (APE) in the Department of Physics at the University of Idaho. Besides this emphasis, the current Physics B.S. will continue to exist, except that it will be re-named “*General Physics Emphasis*” (GPE) to distinguish it from the newly introduced APE. Since the GPE is not a new program, the remainder of this proposal is focused on the (new) APE. The APE is designed to foster interdisciplinary undergraduate education in the sciences and engineering, with emphasis and preparation in the applied sciences. Students in APE will gain basic and well-rounded knowledge in physics, mathematics, and chemistry as well as engineering that will prepare them to be valuable members and future leaders in the high tech industry. The APE is tailored to provide a well balanced educational module that encompasses both fundamentals and practical applications of the sciences and engineering, with focus on educating students in specific application areas such as solid-state physics, materials science engineering, semiconductor devices and nano technologies, and fluid dynamics in mechanical engineering. This focus will allow the graduating students to pursue better high tech job opportunities as well as pursue further higher education, if they choose to do so, in disciplines such as Applied Solid State Physics and Material Science and Engineering.

The APE curriculum is entirely based on existing active accredited courses within the College of Engineering and the College of Science. No new resources or additional funding are needed for the APE.

#### **2. Quality**

All classes for the Applied Physics Emphasis (APE) are existing, active, and university approved. The quality of the emphasis as a whole will be monitored by the APE committee at the Department of Physics that currently consists of Dr. Leah Bergman (Committee chair), Dr. David McIlroy, and Dr. Wei Jiang Yeh. The students will be advised by the APE committee members, as well as by their respective academic advisors. The advisors will work together with the students, in an individual fashion, to explore the student’s scientific interest and in accordance to tailor the appropriate curriculum. The progress and class accomplishments of the students in the APE will be closely monitored by the committee members. Due to the flexibility of the APE curricula, a student can readily find and change to a different focus group of classes in order to match the student’s talent and ability; thus we predict strong student retention and success rates.

The conception of the APE had strong input and encouragement from Dr. Karen DenBraven (Mechanical Engineering), Dr. Wudneh Admassu (Chair of Chemical Engineering), Dr. Daniel Choi (Materials Science & Engineering), and Dr. Rick Wells (Electrical and Computer Engineering). The creation of APE was also strongly recommended by the Dean of College of Engineering Dr. Donald Blackketter, and the Dean of the College of Science Dr. Scott Wood.

#### **Curriculum**

Besides the general requirements of the university class curricula, the students enrolled in the APE will have to complete additional **81 credits** from the sciences and engineering in the following manner:

- 54 credits are from the **APE required courses\*** (Chemistry, Mathematics, and Physics).
- 21 credits are from the **APE electives\*** (Physics, Materials Science and Engineering, Electrical Engineering, and Mechanical Engineering).
- Additional 6 credits from any physics and engineering courses.

The electives will be chosen by a student in accordance to her/his interdisciplinary educational interest. The plan of study will be developed and tailored by the APE undergraduate academic advisor.

### **Detailed Curricula:**

Bachelor of Science in Physics (Applied Physics Emphasis) Curriculum:

Required course work includes the university requirements (see regulation J-3) and:

Chem 111 Principles of Chemistry I (4 cr)  
Chem 112 Principles of Chemistry II (5 cr)  
Math 170 Analytical Geometry and Calculus I (4 cr)  
Math 175 Analytical Geometry and Calculus II (4 cr)  
Math 275 Analytical Geometry and Calculus III (3 cr)  
Math 310 Ordinary Differential Equations (3 cr)  
Math 330 Linear Algebra (3 cr)  
Phys 200 Physics Seminar (1cr)  
Phys 211 Engineering Physics I (4 cr)  
Phys 212 Engineering Physics II (4 cr)  
Phys 213 Engineering Physics III (4 cr)  
Phys 305 Modern Physics (3 cr)  
Phys 321 Analytical Mechanics (3 cr)  
Phys 341 Electromagnetic Fields I (3 cr)  
Phys 351 Introductory Quantum Mechanics I (3 cr)  
Phys 411 Physical Instrumentation I (3 cr)

Physics and engineering electives (27 credits, such that at least 21 credits are from upper division and 9 credits from 400 level. At least 21 credits from the following):

Phys 433, Phys 463, Phys 443, Phys 444, Phys 431, Engr 240, Engr 210, Engr 335, Engr 350, MSE 201, MSE 313, MSE 427, ECE 350+ ECE 351, ECE 460, ECE 462, ME 301, ME 412, ME 413, ME 420.

Need 4 credits of upper division lab work in physics and engineering, and a total of 128 credits for the degree

### **Students**

The APE is designed to attract students whose aptitude and talent are in the fundamentals of physics, and in parallel have strong interest in the scientific applications to 21st century emerging technologies. The emphasis in particular will draw and appeal to students who want to acquire knowledge in a science-engineering multidisciplinary module that will enable the student to gain education of the basic principles

of physics, semiconductor technology and fundamentals, materials science, nanotechnology, and basic aspects of engineering dynamics.

### 3. Duplication

The Physics Department at ISU offers a B.S. in Health Physics, which may be perceived as a B.S. degree in an area of applied physics. However, the APE we are proposing is very different in its contents as compared to the Health Physics B.S. of ISU. Therefore, the APE is not a duplication of an existing program in the state of Idaho.

We further note that a general B.S. in Physics is offered at BSU and ISU.

The Physics Departments of the Universities located in Eastern Washington or Montana do not offer a B.S. degree with an applied physics option or emphasis.

### 4. Centrality

The creation of an Applied Physics Emphasis, with its emphasis on interdisciplinary scholarship and practical applications in science and engineering in areas such as solid-state physics and semiconductor technologies, will promote competitive advantage in the high tech industry as well as enable increased outreach and partnerships with state industry. Students will not only acquire broader and integrated exposure to science as it applies to applications and technologies in today's society, but will also be better prepared for high quality job opportunities and further scientific education. In addition it is anticipated that the cross-disciplinary applied emphasis will increase student enrollment and active participation in physics as well as the engineering disciplines. The Applied Physics Emphasis is thus highly consistent with and advances the mission of the State Board of Education as well as the strategic plan for the University of Idaho.

### 5. Demand

The *Applied Physics Emphasis* will provide a new high quality educational choice at the University of Idaho which will give the opportunity for undergraduate students to acquire education in the interdisciplinary field of science and engineering, with an emphasis on firmly educating students in specific application areas such as solid-state physics, materials science engineering, semiconductor devices and nano technologies, and fluid dynamics in mechanical engineering. There is increasing demand in the hi-tech industry arena for well qualified and cross-disciplined men and women: the APE provides a timely and highly desirable educational endeavor for addressing that demand. In the state of Idaho, the graduates may find career-making jobs at **Micron**, at **Idaho National Lab**, and in addition may contribute to **small business** in the science/engineering industries. Thus the APE answers the strong need for an applied cross-disciplinary science curriculum that better prepares students for high tech job opportunities, and moreover will enable increased outreach and partnerships with local industry.

By creating the APE which has a significant science component yet is practical in nature, as it provides cutting-edge classes from the engineering disciplines, the prediction and expectations are that it will draw numerous qualified students, and so will increase student enrollment in classes in the Department of

Physics as well as other science and engineering departments. The expected increase in students and the cross-disciplinary nature of the new emphasis will strengthen the stature of the Department of Physics and that of the University of Idaho in the education and research community.

The most likely source of students who will be expected to enroll will be entering students from the high-schools in the state of Idaho. However, due to the uniqueness in the Northwest region of this educational emphasis in physics, entering students from nearby states are also a strong source of potential candidates.

Cost effective outreach efforts will be initiated to advertise the APE that include:

- ❖ Visits to local and Boise area high schools to present the emphasis to the students, guidance counselors, and science teachers.
- ❖ Advertising via the websites of the Department of Physics and the College of Science.
- ❖ Posting documentation about the APE in high schools and community youth centers.
- ❖ Collaboration with the **Envision Idaho** event. Students from the local high schools will be invited to our department to get first-hand information about the APE, as well as to visit our laboratories.

## 6. Resources

Since the APE curriculum is based on existing courses within the College of Science and College of Engineering, no new recourses or additional funding are required. Instead students in the APE will be filling currently unused capacities in existing courses.

### I. PLANNED STUDENT ENROLLMENT IN THE APE

	FY <u>11</u>		FY <u>12</u>		FY <u>13</u>	
	FTE	Headcount	FTE	Headcount	FTE	Headcount
A. New enrollments	<u>          </u>	<u>      4      </u>	<u>          </u>	<u>      5      </u>	<u>          </u>	<u>      6      </u>
B. Shifting enrollments	<u>          </u>	<u>      3      </u>	<u>          </u>	<u>      2      </u>	<u>          </u>	<u>      1      </u>

### II. EXPENDITURES FOR THE APE

	FY <u>11</u>	FY <u>12</u>	FY <u>13</u>
	<u>          </u>	<u>          </u>	<u>          </u>
<b>GRAND TOTAL EXPENDITURES:</b>	<u>      \$0.00      </u>	<u>      \$0.00      </u>	<u>      \$0.00      </u>

## **PHYSICS (B.S.)**

Required course work includes the university requirements (see regulation J-3) and:

[Chem 111 Principles of Chemistry I \(4 cr\)](#)  
[Chem 112 Principles of Chemistry II \(5 cr\)](#)  
[Math 170 Analytic Geometry and Calculus I \(4 cr\)](#)  
[Math 175 Analytic Geometry and Calculus II \(4 cr\)](#)  
[Math 275 Analytic Geometry and Calculus III \(3 cr\)](#)  
[Phys 200 Physics Seminar \(1 cr\)](#)  
[Phys 211 Engineering Physics I \(4 cr\)](#)  
[Phys 212 Engineering Physics II \(4 cr\)](#)  
[Phys 213 Engineering Physics III \(4 cr\)](#)  
[Phys 305 Modern Physics \(3 cr\)](#)  
[Phys 321 Analytical Mechanics \(3 cr\)](#)  
[Phys 341 Electromagnetic Fields I \(3 cr\)](#)  
[Phys 351 Introductory Quantum Mechanics I \(3 cr\)](#)

And one of the following emphases:

### **A. General Physics Emphasis**

[Phys 342 Electromagnetic Fields II \(3 cr\)](#)  
[Phys 371 Mathematical Physics \(3 cr\)](#)  
[Phys 433 Thermal and Statistical Physics \(3 cr\)](#)  
[Upper-division mathematics electives \(6 cr\)](#)  
[Upper-division physics courses, including at least 4 cr of lab and 9 cr from the following: Phys 411, Phys 412, Phys 425, Phys 428, Phys 443, Phys 444, Phys 463, Phys 465, Phys 485 \(at least 15 cr\).](#)  
[3 credits in the humanities in addition to the minimum university-wide core requirements.\\*](#)  
[3 credits in the social sciences in addition to the minimum university-wide core requirements.\\*](#)  
[Electives to total 128 credits for this degree](#)

[\\*Courses satisfying additional Humanities and Social Sciences may be found in Part 3 Regulation J-d of the General Catalog. See your academic advisor for a listing of appropriate courses.](#)

### **B. Applied Physics Emphasis**

[Math 310 Ordinary Differential Equations \(3 cr\)](#)  
[Math 330 Linear Algebra \(3 cr\)](#)  
[Phys 411 Physical Instrumentation I \(3 cr\)](#)  
[Four credits of upper-division lab work in physics and engineering](#)  
[Physics and engineering electives \(27 credit, of which at least 21 credits must be upper-division and at least 9 credits must be 400-level and 21 credits must come from the following: ECE 350 + ECE 351, ECE 460, ECE 462, Engr 210, Engr 240, Engr 335, Engr 350, ME 301, ME 412, ME 413, ME 420, MSE 201, MSE 313, MSE 427, Phys 428, Phys 433, Phys 463, Phys 443, Phys 444.\)](#)  
[Electives to total 128 credits for this degree](#)