

November 6, 2013

MEMORANDUM

TO: State Board of Regents
FROM: David L. Buhler
SUBJECT: Utah Valley University – Bachelor of Science in Physics Education

Issue

Utah Valley University (UVU) requests approval to offer a Bachelor of Science (BS) in Physics Education, effective Spring Semester 2014. The Institutional Board of Trustees approved the degree on March 28, 2013. The Program Review Committee reviewed the proposal on October 9, 2013, and approved it to be placed on the Regents' agenda.

Background

UVU has offered a BS in Chemistry/Physics Education since 2002. Earlier in 2013, the Chemistry/Physics Education degree was restructured and approved by the Board of Regents on the General Consent Calendar as a BS in Chemistry Education. Now, a new BS in Physics Education is presented for approval to complete the original plan of splitting the previous Chemistry/Physics Education degree into separate and more robust Chemistry Education and Physics Education degrees.

According to many sources, the demand for highly-qualified secondary science teachers is high. In fact, the Utah State Office of Education (USOE) shows Physics tied for sixth out of 74 teaching fields/levels in its Teaching Field Index of Criticality for 2012. UVU's proposed BS in Physics Education responds with a 120-credit-hour program that includes study across several areas of physics, as well as general chemistry and calculus. The curriculum meets USOE requirements for an endorsement in Physics, and the new BS in Physics Education qualifies graduates to teach Advanced Placement Physics (which the previous Chemistry/Physics Education degree did not). The necessary courses, library and information resources, and personnel are already in place at Utah Valley University to offer the proposed degree. Furthermore, funding that previously supported the combined Chemistry/Physics Education degree is sufficient to support the separate Chemistry Education and Physics Education degrees. Students at UVU have indicated some preference to pursue more in-depth study of chemistry or physics, rather than a combination of the two disciplines. Accordingly, an upswing in student interest and number of majors is anticipated. Students will be admitted into the BS in Physics Education program upon acceptance into the Secondary Education program at UVU.

Policy Issues

The proposed degree has been developed and reviewed in accordance with processes established by Utah Valley University and the Board of Regents. The USHE Chief Academic Officers are supportive of UVU's request to offer a BS in Physics Education.

Commissioner's Recommendation

The Commissioner recommends the Regents approve the request by Utah Valley University to offer a Bachelor of Science in Physics Education, effective Spring Semester 2014.

David L. Buhler
Commissioner of Higher Education

DLB/GVB
Attachment

**Program Description
Utah Valley University
BS in Physics Education**

Section I: The Request

Utah Valley University requests approval to offer a Bachelor of Science in Physics Education, effective Spring Semester 2014. The institutional Board of Trustees approved the degree on March 28, 2013.

Section II: Program Description

Complete Program Description

Courses required in the Bachelor of Science in Physics Education program will provide students with a solid foundation in physics and related sciences in preparation for career entry into secondary education. The curriculum includes formal studies in the physical science topics of general physics, modern physics, experimental physics, astrophysics, classical mechanics, and thermodynamics, and education topics in educational psychology, development of the adolescent student, foundations of American education, instructional media, classroom management, content area reading and writing, multicultural instruction, ESL, and exceptional students. Required and recommended courses in mathematics, biology, and chemistry complement the Physics Education components. Students will have experiential opportunities, including secondary education curriculum instruction and assessment and student teaching. Students will be admitted directly to the baccalaureate degree program in Physics Education upon acceptance to the Secondary Education program.

Purpose of Degree

The program will provide a curriculum that emphasizes physics education within the larger context of physical sciences. The program is designed to prepare students for career opportunities in teaching physics in junior high or high school directly following program completion.

Upon receiving certification from the Utah State Office of Education, graduates from the program will be competitive for employment requiring physics education expertise and for admission to post-baccalaureate degree programs. Assessment of student success will be monitored by the Physics department and the University through analysis of nationally-normed tests in physics (e.g., GRE) and post-graduation employment and/or graduate school admissions success. The University monitors this through outcomes assessment reports.

Institutional Readiness

The current administrative structures of the Department of Physics, College of Science and Health, and School of Education are adequate and capable of supporting the proposed program. No new organizational structures are needed to deliver the program (i.e., required and elective courses are now being offered by current faculty, and students in the program will be advised by current Physics academic advisors). The delivery of undergraduate or lower-division education will be positively impacted through increased availability of courses concomitant with visibility of the program. By offering a physics education degree, student retention may well be enhanced (e.g., students contemplating transfer to another institution offering a physics education degree have indicated they would stay at UVU if a degree in physics education were offered).

Faculty

No additional faculty members will be needed to support the proposed program.

| Faculty Category | Faculty Headcount – Prior to Program Implementation | Faculty Additions to Support Program | Faculty Headcount at Full Program Implementation |
|---|---|--------------------------------------|--|
| With Doctoral Degrees (Including MFA and other terminal degrees, as specified by the institution) | | | |
| Full-time Tenured | 5 | 0 | 5 |
| Full-time Non-Tenured | 3 | 0 | 3 |
| Part-time Tenured | 0 | 0 | 0 |
| Part-time Non-Tenured | 1 | 0 | 1 |
| With Master's Degrees | | | |
| Full-time Tenured | 2 | 0 | 2 |
| Full-time Non-Tenured | 1 | 0 | 1 |
| Part-time Tenured | 0 | 0 | 0 |
| Part-time Non-Tenured | 7 | 0 | 7 |
| With Bachelor's Degrees | | | |
| Full-time Tenured | 0 | 0 | 0 |
| Full-time Non-Tenured | 0 | 0 | 0 |
| Part-time Tenured | 0 | 0 | 0 |
| Part-time Non-Tenured | 1 | 0 | 1 |
| Other | | | |
| Full-time Tenured | 0 | 0 | 0 |
| Full-time Non-Tenured | 0 | 0 | 0 |
| Part-time Tenured | 0 | 0 | 0 |
| Part-time Non-Tenured | 11 | 0 | 11 |
| Total Headcount Faculty | | | |
| Full-time Tenured | 7 | 0 | 7 |
| Full-time Non-Tenured | 4 | 0 | 4 |
| Part-time Tenured | 0 | 0 | 0 |
| Part-time Non-Tenured | 20 | 0 | 20 |
| Total Department Faculty FTE (As reported in the most recent A-1/S-11 Institutional Cost Study for "prior to program implementation" and using the A-1/S-11 Cost Study Definition for the projected "at full program implementation.") | 16.5 | 0 | 16.5 |

Staff

No additional staff will be needed to support the proposed program.

Library and Information Resources

All physical collections are located in the UVU library building in the QC call number range. Reference collection books are located on the 1st floor, videos on the 2nd floor, periodicals (both current and bound volumes) on the 3rd floor, and regular collection books on the 4th floor. In addition, UVU is a member of the USHE Library Consortium, providing students with access to all Utah State System and BYU libraries.

Books

The regular book collection consists of 1077 titles. Physics education and science education books provide an additional 81 volumes. The reference collection consists of 49 reference books/sets. The online catalog also provides direct access to 23 electronic physics books.

Periodicals

UVU Library currently hosts 237 physics journal titles, with 352 general science titles and 63 science education titles. This collection consists of a mix of print and electronic journals.

Important journal titles include: *Physics Teacher*, *American Journal of Physics*.

Major physics library databases include: IOP Publishing, JSTOR, and Applied Science and Technology, in addition to Academic Search Premier and Science Direct.

Videos

The DVD and VHS physics collection consists of 112 titles.

Admission Requirements

Students will be admitted to the baccalaureate degree program in Physics Education upon acceptance to the Secondary Education program. Admission to the teacher education licensure program is a separate process from, and in addition to, admission to Utah Valley University. Meeting the minimum requirements qualifies the student to be considered for admission. Matriculation requirements are as follows: (1) Students must obtain the departmental advisor's signature on an approved program plan prior to enrollment in their second semester of study; (2) ACT exam (7 years or less) composite score of 20 or higher with no individual score lower than 19; (3) GPA of 2.75 or higher; (4) Completion of all General Education requirements and required pre-professional education courses; (5) An interview directed by the Teacher Education Selection and Retention Committee; and (6) Pass criminal background check.

Student Advisement

Prospective students will be advised of program matriculation and graduation requirements by the Physics department advisor(s). Progress in meeting the degree requirements and suggestions for elective courses related to a student's career goals will be accomplished by annual review with the department advisor(s). Additionally, Physics and Secondary Education faculty will be available to discuss program and career goals with the students.

Justification for Graduation Standards and Number of Credits

Graduation standards are: (1) Completion of a minimum of 120 semester credits with a minimum of 40 upper-division credits; (2) Overall grade point average of 2.0 (C) or above with a minimum of 2.25 in Major; (3) Residency hours – minimum of 30 credit hours through course attendance at UVU, with at least 10 hours earned in the last 45 hours; (4) Completion of GE and specified departmental requirements; (5) A minimum of 52 credit hours must be in the major with a minimum of 20 credits taken at UVU. A minimum of 24 chemistry and physics credits must be upper-division; (6) Complete all chemistry and physics courses with a minimum grade of "C-" or better; and (7) Successful completion of at least one Global/Intercultural course.

External Review and Accreditation

No external consultants were involved in the development of the proposed program. No program-specific accreditation is required by any regional or national agency. Review of the program will be performed commensurate with the institutional accreditation cycle.

Projected Program Enrollment and Graduates; Projected Departmental Faculty/Students:

The following projected number of majors in the program is based on a survey of UVU physics majors over the past three years.

| Data Category | Current – Prior to New Program Implementation | Projected Year 1 | Projected Year 2 | Projected Year 3 | Projected Year 4 | Projected Year 5 |
|--|---|------------------|------------------|------------------|------------------|------------------|
| Data for Proposed Program | | | | | | |
| Number of Graduates in Proposed Program | 2 | 2 | 3 | 4 | 4 | 5 |
| Total # of Declared Majors in Proposed Program | 10 | 12 | 14 | 16 | 18 | 20 |
| Departmental Data – For All Programs Within the Department | | | | | | |
| Total Department Faculty FTE (as reported in Faculty table above) | 16.5 | 16.5 | 16.5 | 16.5 | 16.5 | 16.5 |
| Total Department Student FTE (Based on Fall Third Week) | 573 | 573 | 573 | 573 | 573 | 573 |
| Student FTE per Faculty FTE (ratio of Total Department Faculty FTE and Total Department Student FTE above) | 34.7 | 34.7 | 34.7 | 34.7 | 34.7 | 34.7 |
| Program accreditation-required ratio of Student FTE/Faculty FTE, if applicable. | NA | NA | NA | NA | NA | NA |

Expansion of Existing Program

Not applicable.

Section III: Need

Program Need

Even though UVU had a BS degree in Chemistry/Physics Education (composite), graduates from this program were not allowed to teach AP physics or chemistry. By dividing the degree into two separate degrees of Chemistry Education and Physics Education, the graduates will be qualified to teach these AP courses. In addition, although some students have enjoyed being trained in depth in both physics and

chemistry, several have had a marked preference for one discipline over the other. These latter students have indicated that they would have liked depth only in physics or chemistry, but not in both.

Labor Market Demand

The market demand for secondary science teachers in Utah and the rest of the United States is high. UVU Chemistry/Physics Education majors have all received job offers while completing their student teaching or internships at state high schools. According to the U.S. Bureau of Labor Statistics: (1) Employment for high school teachers is expected to grow 7% from 2010 to 2020; (2) Similarly, employment for middle school teachers is expected to grow 17% for the same time period; (3) Enrollment for the above groups is expected to be greater in the South and West; (4) Many schools report having difficulty filling teaching positions for certain subjects, including math and science (especially chemistry and physics); and (5) A significant number of teacher retirements is expected for 2010 to 2020.¹

The “Teaching Field Index of Criticality for Utah’s T. H. Bell Teaching Incentive Loan Program” dated November 2010 shows physics with an index of 3.7 on the high end of the range for “moderate shortage” (range 3.0 to 3.9). The overall criticality scale runs from 1.0 to 4.9. The need for physics teachers was the highest on the criticality scale for all teachers in the sciences.

Data from the Utah State Office of Education indicates there are three programs to approve an educator to teach physics or chemistry: State-Approved Endorsement Plans, Alternative Routes to Licensure, and Letters of Authorization. In the field of physics this past year, there were only 20 educators who were in teaching positions by virtue of one of those three plans. Yet, for physics there are 237 teachers currently assigned to teach course(s) that require a physics endorsement. Therefore, there were 217 instructors without an official endorsement or certification. This clearly indicates a substantial unfulfilled need for physics education.

Moreover, the “2007 Report on Teacher Education Supply and Demand Need of K-12 Education in the State of Utah” by David J. Sperry, Utah State Board of Regents, indicates two conclusions: “First, teacher shortages [especially science teachers] in Utah remain critical, and second Utah’s colleges and universities need to be given the resources to recruit more students in education, as well as the resources to train them.” The report further indicates that the degree of difficulty for hiring science and math teachers is extremely high. On the first day of school in fall 2007, public schools in the state had 14 vacancies in the area of math and science, which was more than double the number of vacancies in any of the other areas of study.

Student Demand

According to the list of declared majors, the number of students in the BS in Chemistry/Physics Education program rose to 13 students for 2012-2013. These students were surveyed with regard to preferences in programs. Of the four students who responded, two students preferred the Chemistry/Physics Education program they have started and nearly finished. One student indicated she would have preferred a degree in physics education only. Another student said she would have preferred a degree in chemistry education only. Biology and earth science education students were also surveyed to find if any of them would have

¹ U.S. Bureau of Labor Statistics: <http://www.bls.gov/ooh/education-training-and-library/high-school-teachers.htm#tab-6>;
<http://www.bls.gov/ooh/education-training-and-library/middle-school-teachers.htm#tab-6>

chosen physics education if they would have had the opportunity. Twelve students responded. Three said they would have preferred chemistry education, and four indicated physics education would have been their first choice. Another student said he would have chosen either physics education or chemistry education and not his current program. The additional four respondents said they would remain in their current programs in biology or earth science education. Although some students have enjoyed being trained in-depth in both physics and chemistry with the current degree, over the last eight years several now-graduated students have indicated a marked preference for one discipline over the other. These latter students said that they would have preferred depth in either physics or chemistry, but not both. Additionally, it is expected the BS degree in Physics Education will facilitate with the recruitment of science education students into the Physics Education program more readily. The new Physics Education degree will also allow graduates to teach physics AP classes, which the current combined degree does not. The number of majors should increase as a result.

Similar Programs

Similar BS in Physics Education programs are currently offered at the University of Utah and Utah State University.

Collaboration with and Impact on Other USHE Institutions

Part of the agenda for the September 2012 USHE articulation meeting for physics was devoted to physics education programs. The unanimous consensus among all USHE physics participants was that physics education programs are critical, and many more physics secondary instructors are needed. In discussions over the phone with the chairs of the physics departments at Utah State University, the University of Utah, and Weber State University, all were in agreement that more physics teachers are needed in the state and nation, and a UVU physics education program would be welcomed and would help solve the shortage. No negative impact on existing programs at the other universities was anticipated. Most (70-80%) UVU students are from Utah County or the surrounding areas and prefer to remain in Utah after graduation.

Benefits

Student recruitment is very important, and offering this program will enhance new student recruitment by emphasizing the availability of physics education at UVU. Both UVU students and prospective students who are interested in science education will be able to choose physics education as a major. Student retention will likely be improved by meeting both student interests and making market need for public and private employers more visible.

Consistency with Institutional Mission

The proposed BS in Physics Education program will meet several goals and objectives of the Utah System of Higher Education Mission, as well as the mission of Utah Valley University. It will provide high quality academic and professional education that prepares students to become productive players in the global marketplace, as well as to encourage students to become lifelong learners. This program will provide opportunities for students to be engaged in real-world, hands-on experience in the community and region by engaging community partners. Students will use the most current technology and methodology to make them competitive with peers.

Section IV: Program and Student Assessment

Program Assessment

The overall goal of this degree program is to produce well-trained secondary education physics teachers. Assessment of student success will be monitored by the Physics department, University assessment specialists, analysis of nationally normed tests in physics (e.g., GRE), and post-graduation employment and/or graduate school admissions. These outcome assessments will be used to modify and strengthen the program. These assessment methods have been employed successfully for the last ten years for the Chemistry/Physics Education degree.

Expected Standards of Performance

The performance standards currently used in the BS in Physics program shall apply to students in the BS in Physics Education program. For graduation, a minimum of a C- must be earned in all program core courses, and thus graduates will have demonstrated course competencies in the major areas of physics and physics education (general physics, modern physics, experimental physics, astrophysics, classical mechanics, thermodynamics, educational psychology, development of the adolescent student, foundations of American education, instructional media, classroom management, content area reading and writing, multicultural instruction ESL, and exceptional students), as well as in ancillary subjects (e.g., chemistry, biology, mathematics). Students will demonstrate the ability to analyze and critically evaluate scientific literature, design a scientific study and assess quality of data to formulate conclusions, and present well-reasoned arguments, both in writing and orally, through activities in different courses, including the required seminar (PHYS 490R).

Formative

UVU will use the Degree Works program to track individual students throughout their college education. The Physics advisor(s) will consult with each student in the program to assess their progress toward graduation and to assist faculty to assess the success of the curriculum. Grades in prerequisite courses will be analyzed as predictors of performance in subsequent courses.

Summative

Seniors in all Physics department degree programs have and will continue to take a nationally-normed assessment examination in physics. Currently, the Graduate Record Examination Physics Test is being used. Results from this examination have been used to improve the Physics BS curriculum and will be used as part of the outcomes assessment for the Physics Education degree. Follow-up questionnaires will be utilized to assess graduates' perceptions about how well the program prepared them for employment or graduate studies.

Section V: Finance

Budget

As the proposed Physics Education program does not require any additional courses or sections, no additional resources are anticipated. Student enrollments, faculty FTE, and budget are already part of UVU's Physics and Education departments. All required faculty and funds are currently in place.

| 5-Year Budget Projection | | | | | | |
|--|---|--------------------|--------------------|--------------------|--------------------|--------------------|
| Departmental Data | Current Budget— Prior to New Program Implementation | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 |
| Personnel Expense | | | | | | |
| Salaries and Wages | 1,035,251 | 1,035,251 | 1,035,251 | 1,035,251 | 1,035,251 | 1,035,251 |
| Benefits | 392,284 | 392,284 | 392,284 | 392,284 | 392,284 | 392,284 |
| Total Personnel Expense | 1,427,535 | 1,427,535 | 1,427,535 | 1,427,535 | 1,427,535 | 1,427,535 |
| Non-personnel Expense | | | | | | |
| Travel | 5,753 | 5,753 | 5,753 | 5,753 | 5,753 | 5,753 |
| Capital | 7,591 | 7,591 | 7,591 | 7,591 | 7,591 | 7,591 |
| Library | | | | | | |
| Current Expense | 22,337 | 22,337 | 22,337 | 22,337 | 22,337 | 22,337 |
| Total Non-personnel Expense | 35,681 | 35,681 | 35,681 | 35,681 | 35,681 | 35,681 |
| Total Expense (Personnel + Current) | \$ 1,463,215 | \$1,463,215 | \$1,463,215 | \$1,463,215 | \$1,463,215 | \$1,463,215 |
| Departmental Funding | | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 |
| Appropriated Fund | 1,463,215 | 1,463,215 | 1,463,215 | 1,463,215 | 1,463,215 | 1,463,215 |
| Other: | | | | | | |
| Special Legislative Appropriation | | | | | | |
| Grants and Contracts | | | | | | |
| Special Fees/Differential Tuition | | | | | | |
| Total Revenue | \$ 1,463,215 | \$1,463,215 | \$1,463,215 | \$1,463,215 | \$1,463,215 | \$1,463,215 |
| Difference | | | | | | |
| Revenue - Expense | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 |

| | | | | | | |
|---|------|------|------|------|------|------|
| Departmental Instructional Cost/Student Credit Hour* <i>(as reported in institutional Cost Study for "current" and using the same Cost Study Definition for "projected")</i> | \$80 | \$80 | \$80 | \$80 | \$80 | \$80 |
|---|------|------|------|------|------|------|

Funding Sources

All courses in the program, both core requirements and recommended electives, are being offered by current UVU faculty. No new state appropriations, tuitions, or reallocation of funds are needed. As enrollments increase in courses, concomitant with UVU growth, it is anticipated that enrollment growth funding will be adequate to support program growth.

Reallocation

Not applicable.

Impact on Existing Budgets

Whereas all courses in the program, both core requirements and recommended electives, are being currently offered by current UVU faculty, there will be no negative impact on existing budgets.

Section VI: Program Curriculum

| Course Prefix and Number | Title | Credit Hours |
|---|---|--------------|
| ENGL 1010 | Introduction to Writing | 3 |
| ENGL 2020 | Intermediate Writing - Science and Technology | 3 |
| MATH 1210 | Calculus I | 5 |
| American Institutions: Complete one of the following: | | 3 |
| HIST 2700 | US History to 1877 | |
| and HIST 2710 | US History since 1877 | |
| HIST 1700 | American Civilization | |
| HIST 1740 | US Economic History | |
| POLS 1000 | American Heritage | |
| POLS 1100 | American National Government | |
| Complete the following: | | |
| PHIL 2050 | Ethics and Values | 3 |
| HLTH 1100 | Personal Health and Wellness | 2 |
| or PES 1097 | Fitness for Life | |
| Distribution Courses (see course lists in catalog) | | |
| | Biology | 3 |
| CHEM 1210 | Principles of Chemistry I | 4 |

| Course Prefix and Number | Title | Credit Hours |
|--|---|--------------|
| CHEM 1215 | Principles of Chemistry I Laboratory | 1 |
| CHEM 1220 | Principles of Chemistry II | 4 |
| CHEM 1225 | Principles of Chemistry II Laboratory | 1 |
| | Humanities | 3 |
| | Fine Arts | 3 |
| | Social/Behavioral Science | 3 |
| Discipline Core Requirements: | | |
| HIST 4320 | History of Scientific Thought | 3 |
| MATH 1220 | Calculus II | 5 |
| MATH 2210 | Calculus III | 3 |
| PHYS 2210 | Physics for Scientists and Engineers I | 4 |
| PHYS 2215 | Physics for Scientists and Engineers I Lab | 1 |
| PHYS 2220 | Physics for Scientists and Engineers II | 4 |
| PHYS 2225 | Physics for Scientists and Engineers II Lab | 1 |
| PHYS 3010 | Physics Experiments for Secondary Education | 1 |
| PHYS 3740 | Modern Physics | 3 |
| PHYS 4200 | Teaching Methods in Science | 3 |
| EDSC 3000 | Educational Psychology | 3 |
| EDSC 3050 | Foundations of American Education | 2 |
| EDSC 3250 | Instructional Media | 2 |
| EDSC 4200 | Classroom Management I | 2 |
| EDSC 4250 | Classroom Management II | 2 |
| EDSC 4440 | Content Area Reading and Writing | 3 |
| EDSC 445G | Multicultural Instruction ESL | 3 |
| EDSC 4550 | Secondary Curriculum Instruction and Assessment | 3 |
| EDSC 4850 | Student Teaching-Secondary | 10 |
| EDSP 3400 | Exceptional Students | 2 |
| Complete the following set: | | 11 |
| PHYSICS: | | |
| PHYS 3210 | Introduction to Experimental Physics I (2.0) | |
| PHYS 490R | Seminar (0.5) | |
| Complete 9 credits from the following: | | |
| ASTR 3050 | Astrophysics I (3.0) | |
| ASTR 3060 | Astrophysics II (3.0) | |
| MATH 2270 | Linear Algebra (3.0) | |
| PHYS 3220 | Introduction to Experimental Physics II (2.0) | |

| Course Prefix and Number | Title | Credit Hours |
|--|---|--------------|
| PHYS 3230 | Principles of Electronics for the Physical Sciences (3.0) | |
| PHYS 3300 | Mathematical Physics (3.0) | |
| PHYS 3400 | Classical Mechanics (3.0) | |
| PHYS 3500 | Thermodynamics (3.0) | |
| PHYS 3800 | Energy Use on Earth (3.0) | |
| PHYS 4700 | Acoustics (3.0) | |
| | Sub-Total | 112 |
| Elective Requirements: Complete 8 additional credits of upper-division electives (preferably in physics or related sciences or math) | | 8 |
| Track/Options (if applicable) | | |
| | Sub-Total | |
| Total Number of Credits | | 120 |

New Courses to Be Added in the Next Five Years

No new courses are required for the proposed degree program.

Program Schedule

YEAR 1

| Semester 1 | | Semester 2 | |
|--|-----------------|---|-----------------|
| MATH 1210 Calculus I | 5 | MATH 1220 Calculus II | 5 |
| ENGL 1010 Introduction to Writing | 3 | ENGL 2020 Intermediate Writing Science and Technology | 3 |
| HLTH 1100 Personal Health and Wellness | 2 | CHEM 1210 Principles of Chemistry I | 4 |
| Fine Arts Distribution | 3 | CHEM 1215 Principles of Chemistry I Lab | 1 |
| Biology Distribution | 3 | American Institutions Course | 3 |
| | TOTAL 16 | | TOTAL 16 |

YEAR 2

| Semester 3 | | Semester 4 | |
|--|-----------------|---|-----------------|
| CHEM 1220 Principles of Chemistry II | 4 | EDSP 3400 Exceptional Students | 2 |
| CHEM 1225 Principles of Chemistry II Lab | 1 | PHYS 2220 Physics for Scientists and Engineers II | 4 |
| MATH 2210 Calculus III | 3 | PHYS 2225 Physics for Scientists and Engineers II Lab | 1 |
| PHYS 2210 Physics for Scientists and Engineers I | 4 | Social /Behavioral Science Distribution | 3 |
| PHYS 2215 Physics for Scientists and Engineers I Lab | 1 | Humanities Distribution | 3 |
| | TOTAL 13 | | TOTAL 13 |
| Summer | | | |
| PHIL 2050 Ethics and Values | 3 | | |

| YEAR 3 | | | |
|--|-----|---|-----|
| Semester 5 | | Semester 6 | |
| EDSC 3000 Educational Psychology | 3 | EDSC 3050 Foundations of American Education | 2 |
| EDSC 445G Multicultural Instruction ESL | 3 | EDSC 3250 Instructional Media | 2 |
| PHYS 3210 Introduction to Experimental Physics I | 2 | EDSC 4550 Secondary Curriculum Instruction and Assessment | 3 |
| PHYS 3740 Modern Physics | 3 | HIST 4320 History of Scientific Thought | 3 |
| Elective | 2 | PHYS 3010 Physics Experiments for Secondary Education | 1 |
| One Course from Physics Set | 3 | PHYS 490R Seminar | 0.5 |
| | | One Course from Physics Set | 3 |
| TOTAL 16 | | TOTAL 14.5 | |
| YEAR 4 | | | |
| Semester 7 | | Semester 8 | |
| EDSC 4200 Classroom Management I | 2 | EDSC 4250 Classroom Management II | 2 |
| EDSC 4440 Content Area Reading and Writing | 3 | EDSC 4850 Student Teaching-Secondary | 10 |
| PHYS 4200 Teaching Methods in Science | 3 | Elective | 3 |
| PHYS 490R Seminar | 0.5 | | |
| One Course from Physics Set | 3 | | |
| Elective | 3 | | |
| TOTAL 14.5 | | TOTAL 15 | |

Total Program Credits: 120

Notes: (1) MATH 2280: prerequisite for this course is waived for students enrolled in this degree program; and (2) Select electives to meet the minimum departmental, upper-division credit, and residency requirements

Section VII: Faculty

Current full-time Physics faculty:

- Bonnie Andersen – Ph.D. - Acoustics
- Brent Bargerion – Ph.D. – Solid State Physics
- Alvin Benson – Ph.D. – Quantum Mechanics and Geophysics
- Malcolm Crawford – M.S. – Electricity and Magnetism
- Timothy Doyle – Ph.D. – Medical Physics
- Christian Draper—M.S. – Astronomy and General Physics
- Karl Haisch Jr. – Ph.D. – Astrophysics
- Joseph Jensen – Ph.D. – Astrophysics
- Phil Matheson – Ph.D. – Plasma Physics
- Paul Mills – M.S. – Optics and Holography
- Steve Wasserbaech – Ph.D. – Particle Physics

The Secondary Education department supports the Physics Education degree program.