

by

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Abstract: The physics department of the University of Northern Colorado (UNC) typically graduates two to four secondary physics teachers each year. Since 2005 the UNC physics department has graduated 16 physics majors who have become teachers, and at present we have eight additional undergraduates who are planning on secondary teaching as a career. These are rather high numbers for any size university. Most universities have difficulties attracting physics majors into secondary teaching, which has led to the national shortage of qualified physics teachers. The exceptional productivity of our bachelor's-only program has been recognized by the American Institute of Physics. We examine possible causes for our success from the perspectives of both our faculty and our graduates.

Background

The University of Northern Colorado was founded in 1889 as the State Normal School for training teachers. Until the early 1960's the only science degrees were Life Sciences or Physical Sciences. UNC has offered a physics major since 1962. Ever since that time UNC has been graduating physics majors who have gone into teaching. In recent years the physics department has graduated from 10-15 students each year with a variety of emphases (astronomy, engineering, liberal arts, mathematical, teaching.) Two to Four of the graduates are in the teaching emphasis and also receive their teaching certification.

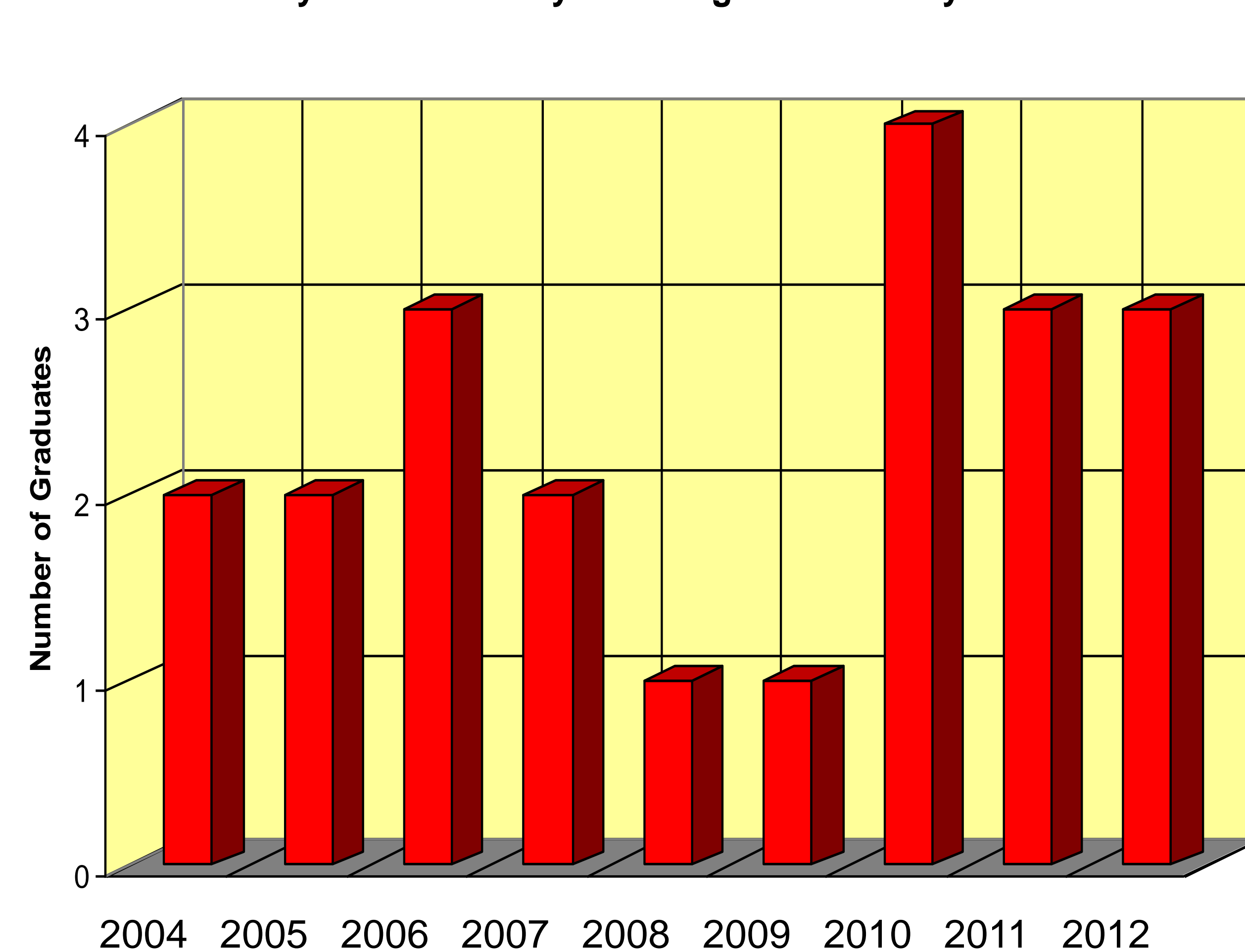
Characteristics of Department

1. Undergraduate only
2. Small number of Faculty (7+). All faculty are supportive of students in general and also of teaching as a career.
3. Significant female representation on faculty (3 of 7)
4. Support of Undergraduate Research
5. Support of K-12 Outreach
 - Long's Peak Science Fair
 - Co/Wyo Junior Academy of Science

Characteristics of Graduates (with teaching credentials)

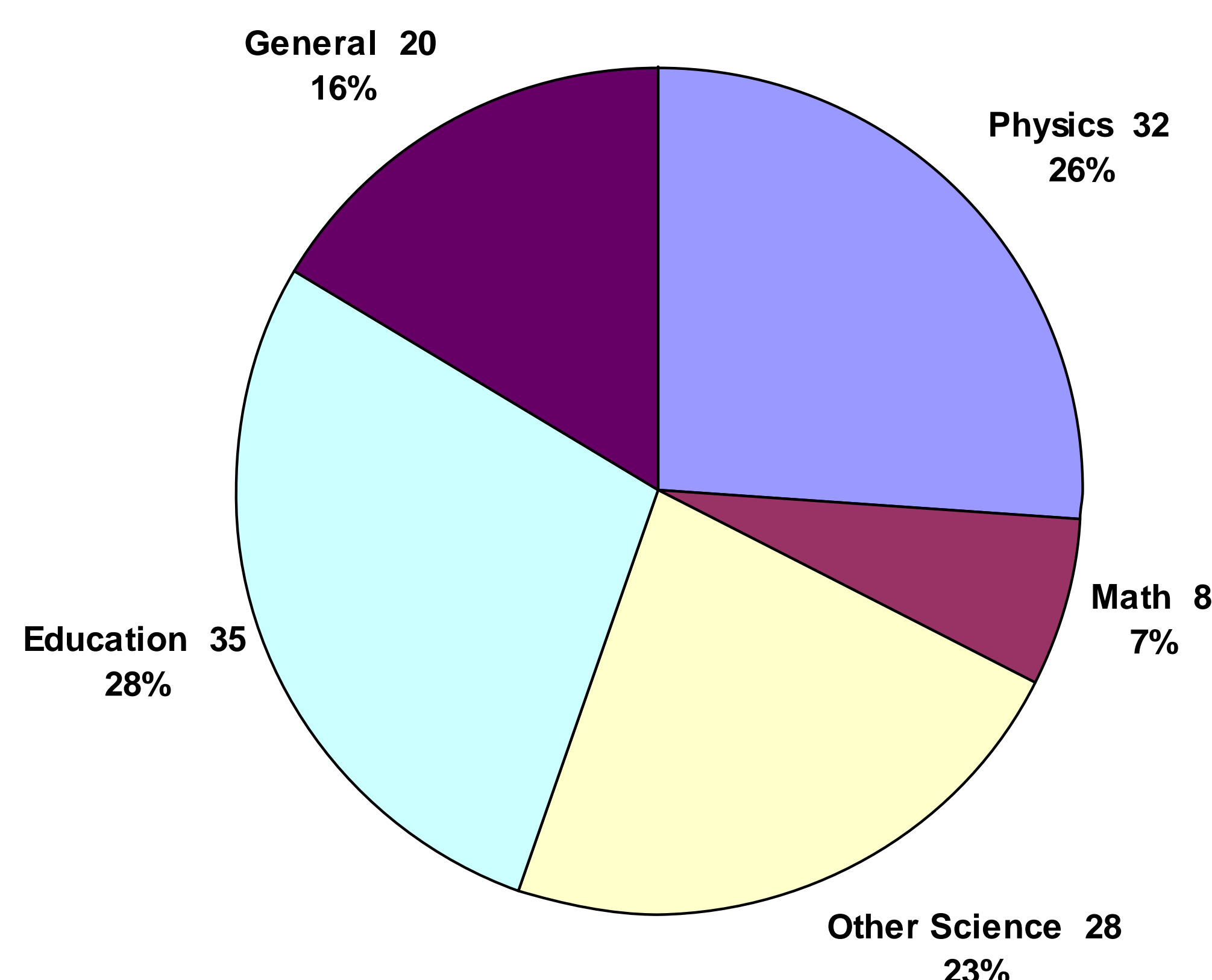
1. Good to Excellent students usually in the top third of their physics classes
2. Most interested in teaching long before coming to University. Many report that they came to UNC because of its reputation for training teachers.
3. The decision to major in physics usually comes as a result of an interest in science and math. It is also made after the decision to become a teacher.
4. Many first generation college students
5. Because of the intense demands on their time, most take more than four years to graduate or attend summer school.
6. Some students report that they would like to have taken more physics courses so they would be better prepared if they go on to more advanced degrees. Nearly all students report that their science background was strong when they started teaching.
7. Many interested in smaller high schools

Physics Secondary Teaching Graduates by Year



There is a great deal of variation from year to year because of the statistics of small numbers. However, it does imply that we graduate approximately 1% of the nations physics majors who also also graduate with teaching certification.

Required Credit Hours by Area (Total 123)



Science Courses Required for a Physics Major

Freshman Year

- MATH 131 Calculus I (4)
- MATH 132 Calculus II (4)
- PHYS 240 General Physics I (5) (calc based)
- PHYS 241 General Physics II (5) (calc based)

Sophomore Year

- PHYS 321 Elementary Modern Physics (4)
- PHYS 320 Mathematical Methods I (3)
- PHYS 340 Mechanics (4)
- PHYS 341 Electricity and Magnetism (4)

Junior and Senior Year

- PHYS 347 Optics (4)
- PHYS 445 Quantum Mechanics I (3)

Additional Science Course Required

- SCED 400 Strategies in Teaching Secondary Sci. (1)
- Two semesters of Chemistry (10)
- Two semesters of Biology (8)
- Two semesters of Earth Science
 - One semester of Astronomy (3)
 - One semester of another Earth Science (3)
- ENST 225 Energy and the Environment (3)

Education Courses Required for Secondary Teaching

The Following zero credit course is required the semester before starting program

- EDFE 110 Initial PTEP Application (0)

Phase I

- STEP 161 Observation and Analysis of Secondary Teaching I (2)
- EDF 366 Conceptions of Schooling: Context and Process (3)

Phase II

- STEP 262 Observation and Analysis of Secondary Teaching II (2)
- EDSE 360 Adaptation, Modification, and Integration of Curriculum for the Secondary Exceptional Learner (3)
- PSY 349 Educational Psychology for Secondary Teachers (3)

Phase III

- STEP 363 Clinical Experience: Secondary (2)
- EDRD 340 Developing Language and Literacy in the Content Areas (3)
- SCED 441 Methods of Teaching Secondary School Science (3)

Phase IV

- STEP 464 Secondary Student Teaching (14)