3+2 PROGRAM

This major is being discontinued and will not accept new students after September 30, 2020. Students who have declared this major prior to September 30, 2020 will use these standards to complete the program requirements.

Introduction

The dual degree 3+2 program is a dual degree program, with a BS in Physics from Canisius and a BS in Engineering from an Engineering school. The student will complete all of the requirements for the BS degree in Physics, which includes the foundation, fields, attributes, and capstone courses in the college's core curriculum. While at the college, the student can use modern physics equipment like a high-resolution spectroscopy equipment, 3-D printer, a multi-channel nuclear spectrometer, various radiation detectors, and an X-ray spectrometer. The student is also encouraged to perform research with a professor or with an internship with a local company or manufacturer. It is in the student's best interest to gain as much professional experience as possible.

Dual Majors

The dual degree 3+2 program is a dual degree program, with a BS in Physics from Canisius and a BS in Engineering from an Engineering school. An additional major at Canisius in this program would prove difficult to complete, due to the already demanding nature of this program; however, students are urged to discuss this with an academic advisor.

Advisement

All students should have an advisor in the major and should contact the department directly to have an advisor assigned if they do not already have one. Meetings with academic advisors are required prior to students receiving their PIN for course registration each semester. All majors should work closely with their advisor in discussing career expectations, choosing their major electives, developing their entire academic program and planning their co-curricular or supplemental academic experiences.

Curriculum

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All undergraduate students must complete either the Canisius Core Curriculum (http://catalog.canisius.edu/undergraduate/academics/curricular-information/core-curriculum/) or the All-College Honors Curriculum (http://catalog.canisius.edu/undergraduate/academics/curricular-information/all-college-honors-program/). Many schools refer to their college-wide undergraduate requirements as "general education" requirements. We believe that the core curriculum and the honors curriculum are more than a series of required classes; they provide the basis for a Jesuit education both with content and with required knowledge and skills attributes that are central to our mission.

Free Electives

Students may graduate with a bachelor's degree with more but not less than 120 credit hours. Free electives are courses in addition to the Canisius Core Curriculum or All-College Honors Curriculum and major requirements sufficient to reach the minimum number of credits required for graduation. The number of credits required to complete a bachelor's degree may vary depending on the student's major(s) and minor(s).

Major Requirements

Code	Title	Credits
CSC 111 & 111L	Introduction to Programming and Introduction to Programming Laboratory	4
PHY 104	Seminar for Physics and Pre-engineering Majors	0
PHY 223 & 223L	General Physics for Physical Science Majors I and General Physics for Physical Science Majors I Laboratory	4
PHY 224 & 224L	General Physics for Physical Science Majors II and General Physics for Physical Science Majors I Laboratory	4
PHY 225 & 225L	General Physics for Physical Science Majors III and General Physics for Physical Science Majors III Laboratory	4
PHY 226 & 226L	Basic Electronics and Basic Electronics Laboratory	4
PHY 330	Electrodynamics I	3
PHY 331	Electrodynamics II	3
PHY 332	Statistical and Thermal Physics	3
PHY 335	Mathematical Analysis for Physicists	4
PHY 350 & PHY 351	Modern Physics Laboratory and Advanced Laboratory	2
PHY 443	Classical Mechanics	3
PHY 445	Special Topics in Physics	1
PHY 446	Quantum Mechanics I	4
PHY 447	Quantum Mechanics II	3
PHY 498	Senior Project	1-3
CHM 111 & 111L	General Chemistry I and General Chemistry I Laboratory	4
MAT 111 & MAT 112	Calculus I and Calculus II	8
MAT 211	Calculus III	4
MAT 222	Differential Equations	3
Science Elective (choose one of the following):		3-4
CHM 112 & 112L	General Chemistry II and General Chemistry II Laboratory	
CSC 112 & 112L	Data Structures and Data Structures Laboratory	
MAT 219	Linear Algebra	
MAT 351	Probability & Statistics I	
BIO 111 & 111L	Introductory Biology I and Introductory Biology Laboratory I	
Total Credits		**69-72**

Also, Depending on Engineering Major

Code	Title	Credits
EGR 111	Introduction to Engineering Design	3
EGR 207	Engineering Statics	3
EGR 208	Engineering Dynamics	3
EGR 211	Engineering Thermodynamics	3
EGR 214	Strength of Materials	3

In some cases, cross registration for additional courses at University at Buffalo may be advisable.

Additional Course Considerations

Junior/Senior level courses are offered on a rotating two year basis. Students will take either the course listed Junior or Senior year, depending on availability. Students will complete the missing requirements in the Physics Major while at the partnering Engineering school. Prior to completion of the third year at Canisius, students will meet with their advisor to plan out the courses to be completed in the Physics major. Course selection may vary somewhat depending on engineering major and partner institution.

Linear Algebra (MAT 219) is advisable, and required by some engineering programs.

Roadmap

Recommended Schedule: 3+2 Program

Freshman

Fall	Spring
EGR 111	MAT 112
MAT 111	PHY 104
PHY 104	PHY 224 & 224L
PHY 223 & 223L	Science Elective[1]
CSC 111 & 111L	

Sophomore

Fall	Spring
MAT 211	MAT 222
PHY 104	PHY 104
PHY 225 & 225L	PHY 226 & 226L
EGR 207	EGR 208
CHM 111 & 111L	

Junior

Fall	Spring
PHY 104	PHY 104
EGR 211	EGR 214
Fall Physics courses in Physics Curriculum	Spring Physics courses in Physics Curriculum

[1] Science Elective to be chosen from BIO 111, CHM 112, CSC 112, MAT 219 or MAT 351. The science elective may be taken in a subsequent semester if it requires a prerequisite. In this case, take a course in the Core Curriculum in the spring semester of the freshman year.