

APPLIED PHYSICS, B.S. (NJCU) AND ELECTRICAL ENGINEERING, B.S. (NJIT), DUAL DEGREE (3 + 2) PROGRAM

This dual-degree program is designed for students interested in Physics and Electrical Engineering. New Jersey City University and New Jersey Institute of Technology jointly offer a five-year program of study leading to a Bachelor of Science in Physics from NJCU and a Bachelor of Science (B.S.) in Electrical Engineering from NJIT. Earning these two degrees increases the chances of obtaining a better entry-level position and opens the door to greater career possibilities. This program combines a traditional liberal arts environment with an intensive technical curriculum.

This dual-degree program is an excellent choice for students who understand the value of a liberal arts education, are interested in careers in the physical sciences and engineering, wish to work as engineers while having a strong background in physics, and wish to maximize their career options. Students enter as full-time, degree-seeking freshmen and continue their studies for three years at NJCU while taking occasional classes at NJIT, during which time the General Education coursework and the majority of Physics degree requirements from NJCU are satisfied. Students enroll full-time at NJIT during the fourth and fifth years of the program, during which time students focus on required engineering courses, some of which satisfy NJCU's Physics degree requirements. A B.S. in Applied Physics is awarded by NJCU at the end of the fourth year and a B.S. in Electrical Engineering is awarded by NJIT at the end of the fifth year.

Students interested in this dual-degree program are strongly encouraged to select the major as soon as possible upon enrolling at NJCU in consultation with a faculty advisor from the Physics Department. The advisor will assist students in planning the program of study in order to complete the program requirements within the five-year time span.

Requirements for admission into the program are a 2.5 or better cumulative GPA and a 3.0 or better GPA in Math and Sciences.

| Code | Title | Credits |
|-------------------------|--|---------|
| Required Courses | | |
| PHYS 140 | Principles of Physics I - Lecture | 3 |
| PHYS 1140 | Principles of Physics I - Laboratory and recitation | 1 |
| PHYS 141 | Principles of Physics II - Lecture | 3 |
| PHYS 1141 | Principles of Physics II - Laboratory and Recitation | 1 |
| PHYS 230 | Physics III (Lecture) | 3 |
| PHYS 1230 | Physics III Recitation & Laboratory | 1 |
| PHYS 301 | Thermodynamics and Kinetic Theory | 3 |
| PHYS 321 | Theory and Applications of Electricity and Magnetism | 3 |
| PHYS 410 | Classical Mechanics | 4 |
| CHEM 105 | General Chemistry I Lecture | 3 |
| CHEM 1105 | General Chemistry I Recitation/Laboratory | 2 |

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|-----------|--|---|
| CHEM 106 | General Chemistry II Lecture | 3 |
| CHEM 1106 | General Chemistry II Recitation/Laboratory | 2 |
| MATH 192 | Calculus and Analytic Geometry I | 4 |
| MATH 193 | Calculus and Analytic Geometry II | 4 |
| MATH 292 | Calculus & Analytical Geometry III | 4 |
| MATH 311 | Differential Equations for Engineers | 4 |
| ECON 208 | Principles of Economics:Micro | 3 |

First Year

| Semester 1 | | Credits |
|------------------------|---|---------|
| ENGL 101 or ESL 101 | English Composition I or English Composition I for English as a Second Language Students | 4 - 6 |
| MATH 192 | Calculus and Analytic Geometry I | 4 |
| PHYS 140 | Principles of Physics I - Lecture | 3 |
| PHYS 1140 | Principles of Physics I - Laboratory and recitation | 1 |
| CHEM 105 | General Chemistry I Lecture | 3 |
| CHEM 1105 | General Chemistry I Recitation/Laboratory | 2 |

Credits 17-19

Semester 2

| | | |
|------------------------|--|-------|
| ENGL 102 or ESL 102 | English Composition II or | 4 - 6 |
| MATH 193 | Calculus and Analytic Geometry II | 4 |
| PHYS 141 | Principles of Physics II - Lecture | 3 |
| PHYS 1141 | Principles of Physics II - Laboratory and Recitation | 1 |
| CHEM 106 | General Chemistry II Lecture | 3 |
| CHEM 1106 | General Chemistry II Recitation/Laboratory | 2 |

Credits 17-19

Second Year

Semester 1

| | | |
|---------------------------------------|-------------------------------------|---|
| PHYS 230 | Physics III (Lecture) | 3 |
| PHYS 1230 | Physics III Recitation & Laboratory | 1 |
| MATH 292 | Calculus & Analytical Geometry III | 4 |
| ECON 208 | Principles of Economics:Micro | 3 |
| General Education Tier I or II Course | | 3 |

Credits 14

Semester 2

| | | |
|----------|--|---|
| PHYS 321 | Theory and Applications of Electricity and Magnetism | 3 |
| MATH 311 | Differential Equations for Engineers | 4 |
| FED 101 | Fundamentals of Engineering Design (Taken at NJIT) | 1 |
| ECE 101 | Intro to Electrical Engineering and Computer Engineering (Taken at NJIT) | 1 |
| CIS 115 | Intro to Computer Science I in C++ (Taken at NJIT) | 3 |

Credits 12

Third Year

Semester 1

| | | |
|----------|-----------------------------------|---|
| PHYS 301 | Thermodynamics and Kinetic Theory | 3 |
| PHYS 410 | Classical Mechanics | 4 |
| ECE | Digital Design (Taken at NJIT) | 3 |

| | | |
|----------------------------------|--------------------------------------|-----------|
| ECE 231 | Circuits and Systems (Taken at NJIT) | 3 |
| General Education Tier II Course | | 3 |
| Credits | | 16 |

Semester 2

| | | |
|----------------|---|-----------|
| PHYS 405 | Introduction to Quantum Mechanics | 3 |
| ECE 232 | Circuits and Systems II (Taken at NJIT) | 3 |
| ECE 271 | Electronic Circuit I (Taken at NJIT) | 3 |
| ECE 291 | Electrical Engineering Laboratory I (Taken at NJIT) | 3 |
| ECE 252 | Microprocessors (Taken at NJIT) | 3 |
| Credits | | 15 |

Fourth Year**Semester 1**

ALL COURSES TAKEN AT NJIT

| | | |
|----------------|--|-----------|
| ECE 333 | Signals and Systems (3-0-3) | 3 |
| ECE 361 | Electromagnetic Fields I (2-0-2) | 2 |
| ECE 372 | Electronic Circuits II (3-0-3) | 3 |
| ECE 395 | Microprocessors Laboratory II (0-4-2) | 2 |
| MECH 320 | Statics and Mechanics of Materials (3-0-3) | 3 |
| PHYS 450 | Advanced Physics Laboratory (1-4-3) | 4 |
| Credits | | 17 |

Semester 2

ALL COURSES TAKEN AT NJIT

| | | |
|----------------|--|-----------|
| ECE 321 | Random Signals and Noise (3-0-3) | 3 |
| ECE 362 | Electromagnetic Fields II (3-0-3) | 3 |
| ECE 374 | Electronic Device I (3-0-3) | 3 |
| ECE 392 | Electrical Engineering Laboratory II (1-2-2) | 2 |
| PHIL 334 | Engineering Ethics (3-0-3) | 3 |
| ECE 341 | Energy Conversion (3-0-3) | 3 |
| Credits | | 17 |

Fifth Year**Semester 1**

COURSES TAKEN AT NJIT

| | | |
|----------------|---|----------|
| ECE 414 | Electrical Engineering Computer Project (1-0-1) | |
| ECE 494 | Electrical Engineering Laboratory III (1-2-2) | |
| ELEC | LIST/HIST/PHIL/STS: GUR (3-0-3) | |
| ELEC | EE Track Elective I (3-0-3) | |
| ELEC | EE Track Elective II (3-0-3) | |
| ECE | ECE Technical Elective (3-0-3) | |
| Credits | | 0 |

Semester 2

ALL COURSES TAKEN AT NJIT

| | | |
|----------|---|--|
| ECE 416 | Electrical and Computer Engineering Project II (3-0-3) or ECE 417 Independent Study (3-0-3) | |
| MGMT 390 | Principles of Management (3-0-3) or IE 492 Engineering Management (3-0-3) | |
| ELEC | Capstone Seminar: GUR (3-0-3) | |
| ELEC | EE Track Laboratory (3-0-3) | |
| ELEC | ECE Technical Elective (3-0-3) | |

| | | |
|----------------------|--------------------------------|----------------|
| ELEC | ECE Technical Elective (3-0-3) | |
| Credits | | 0 |
| Total Credits | | 125-129 |

Student Learning Outcomes

Upon completion of the Applied Physics BS (NJCU) and Electrical Engineering BS (NJIT), Dual Degree (3+2) program, students will be able to:

1. Demonstrate knowledge of the factual and theoretical basis of physics including Newton's Laws of motion, conservation laws, E&M and Quantum Mechanics.
2. Demonstrate understanding of scientific inquiry and explain how scientific knowledge is discovered and validated.
3. Apply quantitative reasoning to describe or explain phenomena in the natural world.
4. Demonstrate knowledge of mathematical tools and their applications to understanding physics systems.
5. Communicate scientific information based on original research or literature review.
6. Demonstrate preparedness to enter the work force or Graduate School.