

Program Description

Graduates of this program work in a technical environment in the communications, optical, medical, research and development, and national defense fields. The work will concentrate on the design and installation of fiber-optic systems and their maintenance, research, and development.

Program Goals

- To instruct students on how to properly integrate active and passive components and make necessary optical fiber splicing and connections to create an optical link or local area network.
- To train students on the use of industrial test and measurement equipment to evaluate, test and troubleshoot fiber optic networks.
- To assure that students can install, troubleshoot, and maintain fiber optic sensors and other fiber optic equipment.
- To qualify students for entry-level employment as a junior engineer in the fiber optic and related areas.
- To prepare students to transfer to a baccalaureate program in optical, electrical engineering or material science.

Special Program Requirement

Two years of high school mathematics, including Intermediate Algebra.

Employment Opportunities

- Fiber optic design/installation/servicing practice
- Medical equipment testing/repairing
- Optical, video manufacturing
- Research/government laboratories
- Technical sales and customer relations
- Telecommunications

Contact Persons

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Highlights

“Average salary of Photonic Technicians is \$55,000.”
 (Photonics Spectra, May 2004)

PHOTONICS *Fiber Optics Technology Option*

Degree: **Associate in Applied Science**

College Code: **FBR.AAS**

Code	Course	Credits
First Year/First Semester		
LFO-101	Introduction to Photonics & Photonic Safety	4
MTH-125	College Algebra & Trigonometry or	
MTH-140	Calculus I ¹	4
ENG-101	English Composition I	3
PHY-101	Physics I or	
PHY-201	Physics III ¹	4
.....	Humanities Elective	3
		18
Second Semester		
EET-101	Electrical/Electronic Principles	4
MTH-132	Statistics for Technology or	
MTH-150	Calculus II ¹	4
ENG-102	English Composition II	3
LFO-201	Photonics Materials	3
PHY-102	Physics II or	
PHY-202	Physics IV ¹	4
		18
Second Year/First Semester		
LFO-211	Photonic Optic Principles & Components	4
LFO-241	Introduction to Fiber Optics	3
LFO-231	Photonic Measurements	3
EET-211	Electronics I	3
.....	Social Science Elective	3
HPE.....	Health & Exercise Science Elective	1
		17
Second Semester		
LFO-292	Photonics Seminar	1
EET-221	Digital Circuits	3
LFO-294	Fiber Optic Project	3
LFO-242	Advanced Fiber Optics	3
.....	Computer Programming Elective	3
HPE.....	Health & Exercise Science Elective	1
		14
Total Minimum Credits		67

¹All students transferring to Rowan or NJIT must take the Calculus I, II track and Physics III, IV track.

Program Description

Photonic: laser/electro-optic technicians work in companies that manufacture, service, and use optical and laser equipment. Such companies span almost every type of business, from industrial applications to military defense, from telecommunication to health and medicine. Responsibilities of laser/electro-optic technicians include design, production, marketing, testing, maintenance, service, calibration, and troubleshooting of systems that rely on optical and laser components.

Program Goals

- To instruct students on how to assemble and align optical components to create optical and electro-optic systems.
- To assure students can operate and maintain different medical, industrial, military, and scientific lasers and laser systems.
- To ground the students in the proper use of industrial test and measurement equipment to evaluate, calibrate, test, and troubleshoot lasers and accompanying equipment.
- To qualify students for entry-level employment as a technician or junior engineer in the laser and optics-related areas.
- To prepare students to transfer to a baccalaureate program in optical, electrical engineering or material science.

Special Program Requirement

Two years of high school math, including Intermediate Algebra

Employment Opportunities

- Industrial lasers and telecommunications
- Laser medical offices
- Laser, optical, video manufacturing
- Private laser/optics servicing practice
- Research/government laboratories
- Technical sales and customer relations

Contact Persons

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Highlights

Information technology and telecommunications, health care and sciences, optics manufacturing, National Defense, and other areas relying heavily on laser/ electro-optics are currently experiencing tremendous growth in research, development, and career and job opportunities.

PHOTONICS

Laser/Electro-Optic Technology

Degree: **Associate in Applied Science**

College Code: **PHT.AAS**

Code	Course	Credits
First Year/First Semester		
LFO-101	Introduction to Photonics & Photonic Safety	4
MTH-125	College Algebra & Trigonometry or	
MTH-140	Calculus I ¹	4
ENG-101	English Composition I	3
PHY-101	Physics I or	
PHY-201	Physics III ¹	4
.....	Humanities Elective	3
		18
Second Semester		
EET-101	Electrical/Electronic Principles	4
MTH-132	Statistics for Technology or	
MTH-150	Calculus II ¹	4
ENG-102	English Composition II	3
LFO-201	Photonics Materials	3
PHY-102	Physics II or	
PHY-202	Physics IV ¹	4
		18
Second Year/First Semester		
LFO-211	Photonic-Optic Principles & Components	4
LFO-212	Pulsed & CW Lasers	3
LFO-241	Introduction to Fiber Optics	3
EET-211	Electronics I	3
LFO-231	Photonics Measurements	3
HPE.....	Health & Exercise Science Elective	1
		17
Second Semester		
LFO-292	Photonics Seminar	1
LFO-221	Photonic & Electro-Optic Devices	3
LFO-251	Laser Electronics or	
EET-212	Electronics II	3
.....	Social Science Elective	3
.....	Computer Programming Elective	3
HPE.....	Health & Exercise Science Elective	1
		14
	Total Minimum Credits	67

¹All students transferring to Rowan or NJIT must take the Calculus I, II track and Physics III, IV track.

Camden County College, NJ

<http://www.camdencc.edu/departments/photronics/index.html>

PHOTONICS (LASER & FIBER OPTICS)

LFO-101 Intro to Photonics & Photonic Safety (4.00 cr.)

This course introduces the elements of a laser, operation of a helium- neon gas laser, laser physics, optical-cavities, properties of laser light, and a survey of laser systems. Safety procedures concerning lasers and related equipment are presented in this course.

Lecture (45.00)

Laboratory (45.00)

LFO-201 Photonic Materials (3.00 cr.)

Photonic Materials is a course designed to provide the laser electrooptic technology and fiber-optic technology students an up-to-date knowledge of the laser peripheral materials. The material selection and characterization of different laser materials and peripheral materials, such as electro-optic, acousto-optic, and nonlinear materials will be included in the course. In the course the basis for material selection and suitability for laser application will be stressed. Laboratory experiments will supplement the basic non-mathematical theory. Practical applications will be stressed in this course.

Lecture (30.00)

Laboratory (30.00)

Prerequisites: LFO-101

LFO-211 Photonic-Optic Principles & Components (4.00 cr.)

This course covers the fundamentals of geometric and physical optics, including Huygen's principle, wave motion, properties of waves, and optical instruments.

Lecture (45.00)

Laboratory (45.00)

Corequisite: LFO-101

LFO-212 Pulsed & CW Lasers (3.00 cr.)

This course covers the laser power and energy measurements, characteristics of flashlamps, discharge circuits, and pulse forming networks for optically pumped solid lasers, CW arc lamps and power supplies for CW lasers, cooling systems for CW-pumped lasers, safe operation and measurements with argon, CO₂, ruby, Nd: YAG, dye and semiconductor lasers, study of laser Q-switching and modelocking using solid state laser systems.

Lecture (30.00)

Laboratory (30.00)

Prerequisites: LFO-101, PHY-101 and EET-101

LFO-221 Photonic & Electro-Optic Devices (3.00 cr.)

This course will discuss the photodetectors, calorimeters and laser power meters, holographic equipment and supplies, and techniques and setups for making holograms. It

covers photographic instrumentation, including oscilloscope, SLR, streak cameras and special purpose imaging devices. Laser modulation and Q-switching devices, including electro-optic, rotating prism, acousto-optic and bleachable dye methods, use of laser collimators and autocollimators, spatial filters, beam expanders, and Faraday isolators, are also covered in this course.

Lecture (30.00)

Laboratory (30.00)

Prerequisites: LFO-212, LFO-211 and LFO-201

LFO-231 Photonics Measurements (3.00 cr.)

This course will discuss wave length, dispersion, and refractive index measurements with divided-circle prism/grating spectrometer, use of monochromators and spectrophotometers, use of scanning Fabry-Perot interferometer for observation of longitudinal modes in a laser output, use of fixed spacing Fabry-Perot etalon, Michelson interferometer, use of Twyman-Green interferometer in optical testing, use of Mach-Zehnder interferometer for measuring refractive index of gas, spatial resolution, concept of the modulation transfer function (MTF), and use of USAF 1951 resolution target to measure MTF of a lens.

Lecture (30.00)

Laboratory (30.00)

Prerequisites: LFO-211

LFO-241 Introduction to Fiber Optics (3.00 cr.)

This course will discuss elements of fiber optics including: integrated optics, waveguide transmission, optical circuitry, and fiber optic components.

Lecture (30.00)

Laboratory (30.00)

Corequisite: LFO-101

LFO-242 Advanced Fiber Optics (3.00 cr.)

This course will continue to develop concepts in Fiber Optics that are introduced in Introduction to Fiber Optics (LFO-241). However, much greater emphasis will be placed on splicing, coupling, optical systems, and optoelectronics.

Lecture (30.00)

Laboratory (30.00)

Prerequisites: LFO-241

LFO-243 Fiber Optic Communication & Installation (3.00 cr.)

This course will continue to develop concepts introduced in the course LFO-241 (Introduction to Fiber Optics). It is designed for the certificate in Fiber Optics with great emphasis put on the tasks and functions needed to perform different fiber optic installations, connections, and testing and troubleshooting optical communication systems.

Lecture (30.00)

Laboratory (30.00)

Prerequisites: LFO-101, LFO-211 and LFO-241

LFO-251 Laser Electronics (3.00 cr.)

The course introduces the student to the electronics of laser power supplies. Constructions of power supplies for electrically excited molecular and ion gas lasers, optically pumped CW and pulsed solid-state lasers, and semiconductor lasers are considered. The course also considers electrical safety procedures necessary during troubleshooting and repairing electrical components of lasers.

Lecture (30.00)

Laboratory (30.00)

Prerequisites: LFO-101 and EET-211

LFO-261 Laser Bio-Physics Technology for Allied Health (3.00 cr.)

This course will discuss elements of a laser, properties of light, survey of laser systems, safety procedures concerning lasers, and related equipment. This course will also concentrate on laser surgical techniques, both in the office and in a hospital setting.

Lecture (30.00)

Laboratory (30.00)