

Laser/Electro-optics Technology

The Curriculum

Courses are offered in the theory and practice of laser and electro-optic technology. The curriculum emphasizes principles of laser optics, operations, devices, measurement techniques, systems, and applications. Students are taught how to build, service, and operate lasers for a variety of applications.

The Associate Degree/Occupational Certificate Major

Students majoring in laser/electro-optics technology are preparing for vocations in laser technology and affiliated applied sciences. Career opportunities for trained technicians are many and various, since the laser and other forms of electro-optics are widely applied within manufacturing, medicine, science, and a range of other fields. Students may elect to pursue an Associate in Science degree or an Occupational Certificate in the program. In both cases, students complete a strong core curriculum in optics, electro-optics, physical science, and electronics. In addition, students must complete courses in applied mathematics and writing. This combination of courses is designed to ensure that the graduating student is not only technically trained but also fundamentally educated, able as a result to adapt to changing circumstances, enter a traditional calculus-based engineering or science program, and communicate effectively.

Similar to many fields in high technology, laser/electro-optics is rapidly evolving. It is fundamentally important that graduates entering the field have the ability to evolve along with the industry; the program consequently stresses the acquisition of such an ability.

If you intend to transfer:

Courses that fulfill major requirements for an associate degree at Irvine Valley College may not be the same as those required for completing the major at a transfer institution offering a baccalaureate degree. If you plan to transfer to a four-year college or university, you should (1) refer to the transfer section of this catalog, (2) consult the catalog of your prospective transfer institution (see the IVC Transfer Center for assistance), and (3) schedule an appointment with an IVC counselor to develop a plan of study before you begin your program. In addition, it may be helpful to meet with the appropriate department faculty at IVC.

If you plan to complete an associate degree or occupational certificate:

You must complete the following set of courses to fulfill the requirements for the Occupational Certificate or Associate in Science (A.S.) degree major. For the A.S. degree, you must also meet the general education requirements listed on page 21. Refer to page 16 for additional options for fulfilling the major requirement for the A.S. degree.

LASER/ELECTRO-OPTICS TECHNOLOGY MAJOR

(A.S. Degree or Occupational Certificate)

<i>First Semester</i>		<i>Units</i>	<i>Third Semester</i>		
LET 200/200L	Introduction to Lasers/Laboratory	4	LET 220/220L	Laser Devices and Measurement	
ET 102	Basic Electronic Circuits I	4		Techniques/Laboratory	4
ET 104	Basic Electronic Circuits II	4	ET 107	Electronic Devices and Circuits II	4
Math 200	Introduction to Technical Mathematics	5	<i>Fourth Semester</i>		
<i>Second Semester</i>			LET 230/230L	Laser Systems and Applications/Laboratory	4
LET 210/210L	Fundamentals of Optics/Laboratory	4	LET 250	Projects in Laser/Electro-optics Technology	4
ET 105	Electronic Devices and Circuits I	4	Total units:		44-45
WR 1	College Writing 1	(4)			
or	or				
WR 102	Technical Writing	(3)			

Laser/Electro-optics Technology Courses

LET 189 **0.5-5 units**

SPECIAL TOPICS IN LASER/ELECTRO-OPTICS TECHNOLOGY

The Special Topics course is a grouping of short seminars designed to provide students with the latest concepts in the field of laser/electro-optics technology. The course content is thematic in nature, and each seminar topic within the course differs from other offerings in the same course. R-E

Lecture hours: 0.5-5 Lab hours: 0.5-5

LET 199 **0.5-5 units**

SEMINAR IN LASER/ELECTRO-OPTICS TECHNOLOGY

Laser/Electro-optics Technology 199 is a lower-division seminar given over to the study of a specific topic, issue, or problem within laser/electro-optics technology which is not part of the regular college curriculum. R-E

Lecture hours: 0.5-5 Lab hours: 0.5-5

LET 200 **3 units**

INTRODUCTION TO LASERS

Coreq: LET 200L. Recom: Math 200. This course introduces the student to the elements and operation of a laser, the properties of light, and the fundamentals of atomic and molecular structure as applied to laser systems. The helium-neon laser is studied in detail, and other laser systems are surveyed. Safety procedures regarding the use of the laser systems are stressed. NR

Lecture hours: 3

LET 200L **1 unit**

INTRODUCTION TO LASERS LABORATORY

Coreq: LET 200. This laboratory course introduces students to the measurement of laser output parameters such as beam diameter, divergence, and irradiance. The course covers the cleaning of optical surfaces, the alignment of a laser resonator, and basic laser safety. Throughout, the course stresses appropriate techniques for taking, recording, and analyzing data. NR

Lab hours: 3

LET 210 **3 units**

FUNDAMENTALS OF OPTICS

Coreq: LET 210L. This is a comprehensive course in geometrical and wave optics. Topics include reflection and refraction, matrix optics, thin and thick lenses, interference, diffraction, and polarization. The principles of fiber optics and holography are introduced, and selected topics in magneto- and electro-optics are discussed. NR

Lecture hours: 3

LET 210L **1 unit**

FUNDAMENTALS OF OPTICS LABORATORY

Coreq: LET 210. This laboratory course introduces students to geometrical and wave optics. Experiment topics will include refraction, thin and thick lenses, diffraction, and interference. Students will learn how to perform basic fiber-optics measurements using an optical power meter and an Optical Time Domain Reflectometer (OTDR). The course also introduces basic holographic techniques. NR

Lab hours: 3

LET 220 **3 units**

LASER DEVICES AND MEASUREMENT TECHNIQUES

Coreq: LET 220L. Recom: LET 210/210L and ET 107. This course is designed to acquaint the student with many of the components, devices, and measurement techniques used in the laser/electro-optics industry. Components discussed include optical tables and benches, mounts, mirrors, lenses, gratings, filters, and polarizers. Devices covered include Q-switches and mode lockers, modulators, beam expanders, and optical isolators. The course introduces measurement techniques using spectrophotometers, spectrum analyzers, and monochromators. NR

Lecture hours: 3

LET 220L **1 unit**

LASER DEVICES AND MEASUREMENT TECHNIQUES LABORATORY

Coreq: LET 220. Recom: LET 210/210L. This laboratory course is designed to give students practical experience in using and operating a variety of instruments and devices common to the electro-optics industry. A semester project, including oral and written progress reports, is required. NR

Lab hours: 3

LET 230 **3 units**

LASER SYSTEMS AND APPLICATIONS

Coreq: LET 230L. Recom: LET 220/220L. This course introduces the student to the operation and application of a variety of laser systems typical of those used in industry. Lasers discussed in the course include nitrogen, carbon dioxide, ruby, neodymium:YAG, organic dye, and krypton and argon ion. The course examines applications in such areas as material processing, medicine, consumer products, information storage, holography, communications, and defense. Students will be taught the basic skills of laser maintenance and the appropriate safety procedures regarding laser radiation, high voltage, and toxic materials. NR

Lecture hours: 3

LET 230L **1 unit**

LASER SYSTEMS AND APPLICATIONS LABORATORY

Coreq: LET 230. Recom: LET 220/220L. This laboratory course gives the student extensive hands-on experience in the operation, maintenance, and applications of a wide variety of laser systems. Lasers operated during this lab include argon and krypton ion, organic dye, carbon dioxide, nitrogen, ruby, helium-neon, and neodymium:YAG. Students are taught basic laser system maintenance and the appropriate safety procedures regarding laser radiation, high voltage, and toxic materials. NR

Lab hours: 3

LET 250 **4 units**

PROJECTS IN LASER/ELECTRO-OPTICS TECHNOLOGY

Recom: LET 230/230L and ET 107. This course is designed to instruct the student by providing actual practice in designing and implementing a project in laser/electro-optics. Projects may include the construction of a laser or a related electro-optical device and/or the utilization of a laser in an experiment. R-E-3

Lecture hours: 3 Lab hours: 3

LET 289 **0.5-5 units**

SPECIAL TOPICS IN LASER/ELECTRO-OPTICS TECHNOLOGY

The Special Topics course is a grouping of short seminars designed to provide students with the latest concepts in the field of laser/electro-optics technology. The course content is thematic in nature, and each seminar topic within the course differs from other offerings in the same course. R-E

Lecture hours: 0.5-5 Lab hours: 0.5-5