# Program Planning Guide
## Laser & Photonics Technology, Associate in Applied Science Degree, A40280

Program Length: 5 semesters  
Career Pathway Options: Associate in Applied Science Degree in Laser & Photonics Technology  
Program Site/s: Harnett Main Campus - Day

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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
<th>Notes:</th>
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<tr>
<td>ACA</td>
<td>Student Success Course</td>
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<tr>
<td>CIS 110</td>
<td>Introduction to Computers</td>
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<td>EGR 131</td>
<td>Introduction to Electronics Tech</td>
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<td>ELC 131</td>
<td>Circuit Analysis I</td>
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<td>ENG 111</td>
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<td>MAT 171</td>
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<td>ELN 131</td>
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<td>LEO 111</td>
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<td>Advanced Photonics Applications</td>
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## Program Planning Guide
### Laser and Photonics Technology, AAS, (A40280)

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<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
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Total Semester Hours Credit Required for Graduation: **75**
**Course Descriptions**

**ACA 122 College Transfer Success** 0-2-1
This course provides information and strategies necessary to develop clear academic and professional goals beyond the community college experience. Topics include the CAA, college policies and culture, career exploration, gathering information on senior institutions, strategic planning, critical thinking, and communications skills for a successful academic transition. Upon completion, students should be able to develop an academic plan to transition successfully to senior institutions. This course has been approved for transfer under the CAA and ICAA as a premajor and/or elective course requirement.

**CIS 110 Introduction to Computers** 2-2-3
This course introduces computer concepts, including fundamental functions and operations of the computer. Topics include identification of hardware components, basic computer operations, security issues, and use of software applications. Upon completion, students should be able to demonstrate an understanding of the role and function of computers and use the computer to solve problems. This course has been approved for transfer under the CAA and ICAA as a general education course in Mathematics.

**COM 231 Public Speaking** 3-0-3
This course provides instruction and experience in preparation and delivery of speeches within a public setting and group discussion. Emphasis is placed on research, preparation, delivery, and evaluation of informative, persuasive, and special occasion public speaking. Upon completion, students should be able to prepare and deliver well-organized speeches and participate in group discussion with appropriate audiovisual support. This course has been approved for transfer under the CAA and ICAA as a universal general education transfer component (UGETC) course in Communications.

**EGR 131 Introduction To Electronics Technology** 1-2-2
This course introduces the basic skills required for electrical/electronics technicians. Topics include soldering/desoldering, safety practices, test equipment, scientific calculators, AWG wire table, the resistor color code, electronic devices, problem solving, and use of hand tools. Upon completion, students should be able to solder/desolder, operate test equipment, apply problem solving techniques, and use a scientific calculator.

**ELC 127 Software for Technicians** 1-3-2
This course introduces computer software which can be used to solve electrical/electronics problems. Topics include electrical/electronics calculations and applications. Upon completion, students should be able to utilize a personal computer for electrical/electronics-related applications.

**ELC 131 Circuit Analysis I** 3-3-4
Local Corequisite: Take one set: 1) MAT 121 and ELC 131A; 2) ELC 131A and MAT 171
This course introduces DC and AC electricity with an emphasis on circuit analysis, measurements, and operation of test equipment. Topics include DC and AC principles, circuit analysis laws and theorems, components, test equipment operation, circuit simulation, and other related topics. Upon completion, students should be able to interpret circuit schematics; design, construct, verify, and analyze DC/AC circuits; and properly use test equipment.

**ELC 131A Circuit Analysis I Lab** 0-3-1
Corequisite: ELC 131
This course provides laboratory assignments as applied to fundamental principles of DC/AC electricity. Emphasis is placed on measurements and evaluation of electrical components, devices and circuits. Upon completion, the students will gain hands-on experience by measuring voltage, current, and opposition to current flow utilizing various meters and test equipment.

**ELN 131 Analog Electronics I** 3-3-4
Local Prerequisite: EGR 131 or ELC 131
This course introduces the characteristics and applications of semiconductor devices and circuits. Emphasis is placed on analysis, selection, biasing, and applications. Upon completion, students should be able to construct, analyze, verify, and troubleshoot analog circuits using appropriate techniques and test equipment.

**ELN 132 Analog Electronic II** 3-3-4
Local Prerequisite: ELN 131 or ELC 140
This course covers additional applications of analog electronic circuits with an emphasis on analog and mixed signal integrated circuits (IC). Topics include amplification, filtering, oscillation, voltage regulation, and other analog circuits. Upon completion, students should be able to construct, analyze, verify, and troubleshoot analog electronic circuits using appropriate techniques and test equipment.

**ELN 133 Digital Electronics** 3-3-4
Local Prerequisite: EGR 131 or ELC 131 or Instructor Approval
This course covers combinational and sequential logic circuits. Topics include number systems, Boolean algebra, logic families, medium scale integration (MSI) and large scale integration (LSI) circuits, analog to digital (AD) and digital to analog (DA) conversion, and other related topics. Upon completion, students should be able to construct, analyze, verify, and troubleshoot digital circuits using appropriate techniques and test equipment.

**ELN 232 Introduction to Microprocessors** 3-3-4
Local Prerequisite: ELN 133 or Instructor Approval
This course introduces microprocessor architecture and microcomputer systems including memory and input/output interfacing. Topics include low-level language programming, bus architecture, I/O systems, memory systems, interrupts, and other related topics. Upon completion, students should be able to interpret, analyze, verify, and troubleshoot fundamental microprocessor circuits and programs using appropriate techniques and test equipment.

**ELN 275 Troubleshooting** 1-3-2
Local Prerequisites: ELN 133 and ELN 132
This course covers techniques of analyzing and repairing failures in electronic equipment. Topics include safety, signal tracing, use of service manuals, and specific troubleshooting methods for analog, digital, and other electronics-based circuits and systems. Upon completion, students should be able to logically diagnose and
isolate faults and perform necessary repairs to meet manufacturers’ specifications.

ENG 111  Writing and Inquiry  3-0-3  
Prerequisites: DRE 098 or ENG 002  
Local Prerequisites: Take one: 1) ENG 011; 2) ENG 002; 3) DRE 098; 4) ENG 090; 5) ENG 095  
This course is designed to develop the ability to produce clear writing in a variety of genres and formats using a recursive process. Emphasis includes inquiry, analysis, effective use of rhetorical strategies, thesis development, audience awareness, and revision. Upon completion, students should be able to produce unified, coherent, well-developed essays using standard written English. This course has been approved for transfer under the CAA and ICAA as a universal general education transfer component (UGETC) course in English Composition.

ENG 112  Writing/Research in the Disciplines  3-0-3  
Prerequisite: ENG 111  
This course, the second in a series of two, introduces research techniques, documentation styles, and writing strategies. Emphasis is placed on analyzing information and ideas and incorporating research findings into documented writing and research projects. Upon completion, students should be able to evaluate and synthesize information from primary and secondary sources using documentation appropriate to various disciplines. This course has been approved for transfer under the CAA and ICAA as a universal general education transfer component (UGETC) course in English Composition.

ENG 114  Professional Research and Reporting  3-0-3  
Prerequisite: ENG 111  
This course, the second in a series of two, is designed to teach professional communication skills. Emphasis is placed on research, listening, critical reading and thinking, analysis, interpretation, and design used in oral and written presentations. Upon completion, students should be able to work individually and collaboratively to produce well-designed business and professional written and oral presentations. This course has been approved for transfer under the CAA and ICAA as a general education course in English Composition.

ISC 221  Statistical Qual Control  3-0-3  
Local Prerequisites: Completion of curriculum mathematics requirement  
This course covers the principles and techniques of statistical process control for the improvement of productivity. Emphasis is placed on basic statistics for quality control, organization and procedures for efficient quality control including inspections, process control, and tests of significance. Upon completion, students should be able to apply statistical principles and techniques to enhance production.

LEO 111  Lasers and Applications  1-3-2  
Corequisite: MAT 122  
This course covers the basic principles of laser operations and applications with a particular emphasis on laser safety. Topics include the properties of laser light, laser components, laser beam characteristics, and laser safety. Upon completion, students should be able to make measurements of laser beam characteristics and conduct a safety audit and hazards analysis of a laser facility.

LEO 211  Photonics Technology  5-6-7  
Prerequisites: ELN 133  
This course covers optical theory, optical equipment, optical components, and laser systems. Topics include generation and control of light using optical components such as lasers, lenses, mirrors, diffraction gratings, filters, and polarizers. Upon completion, students should be able to construct, analyze, verify, and troubleshoot optical systems using appropriate techniques and equipment.

LEO 212  Photonics Applications  3-3-4  
Local Corequisite: LEO 211  
This course provides knowledge and skills related to emerging photonics applications in North Carolina industry. Topics include applications such as materials processing, bar code scanning, surgical applications, optical data storage, and optical computers. Upon completion, students should be able to describe and analyze the critical issues attendant to a variety of photonics applications.

LEO 213  Advanced Photonic Applications  3-3-4  
Prerequisites: LEO 211  
This course covers advanced knowledge and skills related to industrial photonics applications in industry. Topics include applications such as light emitting diode (LED) semiconductor processing, LED photonics operational testing, fiber optics, and spectroscopy. Upon completion, students should be able to describe an analyze the critical issues attendant to a variety of photonics applications.

LEO 222  Photonics Applications Project  1-3-2  
Prerequisites: ELN 132 and LEO 211  
This course provides a structured approach to an applications-oriented photonics project. Emphasis is placed on selecting, planning, implementing, testing, and presenting the project. Upon completion, students should be able to present and demonstrate their photonics project.

MAT 121  Algebra/Trigonometry I  2-2-3  
Prerequisite: Take one set:  
Set 1: DMA 010, DMA 020, DMA 030, DMA 040, DMA 050, and DMA 060; Set 2: DMA 025, DMA 040, DMA 050, DMA 060; Set 3: DMA 025, DMA 045, DMA 060; Set 4: DMA 010, DMA 020, DMA 030, DMA 045, DMA 060; Set 5: MAT 003;  
Local RISE corequisites: Take one group: 1) MAT-021; 2) MAT-003; 3) DMA-010, DMA-020, DMA-030, DMA-040, DMA-050, DMA-060; 4) MAT-121; 5) MAT-161; 7) DMA-010, DMA-020, DMA-030, DMA-040, DMA-050, DMA-065; 8) DMA-025, DMA-045, DMA-060, DMA-070, DMA-080; 9) DMA-025, DMA-040, DMA-050, DMA-065; 10) MAT-060, MAT-070; 11) MAT-060, MAT-080; 12) MAT-060, MAT-090; 13. MAT-095  
This course provides an integrated approach to technology and the skills required to manipulate, display, and interpret mathematical functions and formulas used in problem solving. Topics include the properties of plane and solid geometry, area and volume, and basic proportion applications; simplification,
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Course Descriptions

**MAT 122  Algebra/Trigonometry II  2-2-3**  
Prerequisite: MAT 121
This course is designed to cover concepts in algebra, function analysis, and trigonometry. Topics include exponential and logarithmic functions, transformations of functions, Law of Sines, Law of Cosines, vectors, and statistics. Upon completion, students should be able to demonstrate the ability to use mathematics and technology for problem-solving, analyzing and communicating results.

**MAT 171  Precalculus Algebra  3-2-4**  
Prerequisite: Take one set:
1. DMA-010, DMA-020, DMA-030, DMA-040, DMA-050, DMA-060, DMA-070, and DMA-080; 2. DMA-010, DMA-020, DMA-030, DMA-040, DMA-050, and DMA-065; 3. DMA-010, DMA-020, DMA-030, DMA-045, DMA-060, DMA-070, and DMA-080
4. DMA-010, DMA-020, DMA-030, DMA-045, & DMA-065;
5. DMA-025, DMA-040, DMA-050, DMA-060, DMA-070, & DMA-080;
6. DMA-025, DMA-040, DMA-050, & DMA-065;
7. DMA-025, DMA-045, DMA-060, DMA-070, & DMA-080;
8. DMA-025, DMA-045, & DMA-065; 9. MAT-212; 10. MAT-003
Local RISE Corequisites: Take one group: 1. MAT-071; 2. MAT-003; 3. DMA-010, DMA-020, DMA-030, DMA-040, DMA-050, DMA-060, DMA-070, DMA-080; 4. MAT-121; 5. MAT-161;
6. DMA-010, DMA-020, DMA-030, DMA-040, DMA-050, DMA-065;
7. DMA-010, DMA-020, DMA-030, DMA-045, DMA-065;
This course is designed to develop topics which are fundamental to the study of Calculus. Emphasis is placed on solving equations and inequalities, solving systems of equations and inequalities, and analysis of functions (absolute value, radical, polynomial, rational, exponential, and logarithmic) in multiple representations. Upon completion, students should be able to select and use appropriate models and techniques for finding solutions to algebra-related problems with and without technology. This course has been approved for transfer under the CAA and ICAA as a universal general education transfer component (UGETC) course in Mathematics.

**PHY 131  Physics-Mechanics  3-2-4**  
Prerequisite: MAT 121, or MAT 171
This algebra/trigonometry-based course introduces fundamental physical concepts as applied to engineering technology fields. Topics include systems of units, problem solving methods, graphical analysis, vectors, motion, forces, Newton’s laws of motion, work, energy, power, momentum, and properties of matter. Upon completion, students should be able to apply the principles studied to applications in engineering technology fields.

**WBL 111  Work-Based Learning I  0-10-1**  
Local Prerequisite: Approval of Instructor or Department Chairperson
This course provides a work-based learning experience with a college-approved employer in an area related to the student’s program of study. Emphasis is placed on integrating classroom learning with related work experience. Upon completion, students should be able to evaluate career selection, demonstrate employability skills, and satisfactorily perform work-related competencies.

**WBL 121  Work-Based Learning II  0-10-1**  
Local Prerequisite: Approval of Instructor or Department Chairperson
This course provides a work-based learning experience with a college-approved employer in an area related to the student’s program of study. Emphasis is placed on integrating classroom learning with related work experience. Upon completion, students should be able to evaluate career selection, demonstrate employability skills, and satisfactorily perform work-related competencies.