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

Suggested Course Schedule:		Hours				Notes:
		Class	Lab	Clinical	Credit	
1st Semester (Fall)						
ACA	Student Success Course				1	
CIS 110	Introduction to Computers	2	2	0	3	
EGR 131	Introduction to Electronics Tech	1	2	0	2	
ELC 131	Circuit Analysis I	3	3	0	4	
ELC 131A	Circuit Analysis I Lab	0	3	0	1	
ENG 111	Writing & Inquiry	3	0	0	3	
Mathematics - select one course:					3	
MAT 171	Precalculus Algebra	3	2	0		
MAT 121	Algebra/Trigonometry I	2	2	0		
					17	or 18
2nd Semester (Spring)						
ELC 127	Software for Technicians	1	3	0	2	
ELN 131	Analog Electronics I	3	3	0	4	
ELN 133	Digital Electronics	3	3	0	4	
LEO 111	Lasers and Applications	1	3	0	2	
Mathematics - select one course:					3	
MAT 172	Precalculus Trigonometry	3	2	0		
MAT 122	Algebra/Trigonometry II	2	2	0		
					15	or 16
3rd Semester (Summer)						
ELN 132	Analog Electronics II	3	3	0	4	
Physics - select one course:					4	
PHY 151	College Physics I	3	2	0		
PHY 131	Physics - Mechanics	3	2	0		
					8	
4th Semester (Fall)						
ELN 275	Troubleshooting	1	3	0	2	
LEO 211	Photonics Technology	5	6	0	7	
LEO 212	Photonics Applications	3	3	0	4	
Humanities/Fine Arts Elective		3	0	0	3	
Communications Elective - select one course:					3	
ENG 112*	Writing/Research in the Disciplines	3	0	0		Recommended*
ENG 114	Professional Research & Reporting	3	0	0		
COM 231	Public Speaking	3	0	0		
					19	
5th Semester (Spring)						
ELN 232	Intro to Microprocessors	3	3	0	4	
ISC 221	Statistical Quality Control	3	0	0	3	
LEO 213	Advanced Photonics Applications	3	3	0	4	
Social/Behavioral Science Electives		3	0	0	3	

Technical Elective - Take 2 SHC					2
LEO 222	Photonics Applications Project	1	3	0	2
WBL 111	Work-Based Learning I	0	10	0	1
WBL 121	Work-Based Learning II	0	10	0	1
WBL 122	Work-Based Learning II	0	20	0	2
					16

Total Semester Hours Credit Required for Graduation: **75**

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: ELC 112 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 212
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;
7. DMA-010, DMA-020, DMA-030, DMA-045, 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,

evaluation, and solving of algebraic equations and inequalities and radical functions; complex numbers; right triangle trigonometry; and systems of equations. Upon completion, students will be able to demonstrate the ability to use mathematics and technology for problem-solving, analyzing and communicating results.

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;
8. DMA-025, DMA-045, DMA-065; 9. DMA-025, DMA-040, DMA-050, DMA-060, DMA-070, DMA-080; 10. DMA-025, DMA-045, DMA-060, DMA-070, DMA-080; 11. DMA-010, DMA-020, DMA-030, DMA-045, DMA-060, DMA-070, DMA-080; 12. DMA-025, DMA-040, DMA-050, DMA-065; 13. MAT-060, MAT-080;
14. MAT-060, MAT-090; 15. MAT-095
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.

MAT 172   Precalculus Trigonometry   3-2-4
Prerequisite: MAT 171
This course is designed to develop an understanding of topics which are fundamental to the study of Calculus. Emphasis is placed on the analysis of trigonometric functions in multiple representations, right and oblique triangles, vectors, polar coordinates, conic sections, and parametric equations. Upon completion, students should be able to select and use appropriate models and techniques for finding solutions to trigonometry-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.

PHY 151   College Physics I   3-2-4
Prerequisite: MAT 171 or MAT 271
This course uses algebra and trigonometry-based mathematical models to introduce the fundamental concepts that describe the physical world. Topics include units and measurement, vectors, linear kinematics and dynamics, energy, power, momentum, fluid mechanics, and heat. Upon completion, students should be able to demonstrate and understanding of the principles involved and display analytical problem solving ability for the topics covered. This course has been approved for tranfer under the CAA and ICAA as a universal general education transfer component (UGETC) course in Natural Sciences.

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.

WBL 122   Work-Based Learning II   0-20-2
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.