

Samuel Ginn College of Engineering

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ENGINEERS ARE FACED with worldwide problems and expectations awesome in responsibility, yet exciting as professional challenges. These range from the extremes of interplanetary exploration through earth orbiting systems to the problems arising from our population explosion: energy, better productivity, housing, transportation and environmental issues.

As a renewed appreciation develops for the contributions of science and technology, engineering leaders are calling for engineers, who are better equipped to tackle the specific, technical problems of the future. They also are calling for engineers who by breadth of education and understanding of other disciplines can convince others of the role of engineers not only in technical matters but in policy decisions to ensure the use of technology to benefit mankind.

Engineering education at Auburn also provides in a four-year curriculum both the technical knowledge and the broad general education necessary to equip engineers for their problem-solving challenges. Centered on mathematics and the physical sciences, the curricula also stress the importance of social sciences, humanities and communication skills. Auburn's engineering programs enable individuals to develop their natural talents and provide knowledge, skills and understanding that will help them to find their places in society as well as in their vocations.

Admission

Freshmen eligibility is determined by the Admissions Office. However, since the requirements for engineering education necessitate high school preparatory work of high intellectual quality and of considerable breadth, the following program is recommended as minimum preparation: English, four units; mathematics (including algebra, geometry, trigonometry, and analytical geometry), four units; chemistry, one unit; history, literature, social science, two or three units. Physics and foreign languages are recommended but not required.

Transfers from other institutions must apply through the Admissions Office. The exact placement of these students can be determined only upon review of their transcripts by the Samuel Ginn College of Engineering. See "Admission of Transfer Students" in the General Information section for complete requirements.

The college allows credit for courses completed with satisfactory grades provided the courses correspond in time and content to courses offered at Auburn. Courses that are taught at the 3000-level or higher at Auburn are generally not transferable from junior colleges.

Many courses required by the Samuel Ginn College of Engineering are highly specialized in their content and potential transfer students need to select courses with care. Therefore, to ensure maximum transferability of credits, students are encouraged to contact the College as soon as possible about acceptable credits.

Transfers from on-campus must be approved by the Samuel Ginn College of Engineering and the admissions committee of the chosen curriculum, and meet the same academic requirements as off-campus transfer students. The criteria include a minimum overall Auburn GPA of 2.2 and the completion of the first mathematics course listed in the chosen curriculum with a grade of C or better.

Programs

Pre-Engineering. The Pre-Engineering Program consists of a freshman program of studies to prepare students for curricula in the Samuel Ginn College of Engineering. It also provides academic and career counseling to assist students in determining the curriculum that best fulfills their personal and educational objectives.

Professional Programs. Curricula accredited by the national accrediting agency, the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET), lead to the degrees of Bachelor of Aerospace Engineering, Chemical Engineering, Civil Engineering, Electrical Engineering, Industrial and Systems Engineering, Materials Engineering, Mechanical Engineering, Fiber

Engineering and Biosystems Engineering. The curriculum leading to the Bachelor of Science in Computer Science is accredited by the Computing Accreditation Commission of ABET. The Department of Textile Engineering also administers curricula leading to the degrees of Bachelor of Textile Management and Technology and Bachelor of Textile Chemistry which are accredited by the Textile Institute, an international organization headquartered in Great Britain, which reviews textile academic programs worldwide.

These curricula are designed to meet the educational requirements of the engineering professions. The program in the fundamental sciences of mathematics, chemistry and physics is followed by a study of basic engineering sciences. Specialized or departmental courses are taken in the third and fourth years. Flexibility is provided in all degree programs through electives so that the individual may emphasize areas of personal interest.

A Forest Engineering Option is also available under the Biosystems Engineering degree program. It is offered jointly by the Biosystems Engineering Department and the School of Forestry and Wildlife Sciences. The curriculum in Environmental Science is offered jointly with the College of Agriculture and the College of Sciences and Mathematics.

Dual-Degree. The Samuel Ginn College of Engineering has agreements with several predominantly liberal arts institutions to offer an academic program where a student can earn two baccalaureate degrees. Under the terms of this program the first three years of study are devoted to earning a major in any one of the disciplines offered by the institution first entered, while completing the basic sciences and mathematics courses required for pre-engineering at Auburn.

Upon completion of three years of study in the liberal arts the student transfers to the Samuel Ginn College of Engineering. After a minimum of two years of study in an engineering curriculum, the student earns degrees from both institutions. The broad background provided by this program may enable a student to cope more effectively with many of the problems of modern-day society.

Dual degree agreements have also been made with Auburn University's Colleges of Agriculture, Liberal Arts and Sciences and Mathematics, to provide for dual-degree programs with the Samuel Ginn College of Engineering.

Graduate. The Samuel Ginn College of Engineering offers the M.S. and Ph.D. degrees in aerospace, chemical, civil, computer science and software engineering, electrical and computer, industrial and systems, materials and mechanical engineering and integrated textile and apparel science. The following professional degrees are offered as well: Master of Aerospace Engineering, Master of Chemical Engineering, Master of Civil Engineering, Master of Electrical and Computer Engineering, Master of Industrial and Systems Engineering, Master of Materials Engineering, Master of Mechanical Engineering and Master of Software Engineering. The college also offers a dual degree Master of Industrial and Systems Engineering and Master of Business Administration.

Cooperative Education. The Cooperative Education Program is offered in all curricula of the Samuel Ginn College of Engineering. Refer to the program and write to the Director, Cooperative Education, Auburn University, AL 36849 for a booklet which gives additional information.

Continuing Education. Business and Engineering Continuing Education extends the resources of the Samuel Ginn College of Engineering to the people, businesses and industries of the state. Programs in this service are technical assistance, short courses, conferences, workshops and seminars. For more information, contact: Director, Business and Engineering Continuing Education, 217 Ramsay Hall, Auburn University, AL 36849.

Video-Based Off-Campus Courses. The College offers graduate-level courses for credit and non-credit to off-campus students through its Graduate Outreach Program. Graduate-level courses are recorded in the classroom on the Auburn campus and mailed to off-campus students on the same day. Students enrolled in the program are required to do the same homework assignments and take the same exams as the on-campus students enrolled in the course. For information on admission to the

program, fees, course offerings and other particulars, write to the Graduate Outreach Program, 202 Ramsay Hall, Auburn University, AL 36849 or call (334) 844-5300.

Scholastic Requirements. Pre-Engineering students are transferred to the curriculum of their choice in the Samuel Ginn College of Engineering upon meeting the following requirements:

Complete all appropriate freshman courses;

Earn an overall GPA on all required and approved elective course work as follows: 2.2 for all curricula, except for a 2.0 for Textile Management.

Recommendation by the Curriculum Admissions Committee.

A student who has not met the above criteria after four resident semesters is dropped from the College. Junior standing will not be granted to any student in the Pre-Engineering Program.

Degree Requirements. To earn the bachelor's degree in the Samuel Ginn College of Engineering, students must complete the subjects in the curriculum, have a minimum GPA of 2.0 in all work attempted at Auburn University and have a cumulative GPA of 2.0 on courses passed in the major at Auburn. The major is defined as all course work shown in bold print on the relevant curriculum model. It is the student's responsibility to keep informed of course requirements and scheduling. Failure to do so may jeopardize graduation.

Military Science. All curricula in the Samuel Ginn College of Engineering permit the use of six hours of basic or advanced ROTC courses passed at Auburn University. For the options, see the specific curriculum. For programs that do not have sufficient electives, credit will be determined on an individual basis. ROTC courses cannot be substituted for any university core or ABET-required courses.

Minors

BUSINESS-ENGINEERING-TECHNOLOGY

Students who minor in Business-Engineering-Technology learn, practice, and integrate entrepreneurship, engineering, and business management skills demanded by the technology-driven global economy, solve real-world case study and design problems, and work in cross-functional teams. The minor is a joint offering by the Colleges of Business and Engineering. Admission to the minor is competitive. Engineering and business majors apply for admission to the Business-Engineering-Technology Program as second semester sophomores.

16 semester hours in the minor

Courses required:	Cr. Hr.
BUSI 3510 Introduction to Engineering and Business	3
BUSI 3520 Integrat Bus. and Engr. Theories in Practice	3
BUSI 3550 Cross-Functional Teamwork	1
BUSI 3560 Leadership	1
BUSI 4540 Entrep & Strat. Mngt. Of Tech. & Innov	4
BUSI 4970 Capstone Project I: Design Proposal	1
BUSI 4980 Capstone Project II: Design Project	3

COMPUTER SCIENCE MINOR

19 semester hours in Minor

Courses required:	Cr. Hr.
COMP 1210 Fundamentals of Computing I	3
COMP 2210 Fundamentals of Computing II	4
COMP 2710 Software Construction	3
COMP 3240 Discrete Structures	3
COMP 3270 Introduction to Algorithms	3
COMP 3700 Software Modeling & Design	3

INFORMATION TECHNOLOGY MINOR

15 semester hours in Minor (minimum 9 hours at 3000-level or above, selected from the following courses: COMP 3000, COMP 4000, COMP 4730, COMP 5000, COMP 5010, COMP 5020, COMP 5030).

Courses required: NONE

Elective Courses: see adviser for approved course listing.

Department of Aerospace Engineering

Aerospace engineers are concerned with the application of scientific principles and engineering concepts and practices to design, build, test and operate aerospace systems. The curriculum is intended to provide students with a broad understanding of fundamental scientific and technological principles, and to develop the ability to use these principles in developing solutions to engineering problems.

The objectives of the aerospace engineering program are: (1) to help students develop written and oral communication skills and to acquire a knowledge of history, literature and society; (2) to provide students a solid foundation in and a sound working knowledge of basic engineering principles; (3) to help students obtain an understanding of the engineering principles and skills specifically needed in the aeronautical and astronautical disciplines; and (4) to assist and encourage each student to develop an enhanced ability to learn and think creatively.

Required courses cover aeronautical and astronautical subjects. Students may also choose to emphasize either aeronautical or astronautical systems. Technical electives allow concentration in such areas as aerodynamics, astronautics, flight dynamics and control, propulsion, structures and structural dynamics. The design of aerospace components and systems is considered to be an integral part of the education of aerospace engineers. Hence, design is included throughout the curriculum, beginning with a sophomore course in aerospace fundamentals and culminating in the senior design course sequence. Students are required to apply their theoretical knowledge of aerodynamics, dynamics, structures and propulsion to solve open-ended problems and to produce portions of preliminary designs.

Curriculum in Aerospace Engineering

FR	F	S		F	S
CHEM	1030		Chemistry	4	**
ENGL	1100	1120	English Composition I & II	3	3
PHYS		1600	Engineering Physics I	**	4
MATH	1610	1620	Calculus I & II	4	4
			Core History	3	3
ENGR	1100		Engineering Orientation	0	**
ENGR		1110	Introduction to Engineering	**	2
COMP	1200		Introduction to Computing	2	**
				16	16
SO					
PHYS	1610		Engineering Physics II	4	**
ENGL	2200	2210	World Literature I & II	3	3
MATH	2630		Calculus III	4	**
MATH		2650	Linear Diff Equations	**	3
			Core Philosophy	3	**
			Core Social Science Group 1	**	3
ENGR		2010	Thermodynamics	**	3
ENGR	2050		Statics	3	**
ENGR		2070	Mechanics of Materials	**	3
AERO		2200	Aero Fundamentals	**	2
				17	17
JR					
			Core Fine Arts	3	**
ENGR	2350		Dynamics	3	**
MATH	2660		Topics in Linear Algebra	3	**
ELEC	3810		Fundamentals of EE	3	**
AERO	3110	3120	Aerodynamics I & II	3	3
AERO		3130	Aerodynamics Lab	**	2
AERO		3220	Aerospace Systems	**	3
AERO		3230	Flight Dynamics	**	4
AERO		3310	Orbital Mechanics	**	3
AERO	3610		Aerospace Structures I	2	**
				17	15
SR					
			Core Social Science Group 2	**	3
AERO	4140		Aerodynamics III	3	**
AERO	4510		Aerospace Propulsion	4	**
AERO	4620	4640	Aerospace Structures II & III	3	2
AERO		4630	Aero Structural Dynamics	**	3
AERO	4@ @0		Program Assessment	0	**
			Design Option I & II	3	3
			Aero/Astro Elective	3	3
				16	14
TOTAL HOURS - 128					

Design Option - see adviser for approved course listing.
Aero/Astro - see adviser for approved course listing.

Department of Biosystems Engineering

The mission of the Biosystems Engineering Department is to develop and disseminate engineering knowledge to solve problems in agriculture, food, forestry, natural resources and the environment. It meets the resident instruction portion of that mission through the offering of a degree program which leads to a Bachelor of Biosystems Engineering. A Forest Engineering Option is also available under the Biosystems Engineering degree program.

Biosystems Engineering

The Biosystems Engineering Department offers the only accredited degree in Biosystems Engineering in Alabama. It is committed to preparing students for productive professional careers in the biosystems industries and related natural resource and environmental systems sectors. Specific educational objectives of the Biosystems Engineering Degree program are to produce graduates with: (1) the skills necessary to solve engineering problems associated with the environment and natural resources, and the production, processing, storage, manufacture, utilization, and recycling of biological products; (2) a fundamental understanding of engineering and biological sciences and the ability to combine knowledge from both domains to develop solutions to problems; (3) the ability to analyze critically and conduct scientific experimentation and engineering analysis that leads to development of environmentally and economically feasible design solutions that can be practically implemented; and (4) the ability to understand and expand the role of engineering in society; communicate, work, and provide leadership in multidisciplinary environments; and continue developing professionally and ethically throughout their career. The curriculum is coordinated by the Samuel Ginn College of Engineering and the College of Agriculture. Students should apply for admission to the Samuel Ginn College of Engineering and complete the Pre-Biosystems Engineering program.

Curriculum in Biosystems Engineering

FR	F	S		F	S
CHEM	1030		Chemistry I.....	3	**
CHEM	1031		Chemistry I Lab.....	1	**
ENGL	1100	1120	English Composition I & II.....	3	3
PHYS	1600		Engineering Physics I.....	**	4
MATH	1610	1620	Calculus I & II.....	4	4
			Core History.....	3	3
ENGR	1100		Engineering Orientation.....	0	**
ENGR		1110	Introduction to Engineering.....	**	2
COMP	1200		Introduction to Comp for Engrs & Sci.....	2	**
				16	16
SO					
BIOL	1020		Principles of Biology.....	4	**
BIOL		1030	Organismal Biology.....	**	4
CHEM	1040		Chemistry II.....	3	**
CHEM	1041		Chemistry II Lab.....	1	**
ECON		2020	Microeconomics.....	**	3
ENGR		2070	Mechanics of Materials.....	**	3
ENGR		2010	Thermodynamics.....	**	3
MECH	2110		Statics & Dynamics.....	4	**
MATH	2630		Calculus III.....	4	**
MATH		2650	Differential Equations.....	**	3
				16	16
JR					
ENGL	2200	2210	World Literature I & II.....	3	3
STAT	3010		Statistics for Engrs & Sci.....	3	**
CIVL	3110		Hydraulics.....	4	**
BIOL		3200	General Microbiology.....	**	4
ELEC	3810		Fundamentals of Electrical Engr.....	3	**
BSEN	3210		Mech Power for Biosystems.....	3	**
BSEN	3230		Natural Resource Conserv Eng.....	**	3
BSEN	3240		Thermal Process Ops in Biosys.....	**	3
			Biosystems Electives.....	**	3
				16	16
SR					
			Core Fine Arts.....	**	3
			Core Social Science Group I.....	**	3
			Core Philosophy.....	**	3
AGRN	2040		Basic Soil Science.....	4	**
BSEN	3260		Engr for Precision Ag & Fy.....	3	**
BSEN	4210		Irrigation Systems Design.....	3	**
BSEN	4230		Waste Mgt & Utilization Eng for Biosys.....	**	3
BSEN	4240		Mech & Elec Process Ops in Biosys.....	**	3
BSEN	4310		Engr Design for Biosystems.....	**	4
			Biosystems Elective.....	3	**
				16	16

TOTAL HOURS - 128

Biosystems Electives: see adviser for approved course listing.

Forest Engineering Option

The Biosystems Engineering Department in conjunction with the Samuel Ginn College of Engineering and School of Forestry and Wildlife Sciences offers an option in Forest Engineering as a part of the Bachelor of Biosystems Engineering degree. It is committed to preparing students

for productive professional careers in the forest products industry and related natural resource and environmental systems sector.

The Forest Engineering Option is coordinated by the Samuel Ginn College of Engineering and the School of Forestry. Beginning students should apply to the Samuel Ginn College of Engineering and complete the Forest Engineering Option portion of the Pre-Biosystems Engineering program. Students pursuing the Forest Engineering Option must meet School of Forestry and Wildlife Sciences requirements for admission to the Forestry Summer Field Practicum.

Curriculum in Forest Engineering

FR	F	S		F	S
CHEM	1030		Chemistry I.....	3	**
CHEM	1031		Chemistry I Lab.....	1	**
ENGL	1100	1120	English Composition I & II.....	3	3
PHYS	1600		Engineering Physics I.....	**	4
MATH	1610	1620	Calculus I & II.....	4	4
			Core History.....	3	3
ENGR	1100		Engineering Orientation.....	0	**
ENGR		1110	Introduction to Engineering.....	**	2
COMP	1200		Introduction to Comp for Engrs & Sci.....	2	**
				16	16
SO					
BIOL		1020	Principles of Biology.....	**	4
ENGL	2200	2210	World Literature I & II.....	3	3
ENGR		2010	Thermodynamics.....	**	3
ENGR		2070	Mechanics of Materials.....	**	3
MECH	2110		Statics & Dynamics.....	4	**
MATH	2630		Calculus III.....	4	**
MATH		2650	Differential Equations.....	**	3
STAT	3010		Statistics for Engr & Sci.....	3	**
				14	16
SUMMER PRACTICUM					
	FOEN	3000	Intro to Forest Operations.....	2	**
	FOEN	3040	Forest Surveying.....	3	**
	FOR	3020	Forest Biology.....	2	**
	FOR	3050	Field Mensuration.....	3	**
	FOR	3060	Intro to Forest Management.....	2	**
				12	**
JR					
ECON		2020	Microeconomics.....	**	3
			Core Fine Arts.....	**	3
FOR	3100		Dendrology (F) OR.....	3	**
FOPR	3390		Wood Science (P).....	3	**
CIVL	3110		Hydraulics.....	4	**
FOR	3180		Measurements I.....	3	**
ELEC	3810		Fund of Elect Engr (P) OR.....	3	**
CIVL	3310		Geotechnical Engr (F).....	4	**
BSEN	3210		Mech Power for Biosystems.....	3	**
BSEN	4250		Hydraulic Control Sys Des.....	**	3
BSEN	3230		Natural Resource Conserv Engr OR.....	**	3
BSEN	3240		Therm Process Ops in Biosys (P).....	**	3
BSEN	5220		Intro to Spatial Tech for Biosys (F).....	**	3
				16/17	15
SR					
			PHIL 1020 or 1040 Ethics.....	3	**
			Core Social Science Group I.....	**	3
FOEN	4220		Low Vol Road Design (F) OR.....	**	3
FOPR	4200		Forest Products Utilization (P) OR.....	**	3
FOPR	5210		Primary Wood Process (P) OR.....	3	**
FOR	5230		Silviculture (F).....	4	**
BSEN	4240		Mech & Elect Proc Ops in Biosys (P).....	3	**
BSEN	4310		Engr Design for Biosystems.....	**	4
FOEN	5230		Engr Wood Structures Design.....	3	**
FOEN	5710		Timber Harvest Analy Methods.....	**	3
			Forest Engineering Elective.....	**	3
				12/13	13

TOTAL HOURS - 130/132

Forest Engineering Elective: see adviser for approved course listing.

(F) denotes courses for Forest Emphasis: see adviser for approved course listing.

(P) denotes courses for Products Emphasis: see adviser for approved course listing.

Department of Chemical Engineering

The instructional mission of the department is to provide its chemical engineering graduates with the tools, skills and competencies necessary to understand and apply today's technologies and, through life-long learning, successfully develop and employ tomorrow's technologies.

Chemical engineers contribute to society through the useful application of knowledge and understanding of chemistry, physics, and mathematics. Chemical engineers traditionally have participated in many decisions crucial to the preservation and improvement of society, including

energy, fuel, commodity chemical and food production, resource management, and the design of necessary pollution control measures. Emerging new areas such as biotechnology, space technology, nanofabrication technology, semiconductor devices and modern construction materials also utilize the unique capabilities of the chemical engineer. Many technologies to improve public health depend significantly on chemical engineering such as biomaterials, biomedical devices, medical diagnostics, the chemical design and synthesis of drugs, the genetic engineering of therapeutic materials, drug delivery systems and medical imaging technology. Finally, chemical engineering plays an essential role in important environmental technologies such as atmospheric chemistry, product life cycle analysis, bioremediation, environmental risk and impact analysis, environmental friendly manufacturing technology and products, separation and conversion technologies for waste reduction and the cleanup of contaminated sites.

Because of their broad training and education, chemical engineers contribute to society in many functions, such as pure research, development, environmental protection, process design, plant operation and manufacturing, marketing, sales, and corporate or government administration.

The program is specially designed to assure all students have demonstrated capabilities in the core chemical engineering topics including material and energy balances, thermodynamics, chemical equilibria, heat, mass and momentum transfer, chemical reaction engineering, continuous and stagewise separation operations, process dynamics, statistics and control. The design experience is interwoven throughout the curriculum from elementary design principles in material and energy balances to the capstone senior process design and process control sequence employing advanced computer process and control simulators and experimental control systems.

The curriculum is specifically designed to enable graduates to model and design chemical and physical processes, design and conduct experiments, analyze and interpret chemical engineering data, and to determine capital and operating costs for chemical and physical processes. The curriculum prepares graduates to understand the need for professional integrity and ethical decision making in the practice of chemical engineering as well as providing an understanding of contemporary issues including business practices, environmental, health, and safety and other public interests. Students are also prepared for graduate study in chemical engineering, medicine, business and law.

Because of the breadth of chemical engineering opportunities, the department offers a number of specially designed program specializations that provide unique training and course selection to those students who wish to concentrate in a particular area or technology. The current program specializations are Biochemical Engineering, Computer Control Chemical Engineering, Environmental Chemical Engineering, Pre-Medicine/Biomedical in Chemical Engineering, and Pulp, Paper and Bioresources Engineering.

Curriculum in Chemical Engineering

FR	F	S		F	S
ENGL	1100	1120	English Composition I & II.....	3	3
CHEM	1110	1120	General Chemistry I & II.....	3	3
CHEM	1111	1121	General Chemistry Lab I & II.....	1	1
MATH	1610	1620	Calculus I & II.....	4	4
			Core History I & II.....	3	3
ENGR		1100	Engineering Orientation.....	**	0
ENGR	1110		Introduction to Engineering.....	2	**
COMP		1200	Computer Science.....	**	2
				16	16
SO					
CHEM		2@0	Progress Assessment I.....	**	0
CHEM	2100		Principles of Chemical Engineering.....	4	**
CHEM	2610		Transport I.....	**	3
PHYS	1600		Engineering Physics I.....	3	**
PHYS	1601		Engineering Physics I Lab.....	1	**
ENGL		2200	World Literature I.....	**	3
ENGR		2010	Thermodynamics.....	**	3
CHEM	2070	2080	Organic Chemistry I & II.....	3	3
CHEM	2071		Organic Chemistry Lab I.....	1	**
MATH	2630		Multivariate Calculus.....	4	**
MATH		2650	Differential Equations.....	**	3
				16	15
JR					
ENGL	2210		World Literature II.....	3	**
CHEM		4070	Physical Chemistry I.....	**	3
CHEM		4071	Physical Chemistry Lab.....	**	1

CHEM	3@0	Progress Assessment II.....	**	0
CHEM	3370	Phase & Reaction Equil.....	3	**
CHEM	3600	Computer - Aided Chemical Engineering ...	3	**
CHEM	3620	Transport II.....	3	**
CHEM	3650	Applied ChE Analysis.....	**	3
CHEM	3660	ChE Separations.....	**	3
CHEM	3700	Chemical Reaction Engineering.....	3	**
CHEM	3820	ChE Lab I.....	**	2
CHEM		CHEN Technical Elective I.....		3
				15
SUMMER				15
ECON	2020	Microeconomics.....	3	
PHIL	1040	Business Ethics.....	3	
ELEC	3810	Electrical Engineering.....	3	
CHEM	4860	ChE Lab II.....	2	
				11
SR				
CHEM	4170	Digital Process Control.....	3	**
CHEM	4450	Process Economics.....	3	**
CHEM	4460	Process Sim, Syn & Design.....	2	**
CHEM	4470	Process Design Practice.....	**	3
		CHEN Technical Elective 2.....	3	**
		CHEN Technical Elective 3 or ROTC.....	**	3
		CHEN Technical Elective 4 or ROTC.....	**	3
		Physical Science Elective.....	4	**
		Core Fine Arts.....	**	3
PSYC	1000	Psychology and Culture.....	**	3
				15
				15

TOTAL HOURS - 134

Electives, Technical Electives, Physical Science Electives: See adviser for approved course listing.

Biochemical Engineering Specialization

Chemical engineers trained in biochemical engineering and biotechnology are the key to successful commercialization of new biologically based processes ranging from high value pharmaceuticals to new food processes. This program specialization provides a strong biology and chemistry fundamental background for graduate work in biochemical engineering and a plan of study to meet these objectives.

Students in this specialization take BCHE 5180, BCHE 5181 or CHEM 2081, CHEN 5800, and Biochemical Engineering Technical Electives (9 hours). These courses replace Technical Elective I, II, III, and IV and Physical Science Elective. A list of approved electives is available in the department office.

Computer Control Chemical Engineering Specialization

Chemical engineers with expertise in the application of computer-aided process control, computer-aided process systems and advanced technology are highly sought after by all process industries. The program specialization provides appropriate courses for an individual with interests in computer control.

Students in this specialization take CHEM 4130 and 4131 or PHYS 1610 and PHYS 1611, CHEN 4160, CHEN 4171 and Computer Control Chemical Engineering Technical Electives (6 hours). These courses replace Technical Elective I, II, III, and IV and Physical Science Elective. A list of approved electives is available in the department office.

Environmental Chemical Engineering Specialization

The environmental specialization in chemical engineering prepares students for careers in the expanding environmental arena. Students specializing in this area learn about the chemical processes and reactions that affect the environment, pollution prevention, the latest standards for air, water and land quality, as well as, hazardous materials management. This specialization prepares students for environmental positions in a broad range of manufacturing and service industries all of which must comply with increasingly complex environmental standards, and in various state and federal agencies.

Students in this specialization take CHEM 4130 and 4131, CHEN 5650 and Environmental Chemical Engineering Technical Electives (9 hours). These courses replace Technical Elective I, II, III, and IV and Physical Science Elective. A list of approved electives is available in the department office.

Pre-Medicine Biomedical Chemical Engineering Specialization

This specialization provides the necessary preparation for students wanting to go to medical school or to do graduate work in biomedical engineering. A pre-med series of courses, when completed, provides a chemical engineering degree while simultaneously meeting medical school requirements. Biomedical options allow for emphasis of medical applications of chemical engineering.

Students in this specialization take BIOL 1020/1021, BIOL 1030/31, PHIL 1030, CHEM 2081, and Pre-Med/Biomed Engineering Technical Elective (8 hour). These courses replace Technical Elective I, II, III, and IV, Physical Science Elective, PHIL 1040 and CHEM 4071. A list of approved electives is available in the department office. Students in this program specialization who are interested in medical school must work with the director for Pre-Health Professions in the College of Science and Mathematics.

**Pulp, Paper, and Bio-Resource
Chemical Engineering Specialization**

This specialization prepares students for challenging and rewarding careers in the pulp, paper and bio-resource industries. These industries are unique in being capable of sustainable development with a renewable raw material base, recyclable products, and processing technology able to achieve energy self-sufficiency and environmental compatibility. This specialization prepares students for a broad range of career paths in process engineering, product development, bio-technology and sustainable engineering.

Students in this specialization take BCHE 5180, CHEN 3090, CHEN 4100, CHEN 5110, CHEN 4560, CHEN 4570, and CHEN 5120. These courses replace Technical Elective I, II, III, and IV, Physical Science Elective, CHEN 4460, CHEN 4470, and CHEM 4071. A list of approved electives is available in the department office.

Department of Civil Engineering

Civil engineers conceive, plan, design, construct, operate, and maintain the facilities and systems that serve the basic needs of society. Auburn University's Department of Civil Engineering strives to prepare students, through high quality programs, to practice civil engineering professionally in a competitive global environment. The department's objectives include preparing graduates to play an active role in the civil engineering profession by functioning as effective team members while developing leadership skills in the profession and in the community, communicating ideas and information effectively, and expanding their body of knowledge and experience as they make progress towards licensure as professional engineers. Graduates should be able to successfully engage in one or more of the following activities: planning and design of new civil infrastructure systems, or rehabilitation of existing systems; monitoring and analysis of the performance of existing infrastructure systems to assess their safety, efficiency, or remaining usefulness; management of natural resources and processes; management of construction or rehabilitation processes; and graduate or professional studies.

The first two years focus on basic principles, which are applied in the last two years in required and elective courses in major specialty areas including construction, geotechnical, transportation, hydraulics, structures, pavements, and environmental engineering. Engineering science and design are integrated throughout, with the design emphasis shifting from introduction of fundamental concepts, principles and tools in the early courses to increasingly realistic situations. The experience culminates in the capstone senior design project. Graduates are prepared for a variety of entry-level civil engineering positions.

Curriculum in Civil Engineering

FR	F	S		F	S
ENGL	1100	1120	English Composition I & II.....	3	3
PHYS	1600	1610	Engineering Physics I & II.....	4	4
MATH	1610	1620	Calculus I & II.....	4	4
			Core History.....	3	3
ENGR	1100		Engineering Orientation.....	0	**
ENGR		1110	Introduction to Engineering.....	**	2
COMP	1200		Introduction to Computing.....	2	**
				16	16
SO					
CHEM	1030	1040	Fund of Chemistry I & II.....	3	3
CHEM	1031		Fund of Chemistry I Lab.....	1	**
ENGL	2200		World Literature I.....	3	**
ENGR	2050		Statics.....	3	**
ENGR		2070	Mechanics of Materials.....	**	3
ENGR		2200	Thermo/Fluids/Heat.....	**	3
ENGR		2350	Dynamics.....	**	3
MATH	2630		Calculus III.....	4	**
MATH		2650	Linear Diff Equations.....	**	3
CIVL	2010		Surveying.....	3	**
				17	15

SUMMER					
ENGL	2210		World Literature II.....	3	
			Core Social Science.....	3	
STAT	3010		Stat Meth Sci & Engineering.....	3	
				9	
JR					
CIVL	3010		Civil Engineering Analysis.....	4	**
CIVL	3110		Hydraulics.....	4	**
CIVL	3230		Intro to Environmental Engr.....	**	4
CIVL	3310		Geotechnical Engineering I.....	4	**
CIVL	3410		Construction Engineering.....	**	3
CIVL	3510		Transportation Engineering.....	**	4
CIVL	3610		Structural Analysis.....	4	**
CIVL	3810		Civil Engineering Materials.....	**	4
				16	15
SR					
PHIL	1020		Introduction to Ethics.....	3	**
			Core Fine Arts.....	**	3
			Core Social Science.....	3	**
CIVL			Specialty Elective.....	6	6
CIVL			Technical Elective.....	3	3
CIVL			Senior Design Project.....	**	3
				15	15

TOTAL HOURS - 134

Technical Elective, Design Elective: see adviser for approved course listing.

Environmental Science

The Environmental Science program, like the rather broad field of environmental science, is by its very nature highly interdisciplinary. Although, the Samuel Ginn College of Engineering administers the program through the Department of Civil Engineering, the College of Agriculture and the College of Sciences and Mathematics are equal partners in developing the curriculum, guiding student development and providing instruction.

Environmental quality issues tend to be complex and often a significant level of expertise in physics, chemistry, biology, and geology is needed just to understand and appreciate a specific problem. Moreover, formulating solutions often requires mathematical expertise as well as specific knowledge of the air, water, and soil environments. Thus, the program is structured to educate environmental scientists quite broadly, but also with considerable depth.

The program is specifically tailored to produce graduates who can enter and have a reasonable expectation of success in a field that is continually changing. The principal educational goals are to provide each student with a broad-based general education, a solid background in mathematics, physical science, and biological science, breadth of exposure to the environmental science field, and depth of knowledge in a specific area of environmental science of choice.

The curriculum is organized around a core of courses that are required of all students. Students desiring to specialize may select from groups of courses, called professional tracks, that emphasize environmental applications of biological science, physical science, soils science, or engineering science. A general environmental science track is also available.

Curriculum in Environmental Science

FR	F	S		F	S
BIOL		1020	Principles of Biology.....	**	4
CHEM	1030	1040	Fundamentals of Chemistry I & II.....	3	3
CHEM	1031	1041	Fundamentals of Chemistry I & II Lab.....	1	1
ENGL	1100	1120	English Composition I & II.....	3	3
MATH	1610		Calculus I.....	4	**
			Core History.....	3	3
AGEC	2100		Microcomputer Application.....	3	**
ENVI	1010		Intro to Environmental Science.....	0	**
ENVI		1020	Fund of Environmental Science.....	**	2
				17	16
SO					
BIOL	1030		Organismal Biology.....	4	**
PHYS	1500	1510	General Physics I & II.....	4	4
ENGL	2200	2210	World Literature I & II.....	3	3
GEOL	1100		Physical Geology.....	4	**
CHEM		2030	Survey of Organic Chemistry.....	**	3
STAT		2510	Introduction to Statistics.....	**	3
ENVI	2010		Environ Science Seminar.....	1	**
GEOL	2100		Environmental Geology.....	**	3
				16	16
JR					
CHEM		3050	Analytical Chemistry.....	**	3
CHEM		3051	Analytical Chemistry Lab.....	**	1
FORY	4470		GIS Applications.....	2	**

JR					
PHIL	1040	Business Ethics	**	3	
ENGR	2100	Fund of Engr Mechanics	3	**	
MATH	2650	Linear Differential Equations	3	**	
STAT	3600	Probability and Statistics	3	**	
COMP	3220	Principles of Programming Languages	3	**	
COMP	3240	Discrete Structures	3	**	
COMP	3270	Introduction to Algorithms	3	**	
COMP	3350	Comp Org & Assemb Lng Prog	3	**	
COMP	3500	Introduction to Operating Systems	3	**	
COMP	3700	Software Modeling and Design	3	**	
			15	15	

TOTAL HOURS - 123

COMP Electives: See adviser for approved course listing.

Department of Electrical and Computer Engineering

The Electrical and Computer Engineering curricula produce well-educated graduates prepared to practice engineering at a professional level in an era of rapid and challenging technological development. The educational objectives of the Electrical Engineering curriculum include developing within our graduates a basic foundation in seven fundamental areas of electrical engineering (circuits and systems, electromagnetics, electronics, digital systems, communications and signal processing, control systems, and power engineering) to provide the technical proficiency needed for the professional practice of electrical engineering. The educational objectives of the Computer Engineering Option include developing within our graduates a basic foundation in both electrical engineering (circuits and systems, electronics, and digital systems) and computer science to provide the technical proficiency needed for the professional practice of computer engineering, including the design and application of computer components and systems. In addition, both curricula have as educational objectives to develop within our graduates the ability to communicate their ideas effectively within the technical community and to the general public, to prepare them to take their places in society as responsible citizens, and to provide them with the basis for, and instill within them an appreciation of and enthusiasm for, lifelong scientific inquiry, learning and creativity.

The goal of the professional portion of each curriculum is to emphasize basic areas of study while providing the flexibility to accommodate a diversity of interests and talents. To this end, each curriculum emphasizes engineering design, hands-on laboratory experience, knowledgeable use of digital computer systems, oral and written communication skills, the importance of business, economic, social and global forces on engineering, appreciation of the need to maintain the highest ethical standards, and the maintenance of professional competence through continued self-improvement after graduation.

Each curriculum builds upon a solid foundation in mathematics and science. In the Electrical Engineering curriculum, topics in the seven fundamental areas of electrical engineering are introduced early and are carefully coordinated to provide the principles necessary for the practice of electrical engineering. In the Computer Engineering Option, fundamental topics in both electrical engineering and computer science are introduced early and are carefully coordinated to provide the principles necessary for the design and application of computer components and systems. In each case, design experience is interwoven throughout the curriculum by introducing basic design concepts early, emphasizing design experiences in the laboratories, and culminating with a capstone design project in the senior year. The senior year elective structure provides students with the flexibility to pursue a range of career options.

Curriculum in Electrical Engineering					
FR	F	S		F	S
ENGL	1100	1120	English Composition I & II	3	3
PHYS	1600	1610	Engineering Physics I & II	4	4
MATH	1610	1620	Calculus I & II	4	4
			Core History	3	3
ENGR	1100		Engineering Orientation	0	**
ENGR	1110		Introduction to Engineering	**	2
COMP	1200		Intro to Comp Prog for Engr & Sci	2	**
				16	16

SO					
CHEM	1030		Fundamentals of Chemistry I	**	3
CHEM	1031		Fundamentals of Chemistry I Lab	**	1
			Core Social Science Group 1	3	**
MATH	2630		Calculus III	4	**
MATH	2650		Linear Diff Equations	3	**
MATH	2660		Topics in Linear Algebra	**	3
ELEC	2010	2020	EE Lab I & II	1	1
ELEC	2110		Electric Circuit Analysis	3	**
ELEC	2120		Linear Signals & Systems Analysis	**	3
ELEC	2210		Digital Electronics	**	3
ELEC	2200		Digital Logic Circuits	3	**
ELEC	2220		Computer Systems	**	3
				17	17

JR					
ENGL	2200	2210	World Literature I & II	3	3
ELEC	3030	3040	EE Lab III & IV	1	1
ELEC	3310		Fundamentals of Electromagnetics	3	**
ELEC	3320		Electromagnetics for Wireless App	**	3
ELEC	3400		Communication Systems	**	3
ELEC	3500		Control Systems	**	3
ELEC	3600		Electric Power Engineering	3	**
ELEC	3700		Analog Electronics	3	**
ELEC	3800		Random Signals and Systems	3	**
			Fine Arts Elective	**	3
				15	15

TOTAL HOURS - 128

ELEC Elective, Math/Science Elective: see adviser for approved course listing.

Curriculum in Electrical Engineering (Computer Engineering Option)					
FR	F	S		F	S
ENGL	1100	1120	English Composition I & II	3	3
PHYS	1600	1610	Engineering Physics I & II	4	4
MATH	1610	1620	Calculus I & II	4	4
			Core History	3	3
COMP		1210	Fund of Computing I	**	3
ENGR	1110		Introduction to Engineering	2	**
ENGR	1000		Engineering Orientation	0	**
				16	17

SO					
MATH	2630		Calculus III	4	**
MATH	2650		Linear Diff Equations	3	**
MATH	2660		Topics in Linear Algebra	**	3
COMP	2710		Software Construction	**	3
ELEC	2010	2020	EE Lab I & II	1	1
ELEC	2110		Electric Circuit Analysis	3	**
ELEC	2120		Linear Signals & Systems Analysis	**	3
COMP	2210		Fundamentals of Computer Sci II	4	**
ELEC	2210		Digital Electronics	**	3
ELEC	2200		Digital Logic Circuits	3	**
ELEC	2220		Computer Systems	**	3
				18	16

JR					
CHEM	1030		Fundamentals of Chemistry I	**	3
CHEM	1031		Fundamentals of Chemistry I Lab	**	1
ENGL	2200	2210	World Literature I & II	3	3
			Core Fine Arts	**	3
ELEC	3050		Computer Systems Design Lab	1	**

COMP	3350	Comp. Org. & Assembly Language.....	3	**	ENGR	2100	Fundamentals of Engr Mechanics.....	**	3
COMP	3510	Embedded Systems Software.....	**	3	INSY	3020	Occup. Safety & Ergon.....	**	3
COMP	3710	Wireless Software Engineering.....	**	3	INSY	3021	Methods Engr. & Meas.....	**	2
INSY	3410	Deterministic Operations Research.....	**	3	STAT	3600	Prob. & Statistics I & II.....	**	3
		Math/Science Elective*			STAT	3611	Applied Statistics Lab.....	**	1
ELEC	3400	Communication Systems	**	3					17
ELEC	3800	Random Signals & Systems	**	3	JR				15
			15	15	ENGL	2210	World Literature II.....	**	3
SR							Core Social Science Group 1 & 2.....	3	3
PHIL	1040	Business Ethics.....	3	**	COMP	3000	Obj. Or. Programming	3	**
INSY	3600	Engineering Economics	3	**	INSY	3400	Stochastic Operations Research.....	3	**
COMP	4730	Computer Ethics.....	**	1	INSY	3410	Deterministic Operation Research	3	**
COMP	4320	Introduction to Computer Networks	3	**	INSY	3800	Manufacturing Processes	3	**
COMP	4710	Senior Design Project.....	**	3	INSY	3420	Simulation	**	3
ELEC	3060	Wireless Design Lab	1	**	INSY	3600	Engineering Economy	**	3
COMP	5700	Software Process * OR.....	3	**	INSY	3700	Operations Planning	**	3
ELEC	5120	Telecommunication Networks	**						15
COMP	5710	Software Quality Assurance * OR.....	**	3	SR		Fine Arts	**	3
COMP	5340	Network Quality Assurance	**				Fundamentals of Electrical Engineering	3	**
COMP	5360	Wireless & Mobile Networks	**	3	ELEC	3810	Ethics	3	**
		Wireless Elective/ROTC.....	**	3	PHIL	1040	Quality Control	3	**
		Free Elective/ROTC	3	**	INSY	4330	Professional Practice.....	1	**
		Fine Arts Elective	**	3	INSY	4500	Manufacturing Systems.....	3	**
			16	16	INSY	4700	Senior Design Projects.....	**	3
		TOTAL HOURS - 128			INSY	4800	INSY Electives	3	3
							ENGR Elective	**	3
							Technical Elective.....	**	3
									16
									15

* Software Specialization requires COMP 5700, COMP 5710, and a Math/Science Elective
 ** Network Specialization requires INSY 3410, COMP 5340, ELEC 5120
 Wireless Elective, Math/Science Elective: See adviser for approved course listing.

Department of Industrial and Systems Engineering

The Industrial and Systems Engineering (INSY) curriculum draws on specialized skills in the mathematical, physical and social sciences to develop a student's ability to deal with economic, technical and human considerations in design, analysis and control of industrial and service systems. The curriculum provides a solid core of courses in systems analysis and design, along with courses in ergonomics and economic analysis. To graduate students with a BISE degree who will: 1. Have the technical expertise necessary for the broad practice of Industrial and Systems Engineering. This includes analytical, computational and experimental expertise and the ability to integrate and synthesize their expertise to solve complex problems. 2. View technical problems from a systems perspective with attention to human, business, equipment, materials, energy and information aspects and with appreciation of global and societal contexts. 3. Be able to effectively communicate technical ideas through oral and written media and to function effectively as members and/or leaders of diverse teams. 4. Appreciate the changing world and its effect on the practice of engineering with concern for ethics, currency of expertise and contemporary issues. Design experience is integrated throughout the curriculum starting in the freshman year and culminates in a one semester senior design project in which students apply their knowledge to the solution of real-world problems. Technical and departmental engineering elective courses provide flexibility in the program. Technical electives allow students to select from courses in engineering, statistics and computer science. The degree provides graduates with broad, flexible career opportunities with manufacturing, consulting, service or governmental organizations. The degree can also provide the foundation and background for further studies in engineering and business.

Curriculum in Industrial and Systems Engineering

FR	F	S		F	S
ENGL	1100	1120	English Composition I & II.....	3	3
			History I & II	3	3
MATH	1610	1620	Calculus I & II.....	4	4
PHYS		1600	Physics I & Lab	**	4
CHEM	1030		Fundamentals of Chemistry	3	**
CHEM	1031		Fundamentals of Chemistry Lab	1	**
COMP		1200	Intro. Comp. Prog.....	**	2
ENGR	1100		Eng. Orientation	0	**
ENGR	1110		Introduction to Engineering.....	2	**
				16	16
SO					
ENGL	2200		World Literature I & II.....	3	**
PHYS	1610		Physics II	3	**
PHYS	1611		Physics II Lab.....	1	**
MATH	2630		Calculus III	4	**
MATH	2650		Linear Diff Equations.....	3	**
MATH		2660	Topics in Linear Algebra	**	3

TOTAL HOURS — 125

Department of Mechanical Engineering

The Department of Mechanical Engineering focuses on the design and operation of machinery and the prediction of machine behavior in industries such as: vehicles (land, sea, air, and space), processing (of materials, food, and chemicals), production and fabrication, power generation, heating and refrigeration, and many others. Mechanical engineers design both mechanical components, as well as mechanical systems comprised of different categories of components. Mechanical engineers study the engineering sciences of rigid mechanics (force and motion), deformable mechanics (stress and strain), thermo-fluid sciences (energy and hydraulics), and mechanisms (dynamics and control), often applying these sciences far afield from the traditional mechanical industries.

The mission of the Mechanical Engineering Program is to educate students to become professionals who are prepared to enter practice, and to engage in advanced and lifelong learning, in the profession of mechanical engineering. The Program emphasizes a background in the fundamental disciplines of Mechanical Engineering, as well as the supporting mathematics, basic science, and core subjects, leading to a comprehensive design experience in the senior year. Laboratory experience (physical and computer) and communication (written and oral) are emphasized throughout the curriculum. Specialized concentrations are offered in Automotive Engineering (in cooperation with the Society of Automotive Engineers Collegiate Design Series) and in Pulp and Paper (in cooperation with the Pulp and Paper Institute).

Curriculum in Mechanical Engineering

FR	F	S		F	S
MATH	1610	1620	Calculus I & II.....	4	4
PHYS		1600	Engineering Physics I.....	**	4
ENGL	1100	1120	English Composition I & II.....	3	3
			Core History	3	3
CHEM	1030		Fund. of Chemistry I.....	3	**
CHEM	1031		Fund. of Chemistry I Lab	1	**
COMP	1200		Introduction to Computing.....	2	**
ENGR	1100		Engineering Orientation	0	**
ENGR		1110	Introduction to Engineering	**	2
				16	16
SO					
PHYS	1610		Engineering Physics II	4	**
MATH	2630		Calculus III	4	**
MATH	2650		Linear Differential Equations.....	3	**
MATH		2660	Linear Algebra	**	3
ENGR		2010	Thermodynamics I.....	**	3
MATL		2100	Introduction to Materials Science	**	3
MECH	2@ @0		Mech. Eng. Progress Assessment I	0	**
MECH	2110		Statics and Dynamics	4	**
MECH		2120	Kinematics & Dynamics of Machines.....	**	4
MECH		2210	Concepts in Design & Manufacturing	**	3
				15	16

