Biological and Agricultural Engineering Technology (BS): Environmental Systems Management Concentration

To see more about what you will learn in this program, visit the Learning Outcomes website (https://apps.oirp.ncsu.edu/pgas/)!

The BAET curriculum is administered by the College of Agriculture and Life Sciences and is intended to uniquely prepare students for hands-on application of technology to efficiently manage agricultural and environmental systems. Flexibility within the program allows students to attain depth in science, business, or environmental areas. Graduates provide a critical link in the agricultural and environmental spectrum by interacting directly with both production personnel as well as the designers and implementers of technological systems.

The program objectives of the Biological and Agricultural Engineering Technology (BAET) Bachelor of Science (B.S.) degree are to:

- Develop technical knowledge of physical and biological sciences used in agricultural and environmental systems;
- Apply critical thinking, existing technology and practical approaches to solve problems in agricultural and environmental systems;
- Produce technologists able to work in teams and effectively communicate to audiences; and
- Develop in students an appreciation for life-long education that supports their careers.

Plan Requirements

Major GPA must be 2.0 or higher for graduation.

Code	Title	Hours	Counts towards
Orientation			
ALS 103	Freshman Transitions and Diversity in Agriculture & Life Sciences	1	
or ALS 303	Transfer Transitions and Diversity in Agriculture & Life Sciences		
Communication		**3**	
COM 110	Public Speaking		
ENG 331	Communication for Engineering and Technology		
ENG 332	Communication for Business and Management		
ENG 333	Communication for Science and Research		
Mathematical Sciences			
MA 131	Calculus for Life and Management Sciences A	3	
MA 114	Introduction to Finite Mathematics with Applications	3	
ST 350	Economics and Business Statistics	3	
Natural & Physical Sciences			
CH 101 & CH 102	Chemistry - A Molecular Science and General Chemistry Laboratory	4	
PY 211	College Physics I	4	
BIO 181	Introductory Biology: Ecology, Evolution, and Biodiversity	4	
SSC 200 & SSC 201	Soil Science and Soil Science Laboratory	4	
Physical Science Elective		4	
CH 201 & CH 202	Chemistry - A Quantitative Science and Quantitative Chemistry Laboratory		
or PY 212	College Physics II		
Major Requirements			
BAE 100	Introduction to Biological and Agricultural Engineering and Technology	1	
BAE 200	Computer Methods in Biological Engineering	2	
BAET 201	Shop Processes and Management	3	
BAET 323	Water Management	3	
BAET 332	Management of Animal Environments	4	
BAET 333	Processing Agricultural Products	4	

BAET 343	Agricultural Electrification	4
BAET 432	Agricultural and Environmental Safety and Health	3
BAET 450	Biological and Agricultural Engineering Technology Capstone	3
GC 120	Foundations of Graphics	3
ARE 201	Introduction to Agricultural & Resource Economics	3
AEE 323	Leadership Development in Agriculture and Life Sciences	3
Environmental Systems Management		
BAET 411	Agricultural Machinery and Power Units	4
BAE 325	Introductory Geomatics	3
BAET 443	Environmental Restoration Implementation	3
GIS 280	Introduction to GIS	3
BAET Electives		
ARE Electives (p. 2)		6
Restricted Electives (p. 2)		9
Restricted electives can emphasize agricultural, environmental, or business areas and be effectively used for a minor.		
GEP Courses		
ENG 101	Academic Writing and Research [1]	4
GEP Humanities (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/)		6
GEP Social Sciences (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-social-sciences/)		3
GEP Health and Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/)		2
GEP US Diversity, Equity, and Inclusion (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-usdei/)		3
GEP Interdisciplinary Perspectives (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-interdisciplinary-perspectives/)		5
GEP Global Knowledge (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-global-knowledge/) (verify requirement)		
Foreign Language Proficiency (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/foreign-language-proficiency/) (verify requirement)		
Total Hours		**120**

[1] A grade of C- or higher is required.

ARE Electives

Code	Title	Hours	Counts towards
ARE 303	Farm Management	3	
ARE 304	Agribusiness Management	3	
ARE 306	Agricultural Law	3	
ARE 309	Environmental Law & Economic Policy	3	
ARE 311	Agricultural Markets	3	
ARE 312	Agribusiness Marketing	3	
ARE 321	Agricultural Financial Management	3	
ARE 336	Introduction to Resource and Environmental Economics	3	
EC 336	Introduction to Resource and Environmental Economics	3	

Restricted Electives

Code	Title	Hours	Counts towards
Group A - Biological Sciences			
AEC 360	Ecology	4	
AEC 420	Introduction to Fisheries Science	3	

AEC 423	Introduction to Fisheries Sciences Laboratory	1
AEE 208	Agricultural Biotechnology: Issues and Implications	3
ANS 105	Introduction to Companion Animal Science	3
ANS 110	Introduction to Equine Science	3
ANS 150	Introduction to Animal Science	3
ANS 151	Introduction to Animal Science Lab	1
ANS 205	Physiology of Domestic Animals	3
ANS 206	Anatomy of Domestic Animals Lab	1
ANS 208	Agricultural Biotechnology: Issues and Implications	3
ANS 215	Agricultural Genetics	3
ANS 220	Reproductive Physiology	3
ANS 221	Reproductive Physiology Lab	1
ANS 230	Animal Nutrition	3
ANS 231	Animal Nutrition Lab	1
ANS 415	Comparative Nutrition	3
ANS 452	Comparative Reproductive Physiology and Biotechnology	3
ANS 453	Physiology and Genetics of Growth and Development	3
ANS 454	Lactation, Milk and Nutrition	3
ANS 515	Comparative Nutrition	3
ANS 552	Comparative Reproductive Physiology and Biotechnology	3
ANS 553	Physiology and Genetics of Growth and Development	3
ANS 554	Lactation, Milk and Nutrition	3
BCH 101	Introduction to Microbiology and Biochemistry Laboratory Practices	3
BCH 220	Role of Biotechnology in Society	3
BCH 351	General Biochemistry	3
BCH 451	Principles of Biochemistry	4
BCH 452	Introductory Biochemistry Laboratory	2
BCH 453	Biochemistry of Gene Expression	3
BCH 454	Advanced Biochemistry Laboratory	4
BCH 455	Proteins and Molecular Mechanisms	3
BCH 553	Biochemistry of Gene Expression	3
BCH 555	Proteins and Molecular Mechanisms	3
BEC 463	Fermentation of Recombinant Microorganisms	2
BEC 563	Fermentation of Recombinant Microorganisms	2
BIO 181	Introductory Biology: Ecology, Evolution, and Biodiversity	4
BIO 267	Research in the Life Sciences I: Research Skills	3
BIO 414	Cell Biology	3
BIO 434	Hormones and Behavior	3
BIO 440	The Human Animal: An Evolutionary Perspective	3
BIT 410	Manipulation of Recombinant DNA	4
BIT 462		2

BIT 463	Fermentation of Recombinant Microorganisms	2
BIT 464	Protein Purification	2
BIT 466	Animal Cell Culture Techniques	2
BIT 467	PCR and DNA Fingerprinting	2
BIT 468		2
BIT 476	Applied Bioinformatics	2
BIT 481	Plant Tissue Culture and Transformation	2
BIT 501	Ethical Issues in Biotechnology	1
BIT 562		2
BIT 564	Protein Purification	2
BIT 566	Animal Cell Culture Techniques	2
BIT 567	PCR and DNA Fingerprinting	2
BIT 568		2
CHE 463	Fermentation of Recombinant Microorganisms	2
CHE 563	Fermentation of Recombinant Microorganisms	2
ENT 201	Insects and People	3
ENT 207	Insects and Human Disease	3
ENT 402	Forest Entomology	3
ENT 425	General Entomology	3
FOR 402	Forest Entomology	3
FS 231	Principles of Food and Bioprocess Engineering	4
FS 301	Introduction to Human Nutrition	3
FS 401	Advanced Nutrition and Metabolism	3
FS 402	Chemistry of Food and Bioprocessed Materials	4
FS 403	Analytical Techniques in Food & Bioprocessing Science	4
FS 405	Food Microbiology	3
FS 406	Food Microbiology Lab	1
FS 501	Advanced Nutrition and Metabolism	3
FS 502	Chemistry of Food and Bioprocessed Materials	4
FS 505	Food Microbiology	3
FS 506	Food Microbiology Lab	1
FW 313	Mountain Wildlife Ecology and Management	1
FW 353	Wildlife Management	3
FW 403	Urban Wildlife Management	3
FW 404	Wildlife Habitat Management	3
FW 453	Principles of Wildlife Science	4
HS 215	Agricultural Genetics	3
MB 101	Introduction to Microbiology and Biochemistry Laboratory Practices	3
MB 405	Food Microbiology	3
MB 406	Food Microbiology Lab	1
MB 505	Food Microbiology	3
MB 506	Food Microbiology Lab	1
NTR 301	Introduction to Human Nutrition	3
NTR 401	Advanced Nutrition and Metabolism	3
NTR 415	Comparative Nutrition	3
NTR 419	Human Nutrition and Chronic Disease	3
NTR 454	Lactation, Milk and Nutrition	3

NTR 501	Advanced Nutrition and Metabolism	3
NTR 515	Comparative Nutrition	3
PB 103	Perspectives on Botany	1
PB 200	Plant Life	4
PB 205	Our Green World	3
PB 208	Agricultural Biotechnology: Issues and Implications	3
PB 213	Plants and Civilization	3
PB 215	Medicinal Plants	3
PB 219	Plants in Folklore, Myth, and religion	3
PB 220	Local Flora	3
PB 250	Plant Biology	4
PB 277	Space Biology	3
PB 321	Introduction to Whole Plant Physiology	3
PB 360	Ecology	4
PB 400	Plant Diversity and Evolution	4
PB 403	Systematic Botany	4
PB 413	Plant Anatomy	2
PB 421	Plant Physiology	3
PB 445	Paleobotany	4
PB 464	Rare Plants of North Carolina	3
PB 480	Introduction to Plant Biotechnology	3
PB 481	Plant Tissue Culture and Transformation	2
PB 503	Systematic Botany	4
PB 513	Plant Anatomy	2
PB 545	Paleobotany	4
PB 564	Rare Plants of North Carolina	3
PB 580	Introduction to Plant Biotechnology	3
PHY 452	Comparative Reproductive Physiology and Biotechnology	3
PHY 552	Comparative Reproductive Physiology and Biotechnology	3
PO 415	Comparative Nutrition	3
PO 466	Animal Cell Culture Techniques	2
PO 515	Comparative Nutrition	3
PO 566	Animal Cell Culture Techniques	2
PP 150	Introduction to Plant Molecular Biology	3
PP 222	Kingdom of Fungi	3
Group A - Biological Sciences		
AEC 419	Freshwater Ecology	4
AEC 420	Introduction to Fisheries Science	3
AEC 423	Introduction to Fisheries Sciences Laboratory	1
AEC 441	Biology of Fishes	3
AEC 442	Biology of Fishes Laboratory	1
AEC 460	Field Ecology and Methods	4
AEC 519	Freshwater Ecology	4
ANS 215	Agricultural Genetics	3
ANS 415	Comparative Nutrition	3
ANS 515	Comparative Nutrition	3
BEC 463	Fermentation of Recombinant Microorganisms	2
BEC 563	Fermentation of Recombinant Microorganisms	2
BIO 140	Survey of Animal Diversity	3
BIO 141	Animal Diversity Laboratory	1
BIO 227	Understanding Structural Diversity through Biological Illustration	3
BIO 315	General Parasitology	3

BIO 330	Evolutionary Biology	3
BIO 361	Developmental Biology	3
BIO 370	Developmental Anatomy of the Vertebrates	3
BIO 375	Developmental Anatomy Laboratory	2
BIO 405	Functional Histology	3
BIO 414	Cell Biology	3
BIO 424	Endocrinology	3
BIO 482	Capstone Course in Molecular, Cellular, and Developmental Biology	3
BIO 483	Capstone Course in Integrative Physiology and Neurobiology	3
BIO 484	Capstone Course in Human Biology	3
BIO 485	Capstone Course in Ecology, Evolution, and Conservation Biology	3
BIO 488	Neurobiology	3
BIO 588	Neurobiology	3
BIT 210	Phage Hunters	3
BIT 211	Phage Genomics	2
BIT 463	Fermentation of Recombinant Microorganisms	2
BIT 563	Fermentation of Recombinant Microorganisms	2
BME 301	Human Physiology : Electrical Analysis	3
BME 302	Human Physiology: Mechanical Analysis	4
CHE 463	Fermentation of Recombinant Microorganisms	2
CHE 563	Fermentation of Recombinant Microorganisms	2
CS 211	Plant Genetics	3
ENT 425	General Entomology	3
FS 301	Introduction to Human Nutrition	3
FS 405	Food Microbiology	3
FS 406	Food Microbiology Lab	1
FS 505	Food Microbiology	3
FS 506	Food Microbiology Lab	1
FW 353	Wildlife Management	3
GN 301	Genetics in Human Affairs	3
GN 311	Principles of Genetics	4
GN 312	Elementary Genetics Laboratory	1
GN 421	Molecular Genetics	3
GN 423	Population, Quantitative and Evolutionary Genetics	3
GN 425	Advanced Genetics Laboratory	2
GN 434	Genes and Development	3
GN 441	Human and Biomedical Genetics	3
GN 451	Genome Science	3
GN 490	Genetics Colloquium	1
GN 521	Molecular Genetics	3
GN 541	Human and Biomedical Genetics	3
HS 215	Agricultural Genetics	3
HS 451	Plant Nutrition	3
HS 551	Plant Nutrition	3
MB 180	Introduction to Microbial Bioprocessing	3
MB 200	The Fourth Horseman: Plagues that Changed the World	3
MB 210	Phage Hunters	3
MB 211	Phage Genomics	2
MB 351	General Microbiology	3

MB 352	General Microbiology Laboratory	1
MB 354	Inquiry-Guided Microbiology Lab	1
MB 405	Food Microbiology	3
MB 406	Food Microbiology Lab	1
MB 411	Medical Microbiology	3
MB 412	Medical Microbiology Laboratory	1
MB 414	Microbial Metabolic Regulation	3
MB 420	Fundamentals of Microbial Cell Biotransformations	2
MB 441	Immunology	3
MB 451	Microbial Diversity	3
MB 452	Microbial Diversity Lab	2
MB 455	Microbial Biotechnology	3
MB 461	Molecular Virology	3
MB 480	Current Issues in Microbiology	1
MB 505	Food Microbiology	3
MB 506	Food Microbiology Lab	1
MB 520	Fundamentals of Microbial Cell Biotransformations	2
MEA 200	Introduction to Oceanography	3
MEA 210	Oceanography Lab	1
MEA 220	Marine Biology	3
MEA 250	Introduction to Coastal Environments	3
MEA 251	Introduction to Coastal Environments Laboratory	1
MEA 369	Life on Earth: Principles of Paleontology	3
NTR 301	Introduction to Human Nutrition	3
NTR 415	Comparative Nutrition	3
NTR 419	Human Nutrition and Chronic Disease	3
NTR 420		3
NTR 421		3
NTR 490	Senior Capstone Experience in Nutrition	4
NTR 515	Comparative Nutrition	3
NTR 521		3
PO 404	Avian Anatomy and Physiology	4
PO 404	Avian Anatomy and Physiology	4
PO 415	Comparative Nutrition	3
PO 504	Avian Anatomy and Physiology	4
PO 515	Comparative Nutrition	3
SSC 200	Soil Science	3
SSC 201	Soil Science Laboratory	1
SSC 332	Environmental Soil Microbiology	3
SSC 470	Wetland Soils	3
SSC 570	Wetland Soils	3
ZO 233	Human-Animal Interactions	3
ZO 250	Animal Anatomy and Physiology	4
ZO 317	Primate Ecology and Evolution	3
ZO 333	Captive Animal Biology	3
ZO 350	Animal Phylogeny and Diversity	4
ZO 402	Invertebrate Biology	4
ZO 410	Introduction to Animal Behavior	3
ZO 486	Capstone Course in Zoology	3
Group A - Biological Sciences		
ANS 225	Principles of Animal Nutrition	3
BIT 100	Current Topics in Biotechnology	4
BIT 465	Real-time PCR Techniques	2
BIT 471	RNA Interference and Model Organisms	2

BIT 473	Protein Interactions	2
BIT 474	Plant Genetic Engineering	2
BIT 565	Real-time PCR Techniques	2
BIT 571	RNA Interference and Model Organisms	2
BIT 573	Protein Interactions	2
BIT 574	Plant Genetic Engineering	2
ENT 305	Introduction to Forensic Entomology	3
Group A - Physical Sciences		
AEE 226	Computer Applications and Information Technology in Agricultural & Extension Ed	3
BAE 200	Computer Methods in Biological Engineering	2
BMA 573	Mathematical Modeling of Physical and Biological Processes I	3
BMA 574	Mathematical Modeling of Physical and Biological Processes II	3
BUS 340	Information Systems Management	3
BUS 350	Economics and Business Statistics	3
CE 435	Engineering Geology	3
CE 479	Air Quality	3
CE 581	Fluid Mechanics in Natural Environments	3
CH 230	Computational Chemistry Lab I	1
CH 232	Computational Chemistry Lab II	1
CH 315	Quantitative Analysis	3
CH 316	Quantitative Analysis Laboratory	1
CH 331	Introductory Physical Chemistry	4
CH 401	Systematic Inorganic Chemistry I	3
CH 403	Systematic Inorganic Chemistry II	3
CH 415	Analytical Chemistry II	3
CH 431	Physical Chemistry I	3
CH 433	Physical Chemistry II	3
CH 435	Introduction to Quantum Chemistry	3
CH 437	Physical Chemistry for Engineers	4
CH 441	Forensic Chemistry	3
CH 442	Advanced Synthetic Techniques	4
CH 444	Advanced Synthetic Techniques II	4
CH 452	Advanced Measurement Techniques I	4
CH 454	Advanced Measurement Techniques II	4
CH 463	Molecular Origins of Life	3
CH 563	Molecular Origins of Life	3
CSC 110	Computer Science Principles - The Beauty and Joy of Computing	3
CSC 111	Introduction to Computing: Python	3
CSC 112	Introduction to Computing-FORTRAN	3
CSC 113	Introduction to Computing - MATLAB	3
CSC 116	Introduction to Computing - Java	3
CSC 200		3

CSC 216	Software Development Fundamentals	3
CSC 217	Software Development Fundamentals Lab	1
CSC 226	Discrete Mathematics for Computer Scientists	3
CSC 230	C and Software Tools	3
CSC 236	Computer Organization and Assembly Language for Computer Scientists	3
CSC 246	Concepts and Facilities of Operating Systems for Computer Scientists	3
CSC 251	Web Page Development	1
CSC 255	String Processing Languages	1
CSC 281	Foundations of Interactive Game Design	3
CSC 295	Special Topics in Computer Science	1-3
CSC 302	Introduction to Numerical Methods	3
CSC 316	Data Structures and Algorithms	3
CSC 326	Software Engineering	4
CSC 333	Automata, Grammars, and Computability	3
CSC 342	Applied Web-based Client-Server Computing	3
CSC 379	Ethics in Computing	1
CSC 401	Data and Computer Communications Networks	3
CSC 402	Networking Projects	3
CSC 405	Computer Security	3
CSC 406	Architecture Of Parallel Computers	3
CSC 411	Introduction to Artificial Intelligence	3
CSC 412	Compiler Construction	3
CSC 415	Software Security	3
CSC 416	Introduction to Combinatorics	3
CSC 417	Theory of Programming Languages	3
CSC 422	Automated Learning and Data Analysis	3
CSC 427	Introduction to Numerical Analysis I	3
CSC 428	Introduction to Numerical Analysis II	3
CSC 431	File Organization and Processing	3
CSC 440	Database Management Systems	3
CSC 442	Introduction to Data Science	3
CSC 450	Web Services	3
CSC 453	Introduction to Internet of Things (IoT) Systems	3
CSC 454	Human-Computer Interaction	3
CSC 455	Social Computing and Decentralized Artificial Intelligence	3
CSC 456	Computer Architecture and Multiprocessors	3
CSC 461	Computer Graphics	3
CSC 462	Advanced Computer Graphics Projects	3
CSC 467	Multimedia Technology	3
CSC 474	Network Security	3
CSC 481	Game Engine Foundations	3

CSC 482	Advanced Computer Game Projects	3
CSC 484	Building Game AI	3
CSC 492	Senior Design Project	3
CSC 495	Special Topics in Computer Science	1-6
CSC 499	Independent Research in Computer Science	1-6
CSC 501	Operating Systems Principles	3
CSC 503	Computational Applied Logic	3
CSC 505	Design and Analysis Of Algorithms	3
CSC 506	Architecture Of Parallel Computers	3
CSC 510	Software Engineering	3
CSC 512	Compiler Construction	3
CSC 513	Electronic Commerce Technology	3
CSC 515	Software Security	3
CSC 517	Object-Oriented Design and Development	3
CSC 519	DevOps: Modern Software Engineering Practices	3
CSC 520	Artificial Intelligence I	3
CSC 522	Automated Learning and Data Analysis	3
CSC 530	Computational Methods for Molecular Biology	3
CSC 533	Privacy in the Digital Age	3
CSC 540	Database Management concepts and Systems	3
CSC 541	Advanced Data Structures	3
CSC 546	Management Decision and Control Systems	3
CSC 547	Cloud Computing Technology	3
CSC 548	Parallel Systems	3
CSC 554	Human-Computer Interaction	3
CSC 555	Social Computing and Decentralized Artificial Intelligence	3
CSC 561	Principles of Computer Graphics	3
CSC 562	Introduction to Game Engine Design	3
CSC 563	Visual Interfaces for Mobile Devices	3
CSC 565	Graph Theory	3
CSC 568	Enterprise Storage Architecture	3
CSC 570	Computer Networks	3
CSC 573	Internet Protocols	3
CSC 574	Computer and Network Security	3
CSC 575	Introduction to Wireless Networking	3
CSC 576	Networking Services: QoS, Signaling, Processes	3
CSC 577	Switched Network Management	3
CSC 579	Introduction to Computer Performance Modeling	3
CSC 580	Numerical Analysis I	3
CSC 582	Computer Models of Interactive Narrative	3
CSC 583	Introduction to Parallel Computing	3
CSC 584	Building Game AI	3
CSC 591	Special Topics In Computer Science	1-6

E 531	Dynamic Systems and Multivariable Control I	3
ECE 406	Architecture Of Parallel Computers	3
ECE 460	Embedded System Architectures	3
ECE 506	Architecture Of Parallel Computers	3
ECE 514	Random Processes	3
ECE 517	Object-Oriented Design and Development	3
ECE 547	Cloud Computing Technology	3
ECE 560	Embedded System Architectures	3
ECE 570	Computer Networks	3
ECE 573	Internet Protocols	3
ECE 574	Computer and Network Security	3
ECE 575	Introduction to Wireless Networking	3
ECE 576	Networking Services: QoS, Signaling, Processes	3
ECE 577	Switched Network Management	3
ECE 579	Introduction to Computer Performance Modeling	3
ECG 528	Options and Derivatives Pricing	3
ET 320	Fundamentals of Air Pollution	3
FIM 528	Options and Derivatives Pricing	3
FIM 548	Monte Carlo Methods for Financial Math	3
FIM 549	Financial Risk Analysis	3
GIS 582	Geospatial Modeling	3
ISE 441	Introduction to Simulation	3
ISE 505	Linear Programming	3
ISE 546	Management Decision and Control Systems	3
LOG 201	Logic	3
LOG 335	Symbolic Logic	3
MA 105	Mathematics of Finance	3
MA 205		3
MA 225	Foundations of Advanced Mathematics	3
MA 242	Calculus III	4
MA 302	Numerical Applications to Differential Equations	1
MA 303	Linear Analysis	3
MA 305	Introductory Linear Algebra and Matrices	3
MA 315	Mathematics Methods in Atmospheric Sciences	4
MA 325	Introduction to Applied Mathematics	3
MA 331	Differential Equations for the Life Sciences	3
MA 335	Symbolic Logic	3
MA 341	Applied Differential Equations I	3
MA 351	Introduction to Discrete Mathematical Models	3
MA 401	Applied Differential Equations II	3
MA 402	Mathematics of Scientific Computing	3
MA 403	Introduction to Modern Algebra	3
MA 405	Introduction to Linear Algebra	3
MA 407	Introduction to Modern Algebra for Mathematics Majors	3

MA 408	Foundations of Euclidean Geometry	3
MA 410	Theory of Numbers	3
MA 412	Long-Term Actuarial Models	3
MA 413	Short-Term Actuarial Models	3
MA 416	Introduction to Combinatorics	3
MA 421	Introduction to Probability	3
MA 425	Mathematical Analysis I	3
MA 426	Mathematical Analysis II	3
MA 427	Introduction to Numerical Analysis I	3
MA 428	Introduction to Numerical Analysis II	3
MA 430	Mathematical Models in the Physical Sciences	3
MA 432	Mathematical Models in Life Sciences	3
MA 437	Applications of Algebra	3
MA 440		3
MA 444	Problem Solving Strategies for Competitions	1
MA 450	Methods of Applied Mathematics I	3
MA 451	Methods of Applied Mathematics II	3
MA 491	Reading in Honors Mathematics	1-6
MA 493	Special Topics in Mathematics	1-6
MA 494	Major Paper in Math	1
MA 499	Independent Research in Mathematics	1-6
MA 501	Advanced Mathematics for Engineers and Scientists I	3
MA 502	Advanced Mathematics for Engineers and Scientists II	3
MA 504	Introduction to Mathematical Programming	3
MA 505	Linear Programming	3
MA 507	Survey of Real Analysis	3
MA 508	Survey of Geometry	3
MA 509	Survey of Abstract Algebra	3
MA 510	Selected Topics In Mathematics For Secondary Teachers	1-6
MA 511	Advanced Calculus I	3
MA 512		3
MA 513	Introduction To Complex Variables	3
MA 515	Analysis I	3
MA 518	Geometry of Curves and Surfaces	3
MA 520	Linear Algebra	3
MA 521	Abstract Algebra I	3
MA 522	Computer Algebra	3
MA 523	Linear Transformations and Matrix Theory	3
MA 524	Combinatorics I	3
MA 526	Mathematical Analysis II	3
MA 528	Options and Derivatives Pricing	3
MA 531	Dynamic Systems and Multivariable Control I	3
MA 532	Ordinary Differential Equations I	3
MA 534	Introduction To Partial Differential Equations	3
MA 537	Nonlinear Dynamics and Chaos	3

MA 540	Uncertainty Quantification for Physical and Biological Models	3
MA 544	Computer Experiments In Mathematical Probability	3
MA 546	Probability and Stochastic Processes I	3
MA 547	Stochastic Calculus for Finance	3
MA 548	Monte Carlo Methods for Financial Math	3
MA 549	Financial Risk Analysis	3
MA 551	Introduction to Topology	3
MA 555	Introduction to Manifold Theory	3
MA 561	Set Theory and Foundations Of Mathematics	3
MA 565	Graph Theory	3
MA 573	Mathematical Modeling of Physical and Biological Processes I	3
MA 574	Mathematical Modeling of Physical and Biological Processes II	3
MA 580	Numerical Analysis I	3
MA 583	Introduction to Parallel Computing	3
MA 584	Numerical Solution of Partial Differential Equations--Finite Difference Methods	3
MA 587	Numerical Solution of Partial Differential Equations--Finite Element Method	3
MA 591	Special Topics	1-6
MBA 528	Options and Derivatives Pricing	3
MEA 100	Earth System Science: Exploring the Connections	4
MEA 101	Geology I: Physical	3
MEA 110	Geology I Laboratory	1
MEA 130	Introduction to Weather and Climate	3
MEA 135	Introduction to Weather and Climate Laboratory	1
MEA 202	Geology II: Historical	3
MEA 211	Geology II Laboratory	1
MEA 300	Environmental Geology	4
MEA 312	Atmospheric Thermodynamics	4
MEA 315	Mathematics Methods in Atmospheric Sciences	4
MEA 320	Fundamentals of Air Pollution	3
MEA 321	Fundamentals of Air Quality and Climate Change	3
MEA 323	Geochemistry of Natural Waters	3
MEA 409	Watershed Forensics	3
MEA 410	Introduction to Mineralogy	4
MEA 411	Marine Sediment Transport	3
MEA 412	Atmospheric Physics	3
MEA 415	Climate Dynamics	3
MEA 421	Atmospheric Dynamics I	3
MEA 422	Atmospheric Dynamics II	3
MEA 425	Introduction to Atmospheric Chemistry	3
MEA 440	Igneous and Metamorphic Petrology	4
MEA 443	Synoptic Weather Analysis and Forecasting	4

MEA 444	Mesoscale Analysis and Forecasting	4
MEA 449	Principles of Biological Oceanography	3
MEA 450	Introductory Sedimentology and Stratigraphy	4
MEA 451	Structural Geology	4
MEA 454	Marine Physical-Biological Interactions	3
MEA 455	Micrometeorology	3
MEA 458	Introduction to Tropical Meteorology	3
MEA 459	Field Investigation of Coastal Processes	5
MEA 460	Principles of Physical Oceanography	3
MEA 462	Observational Methods and Data Analysis in Marine Physics	3
MEA 463	Fluid Physics	3
MEA 464	Ocean Circulation Systems	3
MEA 465	Geologic Field Camp	4
MEA 466	Preparatory Course for Field Camp	1
MEA 467	Marine Meteorology	3
MEA 469	Ecology of coastal Resources	3
MEA 470	Introduction to Geophysics	3
MEA 471	Exploration and Engineering Geophysics	3
MEA 473	Principles of Chemical Oceanography	3
MEA 476	Worldwide River and Delta Systems: Their Evolution and Human Impacts	3
MEA 479	Air Quality	3
MEA 481	Geomorphology: Earth's Dynamic Surface	3
MEA 485	Introduction to Hydrogeology	3
MEA 488	Meteorology for Media	3
MEA 493	Special Topics in MEAS	1-6
MEA 495	Junior Seminar in the Marine, Earth, and Atmospheric Sciences	1
MEA 498	Internship in MEAS	1-6
MEA 507	Discipline-based Education Research in the Geosciences	3
MEA 510	Air Pollution Meteorology	3
MEA 511	Introduction to Meteorological Remote Sensing	3
MEA 514	Advanced Physical Meteorology	3
MEA 515	Climate Dynamics	3
MEA 517	Fundamentals of Climate Change Science	3
MEA 518	Adaptation to Climate Change	3
MEA 519	Barriers to Climate Change Literacy	3
MEA 525	Introduction to Atmospheric Chemistry	3
MEA 540	Principles of Physical Oceanography	3
MEA 549	Principles of Biological Oceanography	3
MEA 553	Estuarine Biogeochemistry	3
MEA 554	Marine Physical-Biological Interactions	3
MEA 562	Marine Sediment Transport	3
MEA 570	Geological Oceanography	3

MEA 573	Principles of Chemical Oceanography	3
MEA 574	Advanced Igneous Petrology	3
MEA 577	Electron Microprobe Analysis of Geologic Material	2
MEA 579	Principles of Air Quality Engineering	3
MEA 580	Air Quality Modeling and Forecasting	4
MEA 581	Fluid Mechanics in Natural Environments	3
MEA 582	Geospatial Modeling	3
MEA 585	Physical Hydrogeology	3
MEA 591	Special Topics in Marine Science	1-6
MEA 592	Special Topics in Earth Sciences	1-6
MEA 593	Special Topics in Atmospheric Science	1-6
MEA 599	Regional Geology of North America	1-6
OR 504	Introduction to Mathematical Programming	3
OR 505	Linear Programming	3
OR 531	Dynamic Systems and Multivariable Control I	3
OR 565	Graph Theory	3
OR 579	Introduction to Computer Performance Modeling	3
PSY 240	Introduction to Behavioral Research I	3
PSY 241	Introduction to Behavioral Research I Lab	1
PSY 242	Introduction to Behavioral Research II	3
PSY 243	Introduction to Behavioral Research II Lab	2
PY 414	Electromagnetism I	3
PY 415	Electromagnetism II	3
PY 514	Electromagnetism I	3
PY 515	Electromagnetism II	3
ST 350	Economics and Business Statistics	3
ST 412	Long-Term Actuarial Models	3
ST 413	Short-Term Actuarial Models	3
ST 442	Introduction to Data Science	3
ST 546	Probability and Stochastic Processes I	3
Group A - Physical Sciences		
BME 201	Computer Methods in Biomedical Engineering	3
CSC 442	Introduction to Data Science	3
EC 351	Econometrics I	3
ECE 489	Solid State Solar and Thermal Energy Harvesting	3
ECE 589	Solid State Solar and Thermal Energy Harvesting	3
ECG 561	Applied Econometrics I	3
EMS 519	Teaching and Learning of Statistical Thinking	3
GPH 404	Epidemiology and Statistics in Global Public Health	3
MA 412	Long-Term Actuarial Models	3
MA 413	Short-Term Actuarial Models	3
MA 546	Probability and Stochastic Processes I	3
MA 555	Introduction to Manifold Theory	3

MEA 150	Environmental Issues in Water Resources	4
MEA 463	Fluid Physics	3
MSE 489	Solid State Solar and Thermal Energy Harvesting	3
MSE 589	Solid State Solar and Thermal Energy Harvesting	3
NE 528	Introduction to Plasma Physics and Fusion Energy	3
NE 529	Plasma Physics and Fusion Energy II	3
PSY 240	Introduction to Behavioral Research I	3
PSY 241	Introduction to Behavioral Research I Lab	1
PSY 242	Introduction to Behavioral Research II	3
PSY 243	Introduction to Behavioral Research II Lab	2
PY 123	Stellar and Galactic Astronomy	3
PY 124	Solar System Astronomy	3
PY 125	Astronomy Laboratory	1
PY 131	Conceptual Physics	4
PY 203	University Physics III	4
PY 301	Introduction to Quantum Mechanics	3
PY 328	Stellar and Galactic Astrophysics	3
PY 341	Relativity, Gravitation and Cosmology	3
PY 401	Quantum Physics I	3
PY 402	Quantum Physics II	3
PY 407	Introduction to Modern Physics	3
PY 411	Mechanics I	3
PY 412	Mechanics II	3
PY 413	Thermal Physics	3
PY 414	Electromagnetism I	3
PY 415	Electromagnetism II	3
PY 452	Advanced Physics Laboratory	3
PY 489	Solid State Solar and Thermal Energy Harvesting	3
PY 495	Special Topics in Physics	1-4
PY 499	Independent Research in Physics	1-6
PY 501	Quantum Physics I	3
PY 502	Quantum Physics II	3
PY 506	Nuclear and Subatomic Physics	3
PY 507	Elementary Particle Physics	3
PY 509	General Relativity	3
PY 511	Mechanics I	3
PY 512	Mechanics II	3
PY 514	Electromagnetism I	3
PY 515	Electromagnetism II	3
PY 516	Physical Optics	3
PY 517	Atomic and Molecular Physics	3
PY 519	Biological Physics	3
PY 525	Computational Physics	3
PY 528	Introduction to Plasma Physics and Fusion Energy	3
PY 529	Plasma Physics and Fusion Energy II	3
PY 543	Astrophysics	3
PY 552	Condensed Matter Physics I	3
PY 570	Polymer Physics	3
PY 581	Matter & Interactions for Teachers I	3

PY 582	Matter & Interactions for Teachers II	3
PY 589	Solid State Solar and Thermal Energy Harvesting	3
PY 590	Special Topics In Physics	1-6
PY 599	Special Topics in Physics	1-6
SSC 200	Soil Science	3
SSC 201	Soil Science Laboratory	1
ST 311	Introduction to Statistics	3
ST 312	Introduction to Statistics II	3
ST 370	Probability and Statistics for Engineers	3
ST 371	Introduction to Probability and Distribution Theory	3
ST 372	Introduction to Statistical Inference and Regression	3
ST 380		3
ST 401	Experiences in Data Analysis	4
ST 404	Epidemiology and Statistics in Global Public Health	3
ST 405	Applied Nonparametric Statistics	3
ST 412	Long-Term Actuarial Models	3
ST 413	Short-Term Actuarial Models	3
ST 421	Introduction to Mathematical Statistics I	3
ST 422	Introduction to Mathematical Statistics II	3
ST 430	Introduction to Regression Analysis	3
ST 431	Introduction to Experimental Design	3
ST 432	Introduction to Survey Sampling	3
ST 433	Applied Spatial Statistics	3
ST 434	Applied Time Series	3
ST 435	Statistical Methods for Quality and Productivity Improvement	3
ST 437	Applied Multivariate and Longitudinal Data Analysis	3
ST 440	Applied Bayesian Analysis	3
ST 445	Introduction to Statistical Computing and Data Management	3
ST 446	Intermediate SAS Programming with Applications	3
ST 491	Statistics in Practice	3
ST 495	Special Topics in Statistics	1-6
ST 497	Professional Experience in Statistics	1-3
ST 498	Independent Study In Statistics	1-6
ST 499	Research Experience in Statistics	1-3
ST 501	Fundamentals of Statistical Inference I	3
ST 502	Fundamentals of Statistical Inference II	3
ST 503	Fundamentals of Linear Models and Regression	3
ST 505	Applied Nonparametric Statistics	3
ST 506		3
ST 507	Statistics For the Behavioral Sciences I	3
ST 508		3
ST 511	Statistical Methods For Researchers I	3

ST 512	Statistical Methods For Researchers II	3
ST 513	Statistics for Management and Social Sciences I	3
ST 514	Statistics For Management and Social Sciences II	3
ST 515	Experimental Statistics for Engineers I	3
ST 516	Experimental Statistics For Engineers II	3
ST 517	Applied Statistical Methods I	3
ST 519	Teaching and Learning of Statistical Thinking	3
ST 520	Statistical Principles of Clinical Trials	3
ST 524		3
ST 533	Applied Spatial Statistics	3
ST 534	Applied Time Series	3
ST 535	Statistical Methods for Quality and Productivity Improvement	3
ST 537	Applied Multivariate and Longitudinal Data Analysis	3
ST 540	Applied Bayesian Analysis	3
ST 542	Statistical Practice	3
ST 544	Applied Categorical Data Analysis	3
ST 555	Statistical Programming I	3
ST 556	Statistical Programming II	3
ST 557	Using Technology to Teach and Learn with Data	3
ST 558	Data Science for Statisticians	3
ST 561	Applied Econometrics I	3
ST 562	Data Mining with SAS Enterprise Miner	3
ST 563	Introduction to Statistical Learning	3
ST 590	Special Topics	1-6
ST 701	Statistical Theory I	3
ST 702	Statistical Theory II	3
ST 705	Linear Models and Variance Components	3
TE 570	Polymer Physics	3
Group B - Economics & Business		
ACC 210	Concepts of Financial Reporting	3
ACC 220	Introduction to Managerial Accounting	3
ACC 280	Survey of Financial and Managerial Accounting	3
ACC 310	Intermediate Financial Accounting I	3
ACC 311	Intermediate Financial Accounting II	3
ACC 330	An Introduction To Income Taxation	3
ACC 340	Accounting Information Systems	3
ACC 411	Business Valuation	3
ACC 420	Cost Accounting for Effective Management	3
ACC 440	Enterprise Resource Planning Systems	3
ACC 450	Auditing and Assurance Services	3
ACC 451	Internal Auditing	3
ACC 460	Governmental and Nonprofit Accounting	3
ARE 215	Small Business Accounting	3
ARE 301	Intermediate Microeconomics	3

ARE 303	Farm Management	3
ARE 304	Agribusiness Management	3
ARE 306	Agricultural Law	3
ARE 309	Environmental Law & Economic Policy	3
ARE 311	Agricultural Markets	3
ARE 312	Agribusiness Marketing	3
ARE 321	Agricultural Financial Management	3
ARE 336	Introduction to Resource and Environmental Economics	3
ARE 345	Global Agribusiness Management	3
ARE 404	Advanced Agribusiness Management	3
ARE 413	Applied Agribusiness Marketing	3
ARE 433	U.S. Agricultural Policy	3
ARE 490	Career Seminar in Agriculture & Resource Economics	1
BUS 225	Personal Finance	3
BUS 320	Financial Management	3
BUS 340	Information Systems Management	3
BUS 360	Marketing Methods	3
BUS 370	Operations and Supply Chain Management	3
BUS 420	Financial Management of Corporations	3
BUS 422	Investments and Portfolio Management	3
BUS 425	Advanced Personal Financial Management	3
BUS 426	International Financial Management	3
BUS 440	Database Management	3
BUS 441	Business Data Communications and Networking	3
BUS 442	Information Systems Development	3
BUS 443	Web Development for Business Applications	3
BUS 444	Systems Analysis and Design	3
BUS 461	Channel and Retail Marketing	3
BUS 462	Marketing Research	3
BUS 464	International Marketing	3
BUS 465	Traditional and Digital Brand Promotion	3
BUS 466	Personal Selling	3
BUS 467	Product and Brand Management	3
BUS 468	Marketing Strategy	3
BUS 469	Digital Marketing Practicum	3
BUS 470	Operations Modeling and Analysis	3
BUS 472	Operations Planning and Control Systems	3
BUS 473	Supply Chain Strategy	3
BUS 475	Purchasing and Supply Management	3
BUS 479	Supply Chain Management Undergraduate Practicum	3
EC 301	Intermediate Microeconomics	3
EC 336	Introduction to Resource and Environmental Economics	3
FTM 482	Global Brand Management in Textiles and Apparel	3

M 100	Personal and Professional Identity Development	1
MIE 201	Introduction to Business Processes	3
MIE 305	Legal and Regulatory Environment	3
MIE 330	Human Resource Management	3
MIE 335	Organizational Behavior	3
MIE 432	Labor and Employee Relations	3
MIE 434	Compensation Systems	3
MIE 435	Leadership and Management	3
MIE 436	Training and Development	3
MIE 438	Staffing	3
MIE 480	Business Policy and Strategy	3
PRT 406	Sports Law	3
Group B - Economics & Business		
ACC 220	Introduction to Managerial Accounting	3
ACC 280	Survey of Financial and Managerial Accounting	3
ARE 301	Intermediate Microeconomics	3
ARE 332	Human Resource Management for Agribusiness	3
ARE 336	Introduction to Resource and Environmental Economics	3
ARE 412	Advanced Agribusiness Marketing	3
BUS 340	Information Systems Management	3
BUS 449	Information Technology Capstone	3
BUS 474	Logistics Management	3
EC 202	Principles of Macroeconomics	3
EC 301	Intermediate Microeconomics	3
EC 302	Intermediate Macroeconomics	3
EC 305	A Closer Look at Capitalism	3
EC 336	Introduction to Resource and Environmental Economics	3
EC 348	Introduction to International Economics	3
EC 351	Econometrics I	3
EC 404	Money, Financial Markets, and the Economy	3
EC 410	Public Finance	3
EC 413	Industrial Organization	3
EC 431	Labor Economics	3
EC 437		3
EC 449	International Finance	3
EC 451	Econometrics II	3
EC 474	Economics of Financial Institutions and Markets	3
EC 480		3
EC 490	Research Seminar in Economics	3
FTM 482	Global Brand Management in Textiles and Apparel	3
MIE 412	Finance and Accounting for Entrepreneurs	3
MIE 413	New Venture Planning	3
MIE 419	Entrepreneurship Practicum	3
PRT 406	Sports Law	3
Group C - Applied Sci & Tech		
AEE 101	Introduction to Career and Technical Education	1
AEE 208	Agricultural Biotechnology: Issues and Implications	3
AEE 230	Introduction to Cooperative Extension	3

AEE 303	Administration and Supervision of Student Organizations	3
AEE 311	Communication Methods and Media	3
AEE 322	Experiential Learning in Agriculture	3
AEE 323	Leadership Development in Agriculture and Life Sciences	3
AEE 325	Planning and Delivering Non-Formal Education	3
AEE 326	Teaching Diverse Learners in AED	3
AEE 327	Conducting Summer Programs in Agricultural Education	1
AEE 350	Personal Leadership Development in Agriculture and Life Sciences	3
AEE 360	Developing Team Leadership in Agriculture and Life Sciences	3
AEE 423	Practicum in Agricultural Extension/ Industry	8
AEE 424	Planning Agricultural Educational Programs	3
AEE 426	Methods of Teaching Agriculture	3
AEE 427	Student Teaching in Agriculture	8
AEE 433	Leadership and Management of Volunteers in Agricultural and Extension Education	3
AEE 435	Professional Presentations in Agricultural Organizations	3
AEE 460	Organizational Leadership Development in Agriculture and Life Sciences	3
AEE 478	Advanced Issues in Extension Education	3
AEE 490	Seminar in Agricultural and Extension Education	1
AEE 533	Leadership and Management of Volunteers in Agricultural and Extension Education	3
BAET 201	Shop Processes and Management	3
BAET 323	Water Management	3
BAET 332	Management of Animal Environments	4
BAET 323	Water Management	3
BAET 332	Management of Animal Environments	4
BAET 333	Processing Agricultural Products	4
BAET 343	Agricultural Electrification	4
BAET 411	Agricultural Machinery and Power Units	4
BAET 432	Agricultural and Environmental Safety and Health	3
BAET 443	Environmental Restoration Implementation	3
ALS 110	Academic and Career Skills Seminar	1
ANS 105	Introduction to Companion Animal Science	3
ANS 110	Introduction to Equine Science	3
ANS 150	Introduction to Animal Science	3
ANS 151	Introduction to Animal Science Lab	1

ANS 201	Techniques of Animal Care	2
ANS 208	Agricultural Biotechnology: Issues and Implications	3
ANS 225	Principles of Animal Nutrition	3
ANS 303	Principles of Equine Evaluation	2
ANS 304	Dairy Cattle Evaluation	2
ANS 309	Livestock Evaluation	3
ANS 322	Muscle Foods and Eggs	3
ANS 324	Milk and Dairy Products	3
ANS 400	Companion Animal Management	3
ANS 402	Beef Cattle Management	3
ANS 403	Swine Management	3
ANS 404	Dairy Cattle Management	3
ANS 408	Small Ruminant Management	3
ANS 410	Equine Breeding Farm Management	3
ANS 425	Feed Manufacturing Technology	3
ANS 440	Animal Genetic Improvement	3
ANS 453	Physiology and Genetics of Growth and Development	3
ANS 454	Lactation, Milk and Nutrition	3
ANS 525	Feed Manufacturing Technology	3
ANS 540	Animal Genetic Improvement	3
ANS 553	Physiology and Genetics of Growth and Development	3
ANS 554	Lactation, Milk and Nutrition	3
BAE 100	Introduction to Biological and Agricultural Engineering and Technology	1
BAE 202	Introduction to Biological and Agricultural Engineering Methods	4
BAE 302	Transport Phenomena	3
BAE 322	Introduction to Food Process Engineering	3
BAE 361	Analytical Methods in Engineering Design	3
BAE 371	Fundamentals of Hydrology for Engineers	3
BAE 401	Sensors and Controls	3
BAE 435	Precision Agriculture Technology	3
BAE 451	Engineering Design I	2
BAE 452	Engineering Design II	2
BAE 462	Machinery Design and Applications	3
BAE 472	Irrigation and Drainage	3
BAE 473	Introduction to Hydrologic and Water Quality Modeling	3
BAE 474	Principles and Applications of Ecological Engineering	3
BAE 481	Structures & Environment	3
BAE 501	Sensors and Controls	3
BAE 535	Precision Agriculture Technology	3
BAE 572	Irrigation and Drainage	3
BAE 573	Introduction to Hydrologic and Water Quality Modeling	3

BEC 330	Principles and Applications of Bioseparations	2
BEC 436	Introduction to Downstream Process Development	2
BEC 440		3
BEC 536	Introduction to Downstream Process Development	2
BEC 540		3
BME 540	Nanobiotechnolog Processing, Characterization, and Applications	3
BME 203		3
BME 207	Biomedical Electronics	4
BME 342		3
BME 365	Linear Systems in Biomedical Engineering	3
BME 385	Bioinstrumentation	3
BME 412	Biomedical Signal Processing	3
BME 425	Bioelectricity	3
BME 525	Bioelectricity	3
CS 470	Advanced Turfgrass Pest Management	2
ECI 424	Student Teaching in Modern Foreign Languages	12
ENT 470	Advanced Turfgrass Pest Management	2
FM 425	Feed Manufacturing Technology	3
FM 525	Feed Manufacturing Technology	3
FS 322	Muscle Foods and Eggs	3
FS 324	Milk and Dairy Products	3
FS 435	Food Safety Management Systems	3
FS 535	Food Safety Management Systems	3
MSE 203		3
NTR 425	Feed Manufacturing Technology	3
NTR 454	Lactation, Milk and Nutrition	3
NTR 525	Feed Manufacturing Technology	3
PB 208	Agricultural Biotechnology: Issues and Implications	3
PO 322	Muscle Foods and Eggs	3
PO 425	Feed Manufacturing Technology	3
PO 525	Feed Manufacturing Technology	3
PP 470	Advanced Turfgrass Pest Management	2
SSC 440	Geographic Information Systems (GIS) in Soil Science and Agriculture	3
SSC 473	Introduction to Hydrologic and Water Quality Modeling	3
SSC 540	Geographic Information Systems (GIS) in Soil Science and Agriculture	3
SSC 573	Introduction to Hydrologic and Water Quality Modeling	3
USC 291	Service Learning Program Leader Development I	1
USC 292	Service Learning Program Leader Development II	2
Group C - Applied Sci & Tech		
AEC 420	Introduction to Fisheries Science	3
AEE 206	Introduction to Teaching Agriculture	3
AEE 303	Administration and Supervision of Student Organizations	3

AEE 322	Experiential Learning in Agriculture	3
AEE 327	Conducting Summer Programs in Agricultural Education	1
AEE 424	Planning Agricultural Educational Programs	3
AEE 426	Methods of Teaching Agriculture	3
AEE 427	Student Teaching in Agriculture	8
ANS 322	Muscle Foods and Eggs	3
ANS 324	Milk and Dairy Products	3
ANS 330	Laboratory Animal Science	3
ANS 411	Management of Growing and Performance Horses	3
ANS 425	Feed Manufacturing Technology	3
ANS 525	Feed Manufacturing Technology	3
BAE 325	Introductory Geomatics	3
BAE 425	Industrial Microbiology and Bioprocessing	3
BAE 435	Precision Agriculture Technology	3
BAE 525	Industrial Microbiology and Bioprocessing	3
BAE 535	Precision Agriculture Technology	3
BBS 201	Introduction to Biopharmaceutical Science	3
BBS 301	Process Validation Science	3
BBS 426	Upstream Biomanufacturing Laboratory	2
BBS 526	Upstream Biomanufacturing Laboratory	2
BCH 220	Role of Biotechnology in Society	3
BEC 426	Upstream Biomanufacturing Laboratory	2
BEC 483	Tissue Engineering Technologies	2
BEC 526	Upstream Biomanufacturing Laboratory	2
BEC 583	Tissue Engineering Technologies	2
BME 375	Biomedical Microcontroller Applications	3
BME 444	Orthopaedic Biomechanics	3
BME 451	BME Senior Design: Product Development	3
BME 452	BME Senior Design: Product Implementation and Strategy	3
BME 466	Polymeric Biomaterials Engineering	3
BME 467	Mechanics of Tissues & Implants Requirements	3
BME 483	Tissue Engineering Technologies	2
BME 484	Fundamentals of Tissue Engineering	3
BME 544	Orthopaedic Biomechanics	3
BME 566	Polymeric Biomaterials Engineering	3
BME 583	Tissue Engineering Technologies	2
BME 584	Fundamentals of Tissue Engineering	3
CS 200	Introduction to Turfgrass Management	4

CS 210	Lawns and Sports Turf	3
CS 213	Crop Science	3
CS 216	Southern Row Crop Production - Cotton, Peanuts, and Tobacco	3
CS 218	Southern Row Crop Production - Corn, Small Grains and Soybeans	3
CS 230	Introduction to Agroecology	3
CS 312		3
CS 400	Turf Cultural Systems	3
CS 411	Crop Ecology	3
CS 413	Plant Breeding	2
CS 414	Weed Science	4
CS 415	Integrated Pest Management	3
CS 424	Seed Physiology	3
CS 430	Advanced Agroecology	4
CS 465	Turf Management Systems and Environmental Quality	3
CS 524	Seed Physiology	3
CS 565	Turf Management Systems and Environmental Quality	3
CSSC 490	Senior Seminar in Crop Science and Soil Science	1
ECI 424	Student Teaching in Modern Foreign Languages	12
ENT 203	An Introduction to the Honey Bee and Beekeeping	3
ENT 401	Honey Bee Biology and Management	3
ES 100	Introduction to Environmental Sciences	3
ES 200	Climate Change and Sustainability	3
ES 300	Energy and Environment	3
ES 400	Analysis of Environmental Issues	3
FM 425	Feed Manufacturing Technology	3
FM 460	Feed Mill Operations and Leadership	3
FM 480	Feed Quality Assurance & Formulation	3
FM 490	Feed Science Seminar	1
FM 525	Feed Manufacturing Technology	3
FOR 318	Forest Pathology	3
FOR 420	Watershed and Wetlands Hydrology	4
FOR 472	Forest Soils	4
FOR 520	Watershed and Wetlands Hydrology	4
FS 201	Introduction to Food Science	3
FS 290	Careers in Food and Bioprocessing Sciences	1
FS 322	Muscle Foods and Eggs	3
FS 324	Milk and Dairy Products	3
FS 330	Science of Food Preparation	3
FS 354	Food Sanitation	3
FS 416	Quality Control in Food and Bioprocessing	3
FS 421	Food Preservation	3
FS 426	Upstream Biomanufacturing Laboratory	2
FS 435	Food Safety Management Systems	3
FS 453	Food Laws and Regulations	3
FS 462	Postharvest Physiology	3
FS 475	Problems and Design in Food and Bioprocessing Science	3
FS 516	Quality Control in Food and Bioprocessing	3

FS 521	Food Preservation	3
FS 526	Upstream Biomanufacturing Laboratory	2
FS 535	Food Safety Management Systems	3
FS 553	Food Laws and Regulations	3
FS 562	Postharvest Physiology	3
FW 221	Conservation of Natural Resources	3
FW 311	Piedmont Wildlife Ecology and Management	3
FW 312	Fisheries Techniques and Management	1
FW 313	Mountain Wildlife Ecology and Management	1
FW 314	Coastal Ecology and Management	1
FW 353	Wildlife Management	3
FW 403	Urban Wildlife Management	3
FW 411	Human Dimensions of Wildlife and Fisheries	3
FW 453	Principles of Wildlife Science	4
FW 460	International Wildlife Management and Conservation	3
FW 465	African Ecology and Conservation	4
FW 511	Human Dimensions of Wildlife and Fisheries	3
FW 560	International Wildlife Management and Conservation	3
FW 565	African Ecology and Conservation	4
GPH 201	Fundamentals of Global Public Health	3
HS 432	Introduction to Permaculture	3
HS 462	Postharvest Physiology	3
HS 532	Introduction to Permaculture	3
HS 562	Postharvest Physiology	3
IDS 303	Humans and the Environment	3
NR 303	Humans and the Environment	3
NR 350	International Sustainable Resource Use	4
NR 406	Conservation of Biological Diversity	3
NR 420	Watershed and Wetlands Hydrology	4
NR 460	Renewable Natural Resource Management and Policy	3
NR 520	Watershed and Wetlands Hydrology	4
NR 560	Renewable Natural Resource Management and Policy	3
NTR 425	Feed Manufacturing Technology	3
NTR 525	Feed Manufacturing Technology	3
PO 322	Muscle Foods and Eggs	3
PO 424	Poultry Meat Production	3
PO 425	Feed Manufacturing Technology	3
PO 435	Poultry Incubation & Breeding	4
PO 525	Feed Manufacturing Technology	3
PP 318	Forest Pathology	3
SSC 440	Geographic Information Systems (GIS) in Soil Science and Agriculture	3
SSC 462	Soil-Crop Management Systems	3

SSC 540	Geographic Information Systems (GIS) in Soil Science and Agriculture	3
TE 466	Polymeric Biomaterials Engineering	3
TE 467	Mechanics of Tissues & Implants Requirements	3
TE 566	Polymeric Biomaterials Engineering	3
VMP 401	Poultry Diseases	4
VMP 420	Disease of Farm Animals	3
Group C - Applied Sci & Tech		
AEC 419	Freshwater Ecology	4
AEC 423	Introduction to Fisheries Sciences Laboratory	1
AEC 519	Freshwater Ecology	4
ANS 322	Muscle Foods and Eggs	3
ANS 425/525	Feed Manufacturing Technology	3
BAET 323	Water Management	3
BIO 227	Understanding Structural Diversity through Biological Illustration	3
BME 204		3
BME 217	Biomedical Electronics Laboratory	1
BME 298	Biomedical Engineering Design and Manufacturing I	2
BME 398	Biomedical Engineering Design and Manufacturing II	2
CS 470	Advanced Turfgrass Pest Management	2
CSSC 490	Senior Seminar in Crop Science and Soil Science	1
ENT 470	Advanced Turfgrass Pest Management	2
FM 425	Feed Manufacturing Technology	3
FM 525	Feed Manufacturing Technology	3
FOR 318	Forest Pathology	3
FOR 420	Watershed and Wetlands Hydrology	4
FOR 472	Forest Soils	4
FOR 520	Watershed and Wetlands Hydrology	4
FS 322	Muscle Foods and Eggs	3
FS 435	Food Safety Management Systems	3
FS 462	Postharvest Physiology	3
FS 535	Food Safety Management Systems	3
FS 562	Postharvest Physiology	3
FW 221	Conservation of Natural Resources	3
FW 404	Wildlife Habitat Management	3
FW 460	International Wildlife Management and Conservation	3
FW 560	International Wildlife Management and Conservation	3
HS 200	Home Horticulture	3
HS 201	The World of Horticulture: Principles and Practices	3
HS 203	Home Plant Propagation	3
HS 242	Introduction to Small Scale Landscape Design	3
HS 250	Home Landscape Design: Creating Garden Spaces	3

HS 252	Landscape Graphic Communication	2
HS 272	Landscape Design/Build	6
HS 290	Horticulture: Careers and Opportunities	1
HS 301	Plant Propagation	4
HS 302	Gardening with Herbaceous Perennials	3
HS 303	Ornamental Plant Identification I	3
HS 304	Ornamental Plant Identification II	3
HS 357	Landscape Grading and Drainage	4
HS 400	Residential Landscaping	6
HS 411	Nursery Management	3
HS 416	Planting Design	4
HS 421	Temperate-Zone Tree Fruits: Physiology and Culture	3
HS 422	Small Fruit Production	3
HS 423		3
HS 431	Vegetable Production	4
HS 440	Greenhouse Management	3
HS 442	Floriculture Crop Production	3
HS 462	Postharvest Physiology	3
HS 471	Landscape Ecosystem Management	4
HS 516	Planting Design	4
HS 521	Temperate-Zone Tree Fruits: Physiology and Culture	3
HS 523		
HS 423		3
HS 562	Postharvest Physiology	3
IDS 303	Humans and the Environment	3
NR 300	Natural Resource Measurements	4
NR 303	Humans and the Environment	3
NR 400	Natural Resource Management	4
NR 420	Watershed and Wetlands Hydrology	4
NR 421	Wetland Science and Management	3
NR 460	Renewable Natural Resource Management and Policy	3
NR 484	Environmental Impact Assessment	4
NR 500	Natural Resource Management	4
NR 520	Watershed and Wetlands Hydrology	4
NR 521	Wetland Science and Management	3
NR 560	Renewable Natural Resource Management and Policy	3
NTR 420		3
NTR 425	Feed Manufacturing Technology	3
NTR 525	Feed Manufacturing Technology	3
PO 201	Poultry Science and Production	3
PO 201A	Poultry Science and Production	3
PO 202	Poultry Science and Production Laboratory	1
PO 202A	Poultry Science and Production Laboratory	1
PO 290	Poultry Seminar	1
PO 322	Muscle Foods and Eggs	3
PO 340	Live Poultry and Poultry Product Evaluation, Grading, and Inspection	3
PO 410	Production and Management of Game Birds in Confinement	3
PO 411	Agrosecurity	3

PO 421	Commercial Egg Production	3
PO 425	Feed Manufacturing Technology	3
PO 433	Poultry Processing and Products	3
PO 525	Feed Manufacturing Technology	3
PO 533	Poultry Processing and Products	3
PP 315	Principles of Plant Pathology	4
PP 318	Forest Pathology	3
PP 470	Advanced Turfgrass Pest Management	2
SSC 185	Land and Life	3
SSC 341	Soil Fertility and Nutrient Management	3
SSC 342	Soil and Plant Nutrient Analysis	1
SSC 421	Role of Soils in Environmental Management	3
SSC 440	Geographic Information Systems (GIS) in Soil Science and Agriculture	3
SSC 442	Soil and Environmental Biogeochemistry	3
SSC 452	Soil Classification	4
SSC 461	Soil Physical Properties and Plant Growth	3
SSC 462	Soil-Crop Management Systems	3
SSC 470	Wetland Soils	3
SSC 540	Geographic Information Systems (GIS) in Soil Science and Agriculture	3
SSC 570	Wetland Soils	3
TOX 201	Poisons, People and the Environment	3
TOX 401	Principles of Toxicology	4
TOX 415	Environmental Toxicology and Chemistry	4
TOX 501	Principles of Toxicology	4

Semester Sequence

This is a sample.

First Year		
Fall Semester		**Hours**
ALS 103 or ALS 303	Freshman Transitions and Diversity in Agriculture & Life Sciences or Transfer Transitions and Diversity in Agriculture & Life Sciences	1
BIO 181	Introductory Biology: Ecology, Evolution, and Biodiversity	4
GEP Social Sciences (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-social-sciences/)		3
ENG 101	Academic Writing and Research	4
MA 114	Introduction to Finite Mathematics with Applications	3
	Hours	**15**
Spring Semester		
CH 101 & CH 102	Chemistry - A Molecular Science and General Chemistry Laboratory	4
MA 131	Calculus for Life and Management Sciences A	3
GEP Humanities (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/)		3
GC 120	Foundations of Graphics	3
GEP Health and Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/)		1
BAE 100	Introduction to Biological and Agricultural Engineering and Technology	1
	Hours	**15**
Second Year		
Fall Semester		
BAET 201	Shop Processes and Management	3
PY 211	College Physics I	4
BAET 200	Computer Applications in Biological and Agricultural Engineering Technology	2
SSC 200 & SSC 201	Soil Science and Soil Science Laboratory	4
	Hours	**13**
Spring Semester		
GEP Interdisciplinary Perspectives (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-interdisciplinary-perspectives/)		3
Physical Science Elective (p. 1)		4
Restricted Electives (p. 2)		3
ARE 201	Introduction to Agricultural & Resource Economics	3

GEP Health and Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/)		1
	Hours	**14**
Third Year		
Fall Semester		
ST 350	Economics and Business Statistics	3
BAE 325	Introductory Geomatics	3
BAET 343	Agricultural Electrification	4
Agriculture and Resource Economics Elective (p. 2)		3
Communications Elective (p. 1)		3
	Hours	**16**
Spring Semester		
BAET 332	Management of Animal Environments	4
BAET 323	Water Management	3
BAET 333	Processing Agricultural Products	4
Agriculture and Resource Economics Elective (p. 2)		3
GIS 280	Introduction to GIS	3
	Hours	**17**
Fourth Year		
Fall Semester		
BAET 432	Agricultural and Environmental Safety and Health	3
BAET 443	Environmental Restoration Implementation	3
AEE 323	Leadership Development in Agriculture and Life Sciences	3
GEP Humanities (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/)		3
BAET 411	Agricultural Machinery and Power Units	4
	Hours	**16**
Spring Semester		
Restricted Electives (p. 2)		3
Restricted Electives (p. 2)		3
BAET 450	Biological and Agricultural Engineering Technology Capstone	3
GEP US Diversity, Equity, and Inclusion (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-usdei/)		3
GEP Interdisciplinary Perspectives (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-interdisciplinary-perspectives/)		2
	Hours	**14**
	Total Hours	**120**

Career Opportunities

BE students learn to solve a wide variety of engineering problems and will have opportunities for specialization though selection of a specific concentration. Scientific and engineering principles are applied: to conserve and manage air, energy, soil and water resources; to manage, protect and restore natural ecosystems; to understand and utilize biological, chemical and physical processes for the production and conversion of biomass to bio energy; to analyze, understand and utilize mechanical properties of biological materials; to design and develop machinery systems for all phases of agricultural and food production; to design and evaluate structures and environmental control systems for housing animals, plant growth, and biological product storage; to develop improved systems for processing and marketing food and agricultural products; and to design sensor-based instrumentation and control systems for biological and agricultural applications.

Graduates of the BE curriculum receive a Bachelor's of Engineering in Biological Engineering, qualifying them for positions in design, development, and research in industry, government and public institutions. The curriculum also prepares students for post-graduate work leading to advanced degrees. Typical positions filled by recent BE graduates include: stream and wetlands restoration project manager; product design; development and testing engineer; plant engineering and management; engineering analysis and inspection for federal and state agencies; engineering consultant and research engineer. Entry-level salary ranges for BE graduates are similar to those of Civil, Industrial, and Mechanical Engineering graduates.

The BAET curriculum provides graduates opportunities in technical analysis, application and evaluation of agricultural production systems and environmental systems. The curriculum's flexibility enables students to specialize technologically in agriculture, the environment, or business management. Careers include technical jobs in production agriculture, environmental systems, agribusiness sales and service, and agricultural extension.