

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

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
Orientation		
ALS 103 or ALS 303	First-year Success in Agriculture and Life Sciences Transfer Success in Agriculture and Life Sciences	1
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 or PY 212	Chemistry - A Quantitative Science and Quantitative Chemistry Laboratory 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 (verify requirement)		

Total Hours **120**

¹ A grade of C- or higher is required.

ARE Electives

Code	Title	Hours
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
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	AEC 519	Freshwater Ecology	4
MB 406	Food Microbiology Lab	1	ANS 215	Agricultural Genetics	3
MB 505	Food Microbiology	3	ANS 415	Comparative Nutrition	3
MB 506	Food Microbiology Lab	1	ANS 515	Comparative Nutrition	3
NTR 301	Introduction to Human Nutrition	3	BEC 463	Fermentation of Recombinant Microorganisms	2
NTR 401	Advanced Nutrition and Metabolism	3	BEC 563	Fermentation of Recombinant Microorganisms	2
NTR 415	Comparative Nutrition	3	BIO 140		3
NTR 419	Human Nutrition and Chronic Disease	3	BIO 141		1
NTR 454	Lactation, Milk and Nutrition	3	BIO 227	Understanding Structural Diversity through Biological Illustration	3
NTR 501	Advanced Nutrition and Metabolism	3	BIO 315	General Parasitology	3
NTR 515	Comparative Nutrition	3	BIO 330	Evolutionary Biology	3
PB 103	Perspectives on Botany	1	BIO 361	Developmental Biology	3
PB 200	Plant Life	4	BIO 370	Developmental Anatomy of the Vertebrates	3
PB 205	Our Green World	3	BIO 375	Developmental Anatomy Laboratory	2
PB 208	Agricultural Biotechnology: Issues and Implications	3	BIO 405	Functional Histology	3
PB 213	Plants and Civilization	3	BIO 414	Cell Biology	3
PB 215	Medicinal Plants	3	BIO 424	Endocrinology	3
PB 219	Plants in Folklore, Myth, and religion	3	BIO 482	Capstone Course in Molecular, Cellular, and Developmental Biology	3
PB 220	Local Flora	3	BIO 483	Capstone Course in Integrative Physiology and Neurobiology	3
PB 250	Plant Biology	4	BIO 484	Capstone Course in Human Biology	3
PB 277	Space Biology	3	BIO 485	Capstone Course in Ecology, Evolution, and Conservation Biology	3
PB 321	Introduction to Whole Plant Physiology	3	BIO 488	Neurobiology	3
PB 360	Ecology	4	BIO 588	Neurobiology	3
PB 400	Plant Diversity and Evolution	4	BIT 210	Phage Hunters	3
PB 403	Systematic Botany	4	BIT 211	Phage Genomics	2
PB 413	Plant Anatomy	2	BIT 463	Fermentation of Recombinant Microorganisms	2
PB 421	Plant Physiology	3	BIT 563	Fermentation of Recombinant Microorganisms	2
PB 445	Paleobotany	4	BME 301	Human Physiology : Electrical Analysis	3
PB 464	Rare Plants of North Carolina	3	BME 302	Human Physiology: Mechanical Analysis	4
PB 480	Introduction to Plant Biotechnology	3	CHE 463	Fermentation of Recombinant Microorganisms	2
PB 481	Plant Tissue Culture and Transformation	2	CHE 563	Fermentation of Recombinant Microorganisms	2
PB 503	Systematic Botany	4	CS 211	Plant Genetics	3
PB 513	Plant Anatomy	2	ENT 425	General Entomology	3
PB 545	Paleobotany	4	FS 301	Introduction to Human Nutrition	3
PB 564	Rare Plants of North Carolina	3	FS 405	Food Microbiology	3
PB 580	Introduction to Plant Biotechnology	3	FS 406	Food Microbiology Lab	1
PHY 452		3	FS 505	Food Microbiology	3
PHY 552	Comparative Reproductive Physiology and Biotechnology	3	FS 506	Food Microbiology Lab	1
PO 415	Comparative Nutrition	3	FW 353	Wildlife Management	3
PO 466	Animal Cell Culture Techniques	2	GN 301	Genetics in Human Affairs	3
PO 515	Comparative Nutrition	3	GN 311	Principles of Genetics	4
PO 566	Animal Cell Culture Techniques	2	GN 312	Elementary Genetics Laboratory	1
PP 150	Introduction to Plant Molecular Biology	3	GN 421	Molecular Genetics	3
PP 222	Kingdom of Fungi	3	GN 423	Population, Quantitative and Evolutionary Genetics	3
Group A - Biological Sciences			GN 425	Advanced Genetics Laboratory	2
AEC 419	Freshwater Ecology	4	GN 434	Genes and Development	3
AEC 420	Introduction to Fisheries Science	3	GN 441	Human and Biomedical Genetics	3
AEC 423	Introduction to Fisheries Sciences Laboratory	1	GN 451	Genome Science	3
AEC 441	Biology of Fishes	3	GN 490	Genetics Colloquium	1
AEC 442	Biology of Fishes Laboratory	1			
AEC 460	Field Ecology and Methods	4			

GN 521	Molecular Genetics	3	ZO 233	Human-Animal Interactions	3
GN 541	Human and Biomedical Genetics	3	ZO 250	Animal Anatomy and Physiology	4
HS 215	Agricultural Genetics	3	ZO 317	Primate Ecology and Evolution	3
HS 451	Plant Nutrition	3	ZO 333	Captive Animal Biology	3
HS 551	Plant Nutrition	3	ZO 350	Animal Phylogeny and Diversity	4
MB 180	Introduction to Microbial Bioprocessing	3	ZO 402	Invertebrate Biology	4
MB 200	The Fourth Horseman: Plagues that Changed the World	3	ZO 410	Introduction to Animal Behavior	3
MB 210	Phage Hunters	3	ZO 486	Capstone Course in Zoology	3
MB 211	Phage Genomics	2	Group A - Biological Sciences		
MB 351	General Microbiology	3	ANS 225	Principles of Animal Nutrition	3
MB 352	General Microbiology Laboratory	1	BIT 100	Current Topics in Biotechnology	4
MB 354	Inquiry-Guided Microbiology Lab	1	BIT 465	Real-time PCR Techniques	2
MB 405	Food Microbiology	3	BIT 471	RNA Interference and Model Organisms	2
MB 406	Food Microbiology Lab	1	BIT 473	Protein Interactions	2
MB 411	Medical Microbiology	3	BIT 474	Plant Genetic Engineering	2
MB 412	Medical Microbiology Laboratory	1	BIT 565	Real-time PCR Techniques	2
MB 414	Microbial Metabolic Regulation	3	BIT 571	RNA Interference and Model Organisms	2
MB 420	Fundamentals of Microbial Cell Biotransformations	2	BIT 573	Protein Interactions	2
MB 441	Immunology	3	BIT 574	Plant Genetic Engineering	2
MB 451	Microbial Diversity	3	ENT 305	Introduction to Forensic Entomology	3
MB 452	Microbial Diversity Lab	2	Group A - Physical Sciences		
MB 455	Microbial Biotechnology	3	AEE 226	Computer Applications and Information Technology in Agricultural & Extension Ed	3
MB 461	Molecular Virology	3	BAE 200	Computer Methods in Biological Engineering	2
MB 480	Current Issues in Microbiology	1	BMA 573	Mathematical Modeling of Physical and Biological Processes I	3
MB 505	Food Microbiology	3	BMA 574	Mathematical Modeling of Physical and Biological Processes II	3
MB 506	Food Microbiology Lab	1	BUS 340	Information Systems Management	3
MB 520	Fundamentals of Microbial Cell Biotransformations	2	BUS 350	Economics and Business Statistics	3
MEA 200	Introduction to Oceanography	3	CE 435	Engineering Geology	3
MEA 210	Oceanography Lab	1	CE 479	Air Quality	3
MEA 220	Marine Biology	3	CE 581	Fluid Mechanics in Natural Environments	3
MEA 250	Introduction to Coastal Environments	3	CH 230	Computational Chemistry Lab I	1
MEA 251	Introduction to Coastal Environments Laboratory	1	CH 232	Computational Chemistry Lab II	1
MEA 369	Life on Earth: Principles of Paleontology	3	CH 315	Quantitative Analysis	3
NTR 301	Introduction to Human Nutrition	3	CH 316	Quantitative Analysis Laboratory	1
NTR 415	Comparative Nutrition	3	CH 331	Introductory Physical Chemistry	4
NTR 419	Human Nutrition and Chronic Disease	3	CH 401	Systematic Inorganic Chemistry I	3
NTR 420		3	CH 403	Systematic Inorganic Chemistry II	3
NTR 421		3	CH 415	Analytical Chemistry II	3
NTR 490	Senior Capstone Experience in Nutrition	4	CH 431	Physical Chemistry I	3
NTR 515	Comparative Nutrition	3	CH 433	Physical Chemistry II	3
NTR 521		3	CH 435	Introduction to Quantum Chemistry	3
PO 404	Avian Anatomy and Physiology	4	CH 437	Physical Chemistry for Engineers	4
PO 404	Avian Anatomy and Physiology	4	CH 441	Forensic Chemistry	3
PO 415	Comparative Nutrition	3	CH 442	Advanced Synthetic Techniques	4
PO 504	Avian Anatomy and Physiology	4	CH 444	Advanced Synthetic Techniques II	4
PO 515	Comparative Nutrition	3	CH 452	Advanced Measurement Techniques I	4
SSC 200	Soil Science	3	CH 454	Advanced Measurement Techniques II	4
SSC 201	Soil Science Laboratory	1	CH 463	Molecular Origins of Life	3
SSC 332	Environmental Soil Microbiology	3	CH 563	Molecular Origins of Life	3
SSC 470	Wetland Soils	3			
SSC 570	Wetland Soils	3			

CSC 110	Computer Science Principles - The Beauty and Joy of Computing	3	CSC 492	Senior Design Project	3
CSC 111	Introduction to Computing: Python	3	CSC 495		1-6
CSC 112	Introduction to Computing-FORTRAN	3	CSC 499	Independent Research in Computer Science	1-6
CSC 113	Introduction to Computing - MATLAB	3	CSC 501	Operating Systems Principles	3
CSC 116	Introduction to Computing - Java	3	CSC 503	Computational Applied Logic	3
CSC 200		3	CSC 505	Design and Analysis Of Algorithms	3
CSC 216	Software Development Fundamentals	3	CSC 506	Architecture Of Parallel Computers	3
CSC 217	Software Development Fundamentals Lab	1	CSC 510	Software Engineering	3
CSC 226	Discrete Mathematics	3	CSC 512	Compiler Construction	3
CSC 230	C and Software Tools	3	CSC 513	Electronic Commerce Technology	3
CSC 236	Computer Organization and Assembly Language for Computer Scientists	3	CSC 515	Software Security	3
CSC 246	Concepts and Facilities of Operating Systems for Computer Scientists	3	CSC 517	Object-Oriented Design and Development	3
CSC 251	Python Applications	1	CSC 519	DevOps: Modern Software Engineering Practices	3
CSC 255		1	CSC 520	Artificial Intelligence I	3
CSC 281	Foundations of Interactive Game Design	3	CSC 522	Automated Learning and Data Analysis	3
CSC 295	Special Topics in Computer Science	1-3	CSC 530	Computational Methods for Molecular Biology	3
CSC 302	Introduction to Numerical Methods	3	CSC 533	Privacy in the Digital Age	3
CSC 316	Data Structures and Algorithms	3	CSC 540	Database Management Concepts and Systems	3
CSC 326	Software Engineering	4	CSC 541	Advanced Data Structures	3
CSC 333	Automata, Grammars, and Computability	3	CSC 546	Management Decision and Control Systems	3
CSC 342	Applied Web-based Client-Server Computing	3	CSC 547	Cloud Computing Technology	3
CSC 379	Ethics in Computing	1	CSC 548	Parallel Systems	3
CSC 401	Data and Computer Communications Networks	3	CSC 554	Human-Computer Interaction	3
CSC 402	Networking Projects	3	CSC 555	Social Computing and Decentralized Artificial Intelligence	3
CSC 405	Computer Security	3	CSC 561	Principles of Computer Graphics	3
CSC 406	Architecture Of Parallel Computers	3	CSC 562	Introduction to Game Engine Design	3
CSC 411	Introduction to Artificial Intelligence	3	CSC 563	Visual Interfaces for Mobile Devices	3
CSC 412	Compiler Construction	3	CSC 565	Graph Theory	3
CSC 415	Software Security	3	CSC 568	Enterprise Storage Architecture	3
CSC 416	Introduction to Combinatorics	3	CSC 570	Computer Networks	3
CSC 417	Theory of Programming Languages	3	CSC 573	Internet Protocols	3
CSC 422	Automated Learning and Data Analysis	3	CSC 574	Computer and Network Security	3
CSC 427	Introduction to Numerical Analysis I	3	CSC 575	Introduction to Wireless Networking	3
CSC 428	Introduction to Numerical Analysis II	3	CSC 576	Networking Services: QoS, Signaling, Processes	3
CSC 431	File Organization and Processing	3	CSC 577	Switched Network Management	3
CSC 440	Database Management Systems	3	CSC 579	Introduction to Computer Performance Modeling	3
CSC 442	Introduction to Data Science	3	CSC 580	Numerical Analysis I	3
CSC 450	Web Services	3	CSC 582	Computer Models of Interactive Narrative	3
CSC 453	Introduction to Internet of Things (IoT) Systems	3	CSC 583	Introduction to Parallel Computing	3
CSC 454	Human-Computer Interaction	3	CSC 584	Building Game AI	3
CSC 455	Social Computing and Decentralized Artificial Intelligence	3	CSC 591	Special Topics In Computer Science	1-6
CSC 456	Computer Architecture and Multiprocessors	3	E 531	Dynamic Systems and Multivariable Control I	3
CSC 461	Computer Graphics	3	ECE 406	Architecture Of Parallel Computers	3
CSC 462	Advanced Computer Graphics Projects	3	ECE 460		3
CSC 467	Introduction to Quantum Algorithms	3	ECE 506	Architecture Of Parallel Computers	3
CSC 474	Network Security	3	ECE 514	Random Processes	3
CSC 481	Game Engine Foundations	3	ECE 517	Object-Oriented Design and Development	3
CSC 482	Advanced Computer Game Projects	3	ECE 547	Cloud Computing Technology	3
CSC 484	Building Game AI	3	ECE 560		3
			ECE 570	Computer Networks	3
			ECE 573	Internet Protocols	3

ECE 574	Computer and Network Security	3	MA 491	Reading in Honors Mathematics	1-6
ECE 575	Introduction to Wireless Networking	3	MA 493	Special Topics in Mathematics	1-6
ECE 576	Networking Services: QoS, Signaling, Processes	3	MA 494	Major Paper in Mathematics	1
ECE 577	Switched Network Management	3	MA 499	Independent Research in Mathematics	1-6
ECE 579	Introduction to Computer Performance Modeling	3	MA 501	Advanced Mathematics for Engineers and Scientists I	3
ECG 528	Options and Derivatives Pricing	3	MA 502	Advanced Mathematics for Engineers and Scientists II	3
ET 320	Fundamentals of Air Pollution	3	MA 504	Introduction to Mathematical Programming	3
FIM 528	Options and Derivatives Pricing	3	MA 505	Linear Programming	3
FIM 548	Monte Carlo Methods for Financial Math	3	MA 507	Survey of Real Analysis	3
FIM 549	Financial Risk Analysis	3	MA 508	Survey of Geometry	3
GIS 582	Geospatial Modeling	3	MA 509	Survey of Abstract Algebra	3
ISE 441	Introduction to Simulation	3	MA 510	Selected Topics In Mathematics For Secondary Teachers	1-6
ISE 505	Linear Programming	3	MA 511	Advanced Calculus I	3
ISE 546	Management Decision and Control Systems	3	MA 512	Introduction to Analysis	3
LOG 201	Logic	3	MA 513	Introduction To Complex Variables	3
LOG 335	Symbolic Logic	3	MA 515	Analysis I	3
MA 105	Mathematics of Finance	3	MA 518	Geometry of Curves and Surfaces	3
MA 205		3	MA 520	Linear Algebra	3
MA 225	Foundations of Advanced Mathematics	3	MA 521	Abstract Algebra I	3
MA 242	Calculus III	4	MA 522	Computer Algebra	3
MA 302	Numerical Applications to Differential Equations	1	MA 523	Linear Transformations and Matrix Theory	3
MA 303	Linear Analysis	3	MA 524	Combinatorics I	3
MA 305	Introductory Linear Algebra and Matrices	3	MA 526	Mathematical Analysis II	3
MA 315	Mathematics Methods in Atmospheric Sciences	4	MA 528	Options and Derivatives Pricing	3
MA 325	Introduction to Applied Mathematics	3	MA 531	Dynamic Systems and Multivariable Control I	3
MA 331	Differential Equations for the Life Sciences	3	MA 532	Ordinary Differential Equations I	3
MA 335	Symbolic Logic	3	MA 534	Introduction To Partial Differential Equations	3
MA 341	Applied Differential Equations I	3	MA 537	Nonlinear Dynamics and Chaos	3
MA 351	Introduction to Discrete Mathematical Models	3	MA 540	Uncertainty Quantification for Physical and Biological Models	3
MA 401	Applied Differential Equations II	3	MA 544	Computer Experiments In Mathematical Probability	3
MA 402	Mathematics of Scientific Computing	3	MA 546	Probability and Stochastic Processes I	3
MA 403	Introduction to Modern Algebra	3	MA 547	Stochastic Calculus for Finance	3
MA 405	Introduction to Linear Algebra	3	MA 548	Monte Carlo Methods for Financial Math	3
MA 407	Introduction to Modern Algebra for Mathematics Majors	3	MA 549	Financial Risk Analysis	3
MA 408	Foundations of Euclidean Geometry	3	MA 551	Introduction to Topology	3
MA 410	Theory of Numbers	3	MA 555	Introduction to Manifold Theory	3
MA 412	Long-Term Actuarial Models	3	MA 561	Set Theory and Foundations Of Mathematics	3
MA 413	Short-Term Actuarial Models	3	MA 565	Graph Theory	3
MA 416	Introduction to Combinatorics	3	MA 573	Mathematical Modeling of Physical and Biological Processes I	3
MA 421	Introduction to Probability	3	MA 574	Mathematical Modeling of Physical and Biological Processes II	3
MA 425	Mathematical Analysis I	3	MA 580	Numerical Analysis I	3
MA 426	Mathematical Analysis II	3	MA 583	Introduction to Parallel Computing	3
MA 427	Introduction to Numerical Analysis I	3	MA 584	Numerical Solution of Partial Differential Equations--Finite Difference Methods	3
MA 428	Introduction to Numerical Analysis II	3	MA 587	Numerical Solution of Partial Differential Equations--Finite Element Method	3
MA 430	Mathematical Models in the Physical Sciences	3	MA 591	Special Topics	1-6
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			

MBA 528	Options and Derivatives Pricing	3	MEA 498	Internship in MEAS	1-6
MEA 100	Earth System Science: Exploring the Connections	4	MEA 507	Discipline-based Education Research in the Geosciences	3
MEA 101	Geology I: Physical	3	MEA 510	Air Pollution Meteorology	3
MEA 110	Geology I Laboratory	1	MEA 511	Introduction to Meteorological Remote Sensing	3
MEA 130	Introduction to Weather and Climate	3	MEA 514	Advanced Physical Meteorology	3
MEA 135	Introduction to Weather and Climate Laboratory	1	MEA 515	Climate Dynamics	3
MEA 202	Geology II: Historical	3	MEA 517	Fundamentals of Climate Change Science	3
MEA 211	Geology II Laboratory	1	MEA 518	Adaptation to Climate Change	3
MEA 300	Environmental Geology	4	MEA 519	Barriers to Climate Change Literacy	3
MEA 312	Atmospheric Thermodynamics	4	MEA 525	Introduction to Atmospheric Chemistry	3
MEA 315	Mathematics Methods in Atmospheric Sciences	4	MEA 540	Principles of Physical Oceanography	3
MEA 320	Fundamentals of Air Pollution	3	MEA 549	Principles of Biological Oceanography	3
MEA 321	Fundamentals of Air Quality and Climate Change	3	MEA 553	Estuarine Biogeochemistry	3
MEA 323	Geochemistry of Natural Waters	3	MEA 554	Marine Physical-Biological Interactions	3
MEA 409	Watershed Forensics	3	MEA 562	Marine Sediment Transport	3
MEA 410	Introduction to Mineralogy	4	MEA 570	Geological Oceanography	3
MEA 411	Marine Sediment Transport	3	MEA 573	Principles of Chemical Oceanography	3
MEA 412	Atmospheric Physics	3	MEA 574	Advanced Igneous Petrology	3
MEA 415	Climate Dynamics	3	MEA 577	Electron Microprobe Analysis of Geologic Material	2
MEA 421	Atmospheric Dynamics I	3	MEA 579	Principles of Air Quality Engineering	3
MEA 422	Atmospheric Dynamics II	3	MEA 580	Air Quality Modeling and Forecasting	4
MEA 425	Introduction to Atmospheric Chemistry	3	MEA 581	Fluid Mechanics in Natural Environments	3
MEA 440	Igneous and Metamorphic Petrology	4	MEA 582	Geospatial Modeling	3
MEA 443	Synoptic Weather Analysis and Forecasting	4	MEA 585	Physical Hydrogeology	3
MEA 444	Mesoscale Analysis and Forecasting	4	MEA 591	Special Topics in Marine Science	1-6
MEA 449	Principles of Biological Oceanography	3	MEA 592	Special Topics in Earth Sciences	1-6
MEA 450	Introductory Sedimentology and Stratigraphy	4	MEA 593	Special Topics in Atmospheric Science	1-6
MEA 451	Structural Geology	4	MEA 599	Regional Geology of North America	1-6
MEA 454	Marine Physical-Biological Interactions	3	OR 504	Introduction to Mathematical Programming	3
MEA 455	Micrometeorology	3	OR 505	Linear Programming	3
MEA 458	Introduction to Tropical Meteorology	3	OR 531	Dynamic Systems and Multivariable Control I	3
MEA 459	Field Investigation of Coastal Processes	5	OR 565	Graph Theory	3
MEA 460	Principles of Physical Oceanography	3	OR 579	Introduction to Computer Performance Modeling	3
MEA 462	Observational Methods and Data Analysis in Marine Physics	3	PSY 240	Introduction to Behavioral Research I	3
MEA 463	Fluid Physics	3	PSY 241	Introduction to Behavioral Research I Lab	1
MEA 464	Ocean Circulation Systems	3	PSY 242	Introduction to Behavioral Research II	3
MEA 465	Geologic Field Camp	4	PSY 243	Introduction to Behavioral Research II Lab	2
MEA 466	Preparatory Course for Field Camp	1	PY 414	Electromagnetism I	3
MEA 467	Marine Meteorology	3	PY 415	Electromagnetism II	3
MEA 469	Ecology of Coastal Resources	3	PY 514	Electromagnetism I	3
MEA 470	Introduction to Geophysics	3	PY 515	Electromagnetism II	3
MEA 471	Exploration and Engineering Geophysics	3	ST 350	Economics and Business Statistics	3
MEA 473	Principles of Chemical Oceanography	3	ST 412	Long-Term Actuarial Models	3
MEA 476	Worldwide River and Delta Systems: Their Evolution and Human Impacts	3	ST 413	Short-Term Actuarial Models	3
MEA 479	Air Quality	3	ST 442	Introduction to Data Science	3
MEA 481	Geomorphology: Earth's Dynamic Surface	3	ST 546	Probability and Stochastic Processes I	3
MEA 485	Introduction to Hydrogeology	3	Group A - Physical Sciences		
MEA 488	Meteorology for Media	3	BME 201	Computer Methods in Biomedical Engineering	3
MEA 493	Special Topics in MEAS	1-6	CSC 442	Introduction to Data Science	3
MEA 495	Junior Seminar in the Marine, Earth, and Atmospheric Sciences	1	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	PY 528	Introduction to Plasma Physics and Fusion Energy	3
ECG 561	Applied Econometrics I	3	PY 529	Plasma Physics and Fusion Energy II	3
EMS 519	Teaching and Learning of Statistical Thinking	3	PY 543	Astrophysics	3
GPH 404	Epidemiology and Statistics in Global Public Health	3	PY 552	Condensed Matter Physics I	3
MA 412	Long-Term Actuarial Models	3	PY 570	Polymer Physics	3
MA 413	Short-Term Actuarial Models	3	PY 581	Matter & Interactions for Teachers I	3
MA 546	Probability and Stochastic Processes I	3	PY 582	Matter & Interactions for Teachers II	3
MA 555	Introduction to Manifold Theory	3	PY 589	Solid State Solar and Thermal Energy Harvesting	3
MEA 150	Environmental Issues in Water Resources	4	PY 590	Special Topics In Physics	1-6
MEA 463	Fluid Physics	3	PY 599	Special Topics in Physics	1-6
MSE 489	Solid State Solar and Thermal Energy Harvesting	3	SSC 200	Soil Science	3
MSE 589	Solid State Solar and Thermal Energy Harvesting	3	SSC 201	Soil Science Laboratory	1
NE 528	Introduction to Plasma Physics and Fusion Energy	3	ST 311	Introduction to Statistics	3
NE 529	Plasma Physics and Fusion Energy II	3	ST 312	Introduction to Statistics II	3
PSY 240	Introduction to Behavioral Research I	3	ST 370	Probability and Statistics for Engineers	3
PSY 241	Introduction to Behavioral Research I Lab	1	ST 371	Introduction to Probability and Distribution Theory	3
PSY 242	Introduction to Behavioral Research II	3	ST 372	Introduction to Statistical Inference and Regression	3
PSY 243	Introduction to Behavioral Research II Lab	2	ST 380		3
PY 123	Stellar and Galactic Astronomy	3	ST 401	Experiences in Data Analysis	4
PY 124	Solar System Astronomy	3	ST 404	Epidemiology and Statistics in Global Public Health	3
PY 125	Astronomy Laboratory	1	ST 405	Applied Nonparametric Statistics	3
PY 131	Conceptual Physics	4	ST 412	Long-Term Actuarial Models	3
PY 203	University Physics III	4	ST 413	Short-Term Actuarial Models	3
PY 301	Introduction to Quantum Mechanics	3	ST 421	Introduction to Mathematical Statistics I	3
PY 328	Stellar and Galactic Astrophysics	3	ST 422	Introduction to Mathematical Statistics II	3
PY 341	Relativity, Gravitation and Cosmology	3	ST 430	Introduction to Regression Analysis	3
PY 401	Quantum Physics I	3	ST 431	Introduction to Experimental Design	3
PY 402	Quantum Physics II	3	ST 432	Introduction to Survey Sampling	3
PY 407	Introduction to Modern Physics	3	ST 433	Applied Spatial Statistics	3
PY 411	Mechanics I	3	ST 434	Applied Time Series	3
PY 412	Mechanics II	3	ST 435	Statistical Methods for Quality and Productivity Improvement	3
PY 413	Thermal Physics	3	ST 437	Applied Multivariate and Longitudinal Data Analysis	3
PY 414	Electromagnetism I	3	ST 440	Applied Bayesian Analysis	3
PY 415	Electromagnetism II	3	ST 445	Introduction to Statistical Computing and Data Management	3
PY 452	Advanced Physics Laboratory	3	ST 446	Intermediate SAS Programming with Applications	3
PY 489	Solid State Solar and Thermal Energy Harvesting	3	ST 491	Statistics in Practice	3
PY 495	Special Topics in Physics	1-4	ST 495	Special Topics in Statistics	1-6
PY 499	Independent Research in Physics	1-6	ST 497	Professional Experience in Statistics	1-3
PY 501	Quantum Physics I	3	ST 498	Independent Study In Statistics	1-6
PY 502	Quantum Physics II	3	ST 499	Research Experience in Statistics	1-3
PY 506	Nuclear and Subatomic Physics	3	ST 501	Fundamentals of Statistical Inference I	3
PY 507	Elementary Particle Physics	3	ST 502	Fundamentals of Statistical Inference II	3
PY 509	General Relativity	3	ST 503	Fundamentals of Linear Models and Regression	3
PY 511	Mechanics I	3	ST 505	Applied Nonparametric Statistics	3
PY 512	Mechanics II	3	ST 506		3
PY 514	Electromagnetism I	3	ST 507	Statistics For the Behavioral Sciences I	3
PY 515	Electromagnetism II	3	ST 508		3
PY 516	Physical Optics	3	ST 511	Statistical Methods For Researchers I	3
PY 517	Atomic and Molecular Physics	3			
PY 519	Biological Physics	3			
PY 525	Computational Physics	3			

ST 512	Statistical Methods For Researchers II	3	ARE 321	Agricultural Financial Management	3
ST 513	Statistics for Management and Social Sciences I	3	ARE 336	Introduction to Resource and Environmental Economics	3
ST 514	Statistics For Management and Social Sciences II	3	ARE 345	Global Agribusiness Management	3
ST 515	Experimental Statistics for Engineers I	3	ARE 404	Advanced Agribusiness Management	3
ST 516	Experimental Statistics For Engineers II	3	ARE 413	Applied Agribusiness Marketing	3
ST 517	Applied Statistical Methods I	3	ARE 433	U.S. Agricultural Policy	3
ST 519	Teaching and Learning of Statistical Thinking	3	ARE 490	Career Seminar in Agriculture & Resource Economics	1
ST 520	Statistical Principles of Clinical Trials	3	BUS 225	Personal Finance	3
ST 524		3	BUS 320	Financial Management	3
ST 533	Applied Spatial Statistics	3	BUS 340	Information Systems Management	3
ST 534	Applied Time Series	3	BUS 360	Marketing Methods	3
ST 535	Statistical Methods for Quality and Productivity Improvement	3	BUS 370	Operations and Supply Chain Management	3
ST 537	Applied Multivariate and Longitudinal Data Analysis	3	BUS 420	Financial Management of Corporations	3
ST 540	Applied Bayesian Analysis	3	BUS 422	Investments and Portfolio Management	3
ST 542	Statistical Practice	3	BUS 425	Advanced Personal Financial Management	3
ST 544	Applied Categorical Data Analysis	3	BUS 426	International Financial Management	3
ST 555	Statistical Programming I	3	BUS 440	Database Management	3
ST 556	Statistical Programming II	3	BUS 441	Business Data Communications and Networking	3
ST 557	Using Technology to Teach and Learn with Data	3	BUS 442	Information Systems Development	3
ST 558	Data Science for Statisticians	3	BUS 443	Web Development for Business Applications	3
ST 561	Applied Econometrics I	3	BUS 444	Systems Analysis and Design	3
ST 562	Data Mining with SAS Enterprise Miner	3	BUS 461	Channel and Retail Marketing	3
ST 563	Introduction to Statistical Learning	3	BUS 462	Marketing Research	3
ST 590	Special Topics	1-6	BUS 464	International Marketing	3
ST 701	Statistical Theory I	3	BUS 465	Traditional and Digital Brand Promotion	3
ST 702	Statistical Theory II	3	BUS 466	Personal Selling	3
ST 705	Linear Models and Variance Components	3	BUS 467	Product and Brand Management	3
TE 570	Polymer Physics	3	BUS 468	Marketing Strategy	3
Group B - Economics & Business			BUS 469	Digital Marketing Practicum	3
ACC 210	Concepts of Financial Reporting	3	BUS 470	Operations Modeling and Analysis	3
ACC 220	Introduction to Managerial Accounting	3	BUS 472	Operations Planning and Control Systems	3
ACC 280	Survey of Financial and Managerial Accounting	3	BUS 473	Supply Chain Strategy	3
ACC 310	Intermediate Financial Accounting I	3	BUS 475	Purchasing and Supply Management	3
ACC 311	Intermediate Financial Accounting II	3	BUS 479	Supply Chain Management Undergraduate Practicum	3
ACC 330	An Introduction To Income Taxation	3	EC 301	Intermediate Microeconomics	3
ACC 340	Accounting Information Systems	3	EC 336	Introduction to Resource and Environmental Economics	3
ACC 411	Business Valuation	3	FTM 482	Global Brand Management in Textiles and Apparel	3
ACC 420	Cost Accounting for Effective Management	3	M 100	Personal and Professional Identity Development	1
ACC 440	Enterprise Resource Planning Systems: Implementation, Risk, and Analytics	3	MIE 201	Introduction to Business	3
ACC 450	Auditing and Assurance Services	3	MIE 305	Legal and Regulatory Environment	3
ACC 451	Internal Auditing	3	MIE 330	Managing People	3
ACC 460	Governmental and Nonprofit Accounting	3	MIE 335	Organizational Behavior	3
ARE 215	Small Business Accounting	3	MIE 432	Employee Relations	3
ARE 301	Intermediate Microeconomics	3	MIE 434	Rewards and Relationship Management	3
ARE 303	Farm Management	3	MIE 435	Leading in a Changing World	3
ARE 304	Agribusiness Management	3	MIE 436	Consultative Skills	3
ARE 306	Agricultural Law	3	MIE 438	Talent Management	3
ARE 309	Environmental Law & Economic Policy	3	MIE 480	Business Policy and Strategy	3
ARE 311	Agricultural Markets	3	PRT 406	Sports Law	3
ARE 312	Agribusiness Marketing	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 Practicum	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	Health Economics	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	3
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	PO 322	Muscle Foods and Eggs	3
BAE 202	Introduction to Biological and Agricultural Engineering Methods	4	PO 425	Feed Manufacturing Technology	3
BAE 302	Transport Phenomena	3	PO 525	Feed Manufacturing Technology	3
BAE 322	Introduction to Food Process Engineering	3	PP 470	Advanced Turfgrass Pest Management	2
BAE 361	Analytical Methods in Engineering Design	3	SSC 440	Geographic Information Systems (GIS) in Soil Science and Agriculture	3
BAE 371	Fundamentals of Hydrology for Engineers	3	SSC 473	Introduction to Hydrologic and Water Quality Modeling	3
BAE 401	Sensors and Controls	3	SSC 540	Geographic Information Systems (GIS) in Soil Science and Agriculture	3
BAE 435	Precision Agriculture Technology	3	SSC 573	Introduction to Hydrologic and Water Quality Modeling	3
BAE 451	Engineering Design I	2	USC 291	Service Learning Program Leader Development I	1
BAE 452	Engineering Design II	2	USC 292	Service Learning Program Leader Development II	2
BAE 462	Machinery Design and Applications	3	Group C - Applied Sci & Tech		
BAE 472	Irrigation and Drainage	3	AEC 420	Introduction to Fisheries Science	3
BAE 473	Introduction to Hydrologic and Water Quality Modeling	3	AEE 206	Introduction to Teaching Agriculture	3
BAE 474	Principles and Applications of Ecological Engineering	3	AEE 303	Administration and Supervision of Student Organizations	3
BAE 481	Structures & Environment	3	AEE 322	Experiential Learning in Agriculture	3
BAE 501	Sensors and Controls	3	AEE 327	Conducting Summer Programs in Agricultural Education	1
BAE 535	Precision Agriculture Technology	3	AEE 424	Planning Agricultural Educational Programs	3
BAE 572	Irrigation and Drainage	3	AEE 426	Methods of Teaching Agriculture	3
BAE 573	Introduction to Hydrologic and Water Quality Modeling	3	AEE 427	Student Teaching in Agriculture	8
BEC 330	Principles and Applications of Bioseparations	2	ANS 322	Muscle Foods and Eggs	3
BEC 436	Introduction to Downstream Process Development	2	ANS 324	Milk and Dairy Products	3
BEC 440		3	ANS 330	Laboratory Animal Science	3
BEC 536	Introduction to Downstream Process Development	2	ANS 411	Management of Growing and Performance Horses	3
BEC 540		3	ANS 425	Feed Manufacturing Technology	3
BME 540	Nanobiotechnology Processing, Characterization, and Applications	3	ANS 525	Feed Manufacturing Technology	3
BME 203		3	BAE 325	Introductory Geomatics	3
BME 207	Biomedical Electronics	4	BAE 425	Industrial Microbiology and Bioprocessing	3
BME 342		3	BAE 435	Precision Agriculture Technology	3
BME 365	Linear Systems in Biomedical Engineering	3	BAE 525	Industrial Microbiology and Bioprocessing	3
BME 385	Bioinstrumentation	3	BAE 535	Precision Agriculture Technology	3
BME 412	Biomedical Signal Processing	3	BBS 201	Introduction to Biopharmaceutical Science	3
BME 425	Bioelectricity	3	BBS 301	Process Validation Science	3
BME 525	Bioelectricity	3	BBS 426	Upstream Biomanufacturing Laboratory	2
CS 470	Advanced Turfgrass Pest Management	2	BBS 526	Upstream Biomanufacturing Laboratory	2
ECI 424	Student Teaching in Modern Foreign Languages	12	BCH 220	Role of Biotechnology in Society	3
ENT 470	Advanced Turfgrass Pest Management	2	BEC 426	Upstream Biomanufacturing Laboratory	2
FM 425	Feed Manufacturing Technology	3	BEC 483		2
FM 525	Feed Manufacturing Technology	3	BEC 526	Upstream Biomanufacturing Laboratory	2
FS 322	Muscle Foods and Eggs	3	BEC 583		2
FS 324	Milk and Dairy Products	3	BME 375	Biomedical Microcontroller Applications	3
FS 435	Food Safety Management Systems	3	BME 444	Orthopaedic Biomechanics	3
FS 535	Food Safety Management Systems	3	BME 451	BME Senior Design: Product Development	3
MSE 203		3	BME 452	BME Senior Design: Product Implementation and Strategy	3
NTR 425	Feed Manufacturing Technology	3	BME 466	Polymeric Biomaterials Engineering	3
NTR 454	Lactation, Milk and Nutrition	3	BME 467	Mechanics of Tissues & Implants Requirements	3
NTR 525	Feed Manufacturing Technology	3	BME 483	Tissue Engineering Technologies	2
PB 208	Agricultural Biotechnology: Issues and Implications	3			

BME 484	Fundamentals of Tissue Engineering	3	FS 453	Food Laws and Regulations	3
BME 544	Orthopaedic Biomechanics	3	FS 462	Postharvest Physiology	3
BME 566	Polymeric Biomaterials Engineering	3	FS 475	Problems and Design in Food and Bioprocessing Science	3
BME 583	Tissue Engineering Technologies	2	FS 516	Quality Control in Food and Bioprocessing	3
BME 584	Fundamentals of Tissue Engineering	3	FS 521	Food Preservation	3
CS 200	Introduction to Turfgrass Management	4	FS 526	Upstream Biomanufacturing Laboratory	2
CS 210	Lawns and Sports Turf	3	FS 535	Food Safety Management Systems	3
CS 213	Crop Science	3	FS 553	Food Laws and Regulations	3
CS 216	Southern Row Crop Production - Cotton, Peanuts, and Tobacco	3	FS 562	Postharvest Physiology	3
CS 218	Southern Row Crop Production - Corn, Small Grains and Soybeans	3	FW 221	Conservation of Natural Resources	3
CS 230	Introduction to Agroecology	3	FW 311	Piedmont Wildlife Ecology and Management	3
CS 312		3	FW 312	Fisheries Techniques and Management	1
CS 400	Turf Cultural Systems	3	FW 313	Mountain Wildlife Ecology and Management	1
CS 411		3	FW 314	Coastal Ecology and Management	1
CS 413	Plant Breeding	2	FW 353	Wildlife Management	3
CS 414	Weed Science	4	FW 403	Urban Wildlife Management	3
CS 415	Integrated Pest Management	3	FW 411	Human Dimensions of Wildlife and Fisheries	3
CS 424	Seed Physiology	3	FW 453	Principles of Wildlife Science	4
CS 430	Advanced Agroecology	4	FW 460	International Wildlife Management and Conservation	3
CS 465	Turf Management Systems and Environmental Quality	3	FW 465	African Ecology and Conservation	4
CS 524	Seed Physiology	3	FW 511	Human Dimensions of Wildlife and Fisheries	3
CS 565	Turf Management Systems and Environmental Quality	3	FW 560	International Wildlife Management and Conservation	3
CSSC 490	Senior Seminar in Crop Science and Soil Science	1	FW 565	African Ecology and Conservation	4
ECI 424	Student Teaching in Modern Foreign Languages	12	GPH 201		3
ENT 203	An Introduction to the Honey Bee and Beekeeping	3	HS 432	Introduction to Permaculture	3
ENT 401	Honey Bee Biology and Management	3	HS 462	Postharvest Physiology	3
ES 100	Introduction to Environmental Sciences	3	HS 532	Introduction to Permaculture	3
ES 200	Climate Change and Sustainability	3	HS 562	Postharvest Physiology	3
ES 300	Energy and Environment	3	IDS 303	Humans and the Environment	3
ES 400	Analysis of Environmental Issues	3	NR 303	Humans and the Environment	3
FM 425	Feed Manufacturing Technology	3	NR 350	International Sustainable Resource Use	4
FM 460	Feed Mill Operations and Leadership	3	NR 406	Conservation of Biological Diversity	3
FM 480	Feed Quality Assurance & Formulation	3	NR 420	Watershed and Wetlands Hydrology	4
FM 490	Feed Science Seminar	1	NR 460	Renewable Natural Resource Management and Policy	3
FM 525	Feed Manufacturing Technology	3	NR 520	Watershed and Wetlands Hydrology	4
FOR 318	Forest Pathology	3	NR 560	Renewable Natural Resource Management and Policy	3
FOR 420	Watershed and Wetlands Hydrology	4	NTR 425	Feed Manufacturing Technology	3
FOR 472	Forest Soils	4	NTR 525	Feed Manufacturing Technology	3
FOR 520	Watershed and Wetlands Hydrology	4	PO 322	Muscle Foods and Eggs	3
FS 201	Introduction to Food Science	3	PO 424	Poultry Meat Production	3
FS 290	Careers in Food and Bioprocessing Sciences	1	PO 425	Feed Manufacturing Technology	3
FS 322	Muscle Foods and Eggs	3	PO 435	Poultry Incubation & Breeding	4
FS 324	Milk and Dairy Products	3	PO 525	Feed Manufacturing Technology	3
FS 330	Science of Food Preparation	3	PP 318	Forest Pathology	3
FS 354	Food Sanitation	3	SSC 440	Geographic Information Systems (GIS) in Soil Science and Agriculture	3
FS 416	Quality Control in Food and Bioprocessing	3	SSC 462	Soil-Crop Management Systems	3
FS 421	Food Preservation	3			
FS 426	Upstream Biomanufacturing Laboratory	2			
FS 435	Food Safety Management Systems	3			

SSC 540	Geographic Information Systems (GIS) in Soil Science and Agriculture	3	HS 303	Ornamental Plant Identification I	3
TE 466	Polymeric Biomaterials Engineering	3	HS 304	Ornamental Plant Identification II	3
TE 467	Mechanics of Tissues & Implants Requirements	3	HS 357	Landscape Design Grading and Drainage	4
TE 566	Polymeric Biomaterials Engineering	3	HS 400	Residential Landscaping	6
VMP 401	Poultry Diseases	4	HS 411	Nursery Management	3
VMP 420	Disease of Farm Animals	3	HS 416	Landscape Planting Design	4
Group C - Applied Sci & Tech			HS 421	Temperate-Zone Tree Fruits: Physiology and Culture	3
AEC 419	Freshwater Ecology	4	HS 422	Small Fruit Production	3
AEC 423	Introduction to Fisheries Sciences Laboratory	1	HS 423		3
AEC 519	Freshwater Ecology	4	HS 431	Vegetable Production	4
ANS 322	Muscle Foods and Eggs	3	HS 440	Greenhouse Management	3
ANS 425/525	Feed Manufacturing Technology	3	HS 442	Floriculture Crop Production	3
BAET 323	Water Management	3	HS 462	Postharvest Physiology	3
BIO 227	Understanding Structural Diversity through Biological Illustration	3	HS 471	Landscape Ecosystem Management	4
BME 204		3	HS 516	Landscape Planting Design	4
BME 217	Biomedical Electronics Laboratory	1	HS 521	Temperate-Zone Tree Fruits: Physiology and Culture	3
BME 298	Biomedical Engineering Design and Manufacturing I	2	HS 523		
BME 398	Biomedical Engineering Design and Manufacturing II	2	HS 423		3
CS 470	Advanced Turfgrass Pest Management	2	HS 562	Postharvest Physiology	3
CSSC 490	Senior Seminar in Crop Science and Soil Science	1	IDS 303	Humans and the Environment	3
ENT 470	Advanced Turfgrass Pest Management	2	NR 300	Natural Resource Measurements	4
FM 425	Feed Manufacturing Technology	3	NR 303	Humans and the Environment	3
FM 525	Feed Manufacturing Technology	3	NR 400	Natural Resource Management	4
FOR 318	Forest Pathology	3	NR 420	Watershed and Wetlands Hydrology	4
FOR 420	Watershed and Wetlands Hydrology	4	NR 421	Wetland Science and Management	3
FOR 472	Forest Soils	4	NR 460	Renewable Natural Resource Management and Policy	3
FOR 520	Watershed and Wetlands Hydrology	4	NR 484	Environmental Impact Assessment	4
FS 322	Muscle Foods and Eggs	3	NR 500	Natural Resource Management	4
FS 435	Food Safety Management Systems	3	NR 520	Watershed and Wetlands Hydrology	4
FS 462	Postharvest Physiology	3	NR 521	Wetland Science and Management	3
FS 535	Food Safety Management Systems	3	NR 560	Renewable Natural Resource Management and Policy	3
FS 562	Postharvest Physiology	3	NTR 420		3
FW 221	Conservation of Natural Resources	3	NTR 425	Feed Manufacturing Technology	3
FW 404	Wildlife Habitat Management	3	NTR 525	Feed Manufacturing Technology	3
FW 460	International Wildlife Management and Conservation	3	PO 201	Poultry Science and Production	3
FW 560	International Wildlife Management and Conservation	3	PO 201A	Poultry Science and Production	3
HS 200	Home Horticulture	3	PO 202	Poultry Science and Production Laboratory	1
HS 201	The World of Horticulture: Principles and Practices	3	PO 202A	Poultry Science and Production Laboratory	1
HS 203	Home Plant Propagation	3	PO 290	Exploring Opportunities in Poultry Science	1
HS 242	Landscape Design Introduction	3	PO 322	Muscle Foods and Eggs	3
HS 250	Home Landscape Design: Creating Garden Spaces	3	PO 340	Live Poultry and Poultry Product Evaluation, Grading, and Inspection	3
HS 252	Landscape Design Graphic Communication	2	PO 410	Production and Management of Game Birds in Confinement	3
HS 272	Landscape Design/Build	6	PO 411	Agrosecurity	3
HS 290	Horticulture: Careers and Opportunities	1	PO 421	Commercial Egg Production	3
HS 301	Plant Propagation	4	PO 425	Feed Manufacturing Technology	3
HS 302	Gardening with Herbaceous Perennials	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		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	Ecotoxicology	4
TOX 501	Principles of Toxicology	4

Semester Sequence

This is a sample.

First Year

Fall Semester		Hours
ALS 103 or ALS 303	First-year Success in Agriculture and Life Sciences or Transfer Success in Agriculture and 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 through 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.

Career Titles

Learn More About Careers

NCcareers.org (<https://nccareers.org/>)

Explore North Carolina's central online resource for students, parents, educators, job seekers and career counselors looking for high quality job and career information.

Occupational Outlook Handbook (<https://www.bls.gov/ooh/>)

Browse the Occupational Outlook Handbook published by the Bureau of Labor Statistics to view state and area employment and wage statistics. You can also identify and compare similar occupations based on your interests.

Career One Stop Videos (<https://www.careeronestop.org/>)

View videos that provide career details and information on wages, employment trends, skills needed, and more for any occupation. Sponsored by the U.S. Department of Labor.

Focus 2 Career Assessment (<https://careers.dasa.ncsu.edu/explore-careers/career-assessments/>) (NC State student email address required)

This career, major and education planning system is available to current NC State students to learn about how your values, interests, competencies, and personality fit into the NC State majors and your future career. An NC State email address is required to create an account. Make an appointment with your career counselor (<https://careers.dasa.ncsu.edu/about/hours-appointments/>) to discuss the results.

Focus 2 Apply Assessment (<https://www.focus2career.com/Portal/Register.cfm?SID=1929>) (Available to prospective students)

A career assessment tool designed to support prospective students in exploring and choosing the right major and career path based on your unique personality, interests, skills and values. Get started with Focus 2 Apply and see how it can guide your journey at NC State.

American Society of Agricultural and Biological Engineers (<https://www.asabe.org/>)

Career Cornerstone Center-Engineering (<https://www.careercornerstone.org/eng/eng.htm>)

National Society of Professional Engineers (<https://www.nspe.org/>)