

Biological and Agricultural Engineering Technology (BS): Agricultural 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	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

Agricultural Systems Management

BAE 325	Introductory Geomatics	3
BAE 435	Precision Agriculture Technology	3
BAET 411	Agricultural Machinery and Power Units	4

BAET Electives

ARE Electives (p. 2)	6
Restricted Elective (p. 2)	12

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	BCH 101	Introduction to Microbiology and Biochemistry Laboratory Practices	3
ANS 105	Introduction to Companion Animal Science	3	BCH 220	Role of Biotechnology in Society	3
ANS 110	Introduction to Equine Science	3	BCH 351	General Biochemistry	3
ANS 150	Introduction to Animal Science	3	BCH 451	Principles of Biochemistry	4
ANS 151	Introduction to Animal Science Lab	1	BCH 452	Introductory Biochemistry Laboratory	2
ANS 205	Physiology of Domestic Animals	3	BCH 453	Biochemistry of Gene Expression	3
ANS 206	Anatomy of Domestic Animals Lab	1	BCH 454	Advanced Biochemistry Laboratory	4
ANS 208	Agricultural Biotechnology: Issues and Implications	3	BCH 455	Proteins and Molecular Mechanisms	3
ANS 215	Agricultural Genetics	3	BCH 553	Biochemistry of Gene Expression	3
ANS 220	Reproductive Physiology	3	BCH 555	Proteins and Molecular Mechanisms	3
ANS 221	Reproductive Physiology Lab	1	BEC 463	Fermentation of Recombinant Microorganisms	2
ANS 230	Animal Nutrition	3	BEC 563	Fermentation of Recombinant Microorganisms	2
ANS 231	Animal Nutrition Lab	1	BIO 181	Introductory Biology: Ecology, Evolution, and Biodiversity	4
ANS 415	Comparative Nutrition	3	BIO 267	Research in the Life Sciences I: Research Skills	3
ANS 452	Comparative Reproductive Physiology and Biotechnology	3	BIO 414	Cell Biology	3
ANS 453	Physiology and Genetics of Growth and Development	3	BIO 434	Hormones and Behavior	3
ANS 454	Lactation, Milk and Nutrition	3	BIO 440	The Human Animal: An Evolutionary Perspective	3
ANS 515	Comparative Nutrition	3	BIT 410	Manipulation of Recombinant DNA	4
ANS 552	Comparative Reproductive Physiology and Biotechnology	3	BIT 462		2
ANS 553	Physiology and Genetics of Growth and Development	3	BIT 463	Fermentation of Recombinant Microorganisms	2
ANS 554	Lactation, Milk and Nutrition	3	BIT 464	Protein Purification	2

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

NTR 501	Advanced Nutrition and Metabolism	3	PO 466	Animal Cell Culture Techniques	2
NTR 515	Comparative Nutrition	3	PO 515	Comparative Nutrition	3
PB 103	Perspectives on Botany	1	PO 566	Animal Cell Culture Techniques	2
PB 200	Plant Life	4	PP 150	Introduction to Plant Molecular Biology	3
PB 205	Our Green World	3	PP 222	Kingdom of Fungi	3
PB 208	Agricultural Biotechnology: Issues and Implications	3	Group A - Biological Sciences		
PB 213	Plants and Civilization	3	AEC 419	Freshwater Ecology	4
PB 215	Medicinal Plants	3	AEC 420	Introduction to Fisheries Science	3
PB 219	Plants in Folklore, Myth, and religion	3	AEC 423	Introduction to Fisheries Sciences Laboratory	1
PB 220	Local Flora	3	AEC 441	Biology of Fishes	3
PB 250	Plant Biology	4	AEC 442	Biology of Fishes Laboratory	1
PB 277	Space Biology	3	AEC 460	Field Ecology and Methods	4
PB 321	Introduction to Whole Plant Physiology	3	AEC 519	Freshwater Ecology	4
PB 360	Ecology	4	ANS 215	Agricultural Genetics	3
PB 400	Plant Diversity and Evolution	4	ANS 415	Comparative Nutrition	3
PB 403	Systematic Botany	4	ANS 515	Comparative Nutrition	3
PB 413	Plant Anatomy	2	BEC 463	Fermentation of Recombinant Microorganisms	2
PB 421	Plant Physiology	3	BEC 563	Fermentation of Recombinant Microorganisms	2
PB 445	Paleobotany	4	BIO 140		3
PB 464	Rare Plants of North Carolina	3	BIO 141		1
PB 480	Introduction to Plant Biotechnology	3	BIO 227	Understanding Structural Diversity through Biological Illustration	3
PB 481	Plant Tissue Culture and Transformation	2	BIO 315	General Parasitology	3
PB 503	Systematic Botany	4	BIO 330	Evolutionary Biology	3
PB 513	Plant Anatomy	2	BIO 361	Developmental Biology	3
PB 545	Paleobotany	4	BIO 370	Developmental Anatomy of the Vertebrates	3
PB 564	Rare Plants of North Carolina	3			
PB 580	Introduction to Plant Biotechnology	3			
PHY 452		3			
PHY 552		3			
PO 415	Comparative Nutrition	3			

BIO 375	Developmental Anatomy Laboratory	2	FS 506	Food Microbiology Lab	1
BIO 405	Functional Histology	3	FW 353	Wildlife Management	3
BIO 414	Cell Biology	3	GN 301	Genetics in Human Affairs	3
BIO 424	Endocrinology	3	GN 311	Principles of Genetics	4
BIO 482	Capstone Course in Molecular, Cellular, and Developmental Biology	3	GN 312	Elementary Genetics Laboratory	1
BIO 483	Capstone Course in Integrative Physiology and Neurobiology	3	GN 421	Molecular Genetics	3
BIO 484	Capstone Course in Human Biology	3	GN 423	Population, Quantitative and Evolutionary Genetics	3
BIO 485	Capstone Course in Ecology, Evolution, and Conservation Biology	3	GN 425	Advanced Genetics Laboratory	2
BIO 488	Neurobiology	3	GN 434	Genes and Development	3
BIO 588	Neurobiology	3	GN 441	Human and Biomedical Genetics	3
BIT 210	Phage Hunters	3	GN 451	Genome Science	3
BIT 211	Phage Genomics	2	GN 490	Genetics Colloquium	1
BIT 463	Fermentation of Recombinant Microorganisms	2	GN 521	Molecular Genetics	3
BIT 563	Fermentation of Recombinant Microorganisms	2	GN 541	Human and Biomedical Genetics	3
BME 301	Human Physiology : Electrical Analysis	4	HS 215	Agricultural Genetics	3
BME 302	Human Physiology: Mechanical Analysis	4	HS 451	Plant Nutrition	3
CHE 463	Fermentation of Recombinant Microorganisms	2	HS 551	Plant Nutrition	3
CHE 563	Fermentation of Recombinant Microorganisms	2	MB 180	Introduction to Microbial Bioprocessing	3
CS 211	Plant Genetics	3	MB 200	The Fourth Horseman: Plagues that Changed the World	3
ENT 425	General Entomology	3	MB 210	Phage Hunters	3
FS 405	Food Microbiology	3	MB 211	Phage Genomics	2
FS 406	Food Microbiology Lab	1	MB 351	General Microbiology	3
FS 505	Food 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 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	CH 403	Systematic Inorganic Chemistry II	3
BIT 573	Protein Interactions	2	CH 415	Analytical Chemistry II	3
BIT 574	Plant Genetic Engineering	2	CH 431	Physical Chemistry I	3
ENT 305	Introduction to Forensic Entomology	3	CH 433	Physical Chemistry II	3
Group A - Physical Sciences			CH 435	Introduction to Quantum Chemistry	3
AEE 226	Computer Applications and Information Technology in Agricultural & Extension Ed	3	CH 437	Physical Chemistry for Engineers	4
BAE 200	Computer Methods in Biological Engineering	2	CH 441	Forensic Chemistry	3
BMA 573	Mathematical Modeling of Physical and Biological Processes I	3	CH 442	Advanced Synthetic Techniques	4
BMA 574	Mathematical Modeling of Physical and Biological Processes II	3	CH 444	Advanced Synthetic Techniques II	4
BUS 340	Information Systems Management	3	CH 452	Advanced Measurement Techniques I	4
BUS 350	Economics and Business Statistics	3	CH 454	Advanced Measurement Techniques II	4
CE 435	Engineering Geology	3	CH 463	Molecular Origins of Life	3
CE 479	Air Quality	3	CH 563	Molecular Origins of Life	3
CE 581	Fluid Mechanics in Natural Environments	3	CSC 110	Computer Science Principles - The Beauty and Joy of Computing	3
CH 230	Computational Chemistry Lab I	1	CSC 111	Introduction to Computing: Python	3
CH 232	Computational Chemistry Lab II	1	CSC 112	Introduction to Computing- FORTRAN	3
CH 315	Quantitative Analysis	3	CSC 113	Introduction to Computing - MATLAB	3
CH 316	Quantitative Analysis Laboratory	1	CSC 116	Introduction to Computing - Java	3
CH 331	Introductory Physical Chemistry	4	CSC 200		3
CH 401	Systematic Inorganic Chemistry I	3	CSC 216	Software Development Fundamentals	3
			CSC 217	Software Development Fundamentals Lab	1

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

ECE 460	Embedded System Architectures	3	LOG 335	Symbolic Logic	3
ECE 506	Architecture Of Parallel Computers	3	MA 105	Mathematics of Finance	3
ECE 514	Random Processes	3	MA 205		3
ECE 517	Object-Oriented Design and Development	3	MA 225	Foundations of Advanced Mathematics	3
ECE 547	Cloud Computing Technology	3	MA 242	Calculus III	4
ECE 560	Embedded System Architectures	3	MA 302	Numerical Applications to Differential Equations	1
ECE 570	Computer Networks	3	MA 303	Linear Analysis	3
ECE 573	Internet Protocols	3	MA 305	Introductory Linear Algebra and Matrices	3
ECE 574	Computer and Network Security	3	MA 315	Mathematics Methods in Atmospheric Sciences	4
ECE 575	Introduction to Wireless Networking	3	MA 325	Introduction to Applied Mathematics	3
ECE 576	Networking Services: QoS, Signaling, Processes	3	MA 331	Differential Equations for the Life Sciences	3
ECE 577	Switched Network Management	3	MA 335	Symbolic Logic	3
ECE 579	Introduction to Computer Performance Modeling	3	MA 341	Applied Differential Equations I	3
ECG 528	Options and Derivatives Pricing	3	MA 351	Introduction to Discrete Mathematical Models	3
ET 320	Fundamentals of Air Pollution	3	MA 401	Applied Differential Equations II	3
FIM 528	Options and Derivatives Pricing	3	MA 402	Mathematics of Scientific Computing	3
FIM 548	Monte Carlo Methods for Financial Math	3	MA 403	Introduction to Modern Algebra	3
FIM 549	Financial Risk Analysis	3	MA 405	Introduction to Linear Algebra	3
GIS 582	Geospatial Modeling	3	MA 407	Introduction to Modern Algebra for Mathematics Majors	3
ISE 441	Introduction to Simulation	3	MA 408	Foundations of Euclidean Geometry	3
ISE 505	Linear Programming	3	MA 410	Theory of Numbers	3
ISE 546	Management Decision and Control Systems	3	MA 412	Long-Term Actuarial Models	3
LOG 201	Logic	3	MA 413	Short-Term Actuarial Models	3

MA 416	Introduction to Combinatorics	3	MA 508	Survey of Geometry	3
MA 421	Introduction to Probability	3	MA 509	Survey of Abstract Algebra	3
MA 425	Mathematical Analysis I	3	MA 510	Selected Topics In Mathematics For Secondary Teachers	1-6
MA 426	Mathematical Analysis II	3	MA 511	Advanced Calculus I	3
MA 427	Introduction to Numerical Analysis I	3	MA 512		3
MA 428	Introduction to Numerical Analysis II	3	MA 513	Introduction To Complex Variables	3
MA 430	Mathematical Models in the Physical Sciences	3	MA 515	Analysis I	3
MA 432	Mathematical Models in Life Sciences	3	MA 518	Geometry of Curves and Surfaces	3
MA 437	Applications of Algebra	3	MA 520	Linear Algebra	3
MA 440		3	MA 521	Abstract Algebra I	3
MA 444	Problem Solving Strategies for Competitions	1	MA 522	Computer Algebra	3
MA 450	Methods of Applied Mathematics I	3	MA 523	Linear Transformations and Matrix Theory	3
MA 451	Methods of Applied Mathematics II	3	MA 524	Combinatorics I	3
MA 491	Reading in Honors Mathematics	1-6	MA 526	Mathematical Analysis II	3
MA 493	Special Topics in Mathematics	1-6	MA 528	Options and Derivatives Pricing	3
MA 494	Major Paper in Mathematics	1	MA 531	Dynamic Systems and Multivariable Control I	3
MA 499	Independent Research in Mathematics	1-6	MA 532	Ordinary Differential Equations I	3
MA 501	Advanced Mathematics for Engineers and Scientists I	3	MA 534	Introduction To Partial Differential Equations	3
MA 502	Advanced Mathematics for Engineers and Scientists II	3	MA 537	Nonlinear Dynamics and Chaos	3
MA 504	Introduction to Mathematical Programming	3	MA 540	Uncertainty Quantification for Physical and Biological Models	3
MA 505	Linear Programming	3	MA 544	Computer Experiments In Mathematical Probability	3
MA 507	Survey of Real Analysis	3	MA 546	Probability and Stochastic Processes I	3

MA 547	Stochastic Calculus for Finance	3	MEA 135	Introduction to Weather and Climate Laboratory	1
MA 548	Monte Carlo Methods for Financial Math	3	MEA 202	Geology II: Historical	3
MA 549	Financial Risk Analysis	3	MEA 211	Geology II Laboratory	1
MA 551	Introduction to Topology	3	MEA 300	Environmental Geology	4
MA 555	Introduction to Manifold Theory	3	MEA 312	Atmospheric Thermodynamics	4
MA 561	Set Theory and Foundations Of Mathematics	3	MEA 315	Mathematics Methods in Atmospheric Sciences	4
MA 565	Graph Theory	3	MEA 320	Fundamentals of Air Pollution	3
MA 573	Mathematical Modeling of Physical and Biological Processes I	3	MEA 321	Fundamentals of Air Quality and Climate Change	3
MA 574	Mathematical Modeling of Physical and Biological Processes II	3	MEA 323	Geochemistry of Natural Waters	3
MA 580	Numerical Analysis I	3	MEA 409	Watershed Forensics	3
MA 583	Introduction to Parallel Computing	3	MEA 410	Introduction to Mineralogy	4
MA 584	Numerical Solution of Partial Differential Equations-- Finite Difference Methods	3	MEA 411	Marine Sediment Transport	3
MA 587	Numerical Solution of Partial Differential Equations--Finite Element Method	3	MEA 412	Atmospheric Physics	3
MA 591	Special Topics	1-6	MEA 415	Climate Dynamics	3
MBA 528	Options and Derivatives Pricing	3	MEA 421	Atmospheric Dynamics I	3
MEA 100	Earth System Science: Exploring the Connections	4	MEA 422	Atmospheric Dynamics II	3
MEA 101	Geology I: Physical	3	MEA 425	Introduction to Atmospheric Chemistry	3
MEA 110	Geology I Laboratory	1	MEA 440	Igneous and Metamorphic Petrology	4
MEA 130	Introduction to Weather and Climate	3	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 495	Junior Seminar in the Marine, Earth, and Atmospheric Sciences	1
MEA 455	Micrometeorology	3	MEA 498	Internship in MEAS	1-6
MEA 458	Introduction to Tropical Meteorology	3	MEA 507	Discipline-based Education Research in the Geosciences	3
MEA 459	Field Investigation of Coastal Processes	5	MEA 510	Air Pollution Meteorology	3
MEA 460	Principles of Physical Oceanography	3	MEA 511	Introduction to Meteorological Remote Sensing	3
MEA 462	Observational Methods and Data Analysis in Marine Physics	3	MEA 514	Advanced Physical Meteorology	3
MEA 463	Fluid Physics	3	MEA 515	Climate Dynamics	3
MEA 464	Ocean Circulation Systems	3	MEA 517	Fundamentals of Climate Change Science	3
MEA 465	Geologic Field Camp	4	MEA 518	Adaptation to Climate Change	3
MEA 466	Preparatory Course for Field Camp	1	MEA 519	Barriers to Climate Change Literacy	3
MEA 467	Marine Meteorology	3	MEA 525	Introduction to Atmospheric Chemistry	3
MEA 469	Ecology of Coastal Resources	3	MEA 540	Principles of Physical Oceanography	3
MEA 470	Introduction to Geophysics	3	MEA 549	Principles of Biological Oceanography	3
MEA 471	Exploration and Engineering Geophysics	3	MEA 553	Estuarine Biogeochemistry	3
MEA 473	Principles of Chemical Oceanography	3	MEA 554	Marine Physical-Biological Interactions	3
MEA 476	Worldwide River and Delta Systems: Their Evolution and Human Impacts	3	MEA 562	Marine Sediment Transport	3
MEA 479	Air Quality	3	MEA 570	Geological Oceanography	3
MEA 481	Geomorphology: Earth's Dynamic Surface	3	MEA 573	Principles of Chemical Oceanography	3
MEA 485	Introduction to Hydrogeology	3	MEA 574	Advanced Igneous Petrology	3
MEA 488	Meteorology for Media	3	MEA 577	Electron Microprobe Analysis of Geologic Material	2
MEA 493	Special Topics in MEAS	1-6			

MEA 579	Principles of Air Quality Engineering	3	ST 350	Economics and Business Statistics	3
MEA 580	Air Quality Modeling and Forecasting	4	ST 412	Long-Term Actuarial Models	3
MEA 581	Fluid Mechanics in Natural Environments	3	ST 413	Short-Term Actuarial Models	3
MEA 582	Geospatial Modeling	3	ST 442	Introduction to Data Science	3
MEA 585	Physical Hydrogeology	3	ST 546	Probability and Stochastic Processes I	3
MEA 591	Special Topics in Marine Science	1-6	Group A - Physical Sciences		
MEA 592	Special Topics in Earth Sciences	1-6	BME 201	Computer Methods in Biomedical Engineering	3
MEA 593	Special Topics in Atmospheric Science	1-6	CSC 442	Introduction to Data Science	3
MEA 599	Regional Geology of North America	1-6	EC 351	Econometrics I	3
OR 504	Introduction to Mathematical Programming	3	ECE 489	Solid State Solar and Thermal Energy Harvesting	3
OR 505	Linear Programming	3	ECE 589	Solid State Solar and Thermal Energy Harvesting	3
OR 531	Dynamic Systems and Multivariable Control I	3	ECG 561	Applied Econometrics I	3
OR 565	Graph Theory	3	EMS 519	Teaching and Learning of Statistical Thinking	3
OR 579	Introduction to Computer Performance Modeling	3	GPH 404	Epidemiology and Statistics in Global Public Health	3
PSY 240	Introduction to Behavioral Research I	3	MA 412	Long-Term Actuarial Models	3
PSY 241	Introduction to Behavioral Research I Lab	1	MA 413	Short-Term Actuarial Models	3
PSY 242	Introduction to Behavioral Research II	3	MA 546	Probability and Stochastic Processes I	3
PSY 243	Introduction to Behavioral Research II Lab	2	MA 555	Introduction to Manifold Theory	3
PY 414	Electromagnetism I	3	MEA 150	Environmental Issues in Water Resources	4
PY 415	Electromagnetism II	3	MEA 463	Fluid Physics	3
PY 514	Electromagnetism I	3	MSE 489	Solid State Solar and Thermal Energy Harvesting	3
PY 515	Electromagnetism II	3			

MSE 589	Solid State Solar and Thermal Energy Harvesting	3	PY 452	Advanced Physics Laboratory	3
NE 528	Introduction to Plasma Physics and Fusion Energy	3	PY 489	Solid State Solar and Thermal Energy Harvesting	3
NE 529	Plasma Physics and Fusion Energy II	3	PY 495	Special Topics in Physics	1-4
PSY 240	Introduction to Behavioral Research I	3	PY 499	Independent Research in Physics	1-6
PSY 241	Introduction to Behavioral Research I Lab	1	PY 501	Quantum Physics I	3
PSY 242	Introduction to Behavioral Research II	3	PY 502	Quantum Physics II	3
PSY 243	Introduction to Behavioral Research II Lab	2	PY 506	Nuclear and Subatomic Physics	3
PY 123	Stellar and Galactic Astronomy	3	PY 507	Elementary Particle Physics	3
PY 124	Solar System Astronomy	3	PY 509	General Relativity	3
PY 125	Astronomy Laboratory	1	PY 511	Mechanics I	3
PY 131	Conceptual Physics	4	PY 512	Mechanics II	3
PY 203	University Physics III	4	PY 514	Electromagnetism I	3
PY 301	Introduction to Quantum Mechanics	3	PY 515	Electromagnetism II	3
PY 328	Stellar and Galactic Astrophysics	3	PY 516	Physical Optics	3
PY 341	Relativity, Gravitation and Cosmology	3	PY 517	Atomic and Molecular Physics	3
PY 401	Quantum Physics I	3	PY 519	Biological Physics	3
PY 402	Quantum Physics II	3	PY 525	Computational Physics	3
PY 407	Introduction to Modern Physics	3	PY 528	Introduction to Plasma Physics and Fusion Energy	3
PY 411	Mechanics I	3	PY 529	Plasma Physics and Fusion Energy II	3
PY 412	Mechanics II	3	PY 543	Astrophysics	3
PY 413	Thermal Physics	3	PY 552	Condensed Matter Physics I	3
PY 413	Thermal Physics	3	PY 570	Polymer Physics	3
PY 414	Electromagnetism I	3	PY 581	Matter & Interactions for Teachers I	3
PY 415	Electromagnetism II	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	ST 435	Statistical Methods for Quality and Productivity Improvement	3
PY 599	Special Topics in Physics	1-6	ST 437	Applied Multivariate and Longitudinal Data Analysis	3
SSC 200	Soil Science	3	ST 440	Applied Bayesian Analysis	3
SSC 201	Soil Science Laboratory	1	ST 445	Introduction to Statistical Computing and Data Management	3
ST 311	Introduction to Statistics	3	ST 446	Intermediate SAS Programming with Applications	3
ST 312	Introduction to Statistics II	3	ST 491	Statistics in Practice	3
ST 370	Probability and Statistics for Engineers	3	ST 495	Special Topics in Statistics	1-6
ST 371	Introduction to Probability and Distribution Theory	3	ST 498	Independent Study In Statistics	1-6
ST 372	Introduction to Statistical Inference and Regression	3	ST 501	Fundamentals of Statistical Inference I	3
ST 380		3	ST 502	Fundamentals of Statistical Inference II	3
ST 401	Experiences in Data Analysis	4	ST 503	Fundamentals of Linear Models and Regression	3
ST 404	Epidemiology and Statistics in Global Public Health	3	ST 505	Applied Nonparametric Statistics	3
ST 405	Applied Nonparametric Statistics	3	ST 506		3
ST 412	Long-Term Actuarial Models	3	ST 507	Statistics For the Behavioral Sciences I	3
ST 413	Short-Term Actuarial Models	3	ST 508		3
ST 421	Introduction to Mathematical Statistics I	3	ST 511	Statistical Methods For Researchers I	3
ST 422	Introduction to Mathematical Statistics II	3	ST 512	Statistical Methods For Researchers II	3
ST 430	Introduction to Regression Analysis	3	ST 513	Statistics for Management and Social Sciences I	3
ST 431	Introduction to Experimental Design	3	ST 514	Statistics For Management and Social Sciences II	3
ST 432	Introduction to Survey Sampling	3	ST 515	Experimental Statistics for Engineers I	3
ST 433	Applied Spatial Statistics	3			
ST 434	Applied Time Series	3			

ST 516	Experimental Statistics For Engineers II	3	ST 702	Statistical Theory II	3
ST 517	Applied Statistical Methods I	3	ST 705	Linear Models and Variance Components	3
ST 519	Teaching and Learning of Statistical Thinking	3	TE 570	Polymer Physics	3
ST 520	Statistical Principles of Clinical Trials	3	Group B - Economics & Business		
ST 524		3	ACC 200	Introduction to Managerial Accounting	3
ST 533	Applied Spatial Statistics	3	ACC 210	Concepts of Financial Reporting	3
ST 534	Applied Time Series	3	ACC 220	Introduction to Managerial Accounting	3
ST 535	Statistical Methods for Quality and Productivity Improvement	3	ACC 280	Survey of Financial and Managerial Accounting	3
ST 537	Applied Multivariate and Longitudinal Data Analysis	3	ACC 310	Intermediate Financial Accounting I	3
ST 540	Applied Bayesian Analysis	3	ACC 311	Intermediate Financial Accounting II	3
ST 542	Statistical Practice	3	ACC 330	An Introduction To Income Taxation	3
ST 544	Applied Categorical Data Analysis	3	ACC 340	Accounting Information Systems	3
ST 546	Probability and Stochastic Processes I	3	ACC 411	Business Valuation	3
ST 555	Statistical Programming I	3	ACC 420	Cost Accounting for Effective Management	3
ST 556	Statistical Programming II	3	ACC 440	Enterprise Resource Planning Systems: Implementation, Risk, and Analytics	3
ST 557	Using Technology to Teach and Learn with Data	3	ACC 450	Auditing and Assurance Services	3
ST 558	Data Science for Statisticians	3	ACC 451	Internal Auditing	3
ST 561	Applied Econometrics I	3	ACC 460	Governmental and Nonprofit Accounting	3
ST 562	Data Mining with SAS Enterprise Miner	3	ARE 215	Small Business Accounting	3
ST 563	Introduction to Statistical Learning	3	ARE 301	Intermediate Microeconomics	3
ST 590	Special Topics	1-6	ARE 303	Farm Management	3
ST 701	Statistical Theory I	3			

ARE 304	Agribusiness Management	3	BUS 441	Business Data Communications and Networking	3
ARE 306	Agricultural Law	3	BUS 442	Information Systems Development	3
ARE 309	Environmental Law & Economic Policy	3	BUS 443	Web Development for Business Applications	3
ARE 311	Agricultural Markets	3	BUS 444	Systems Analysis and Design	3
ARE 312	Agribusiness Marketing	3	BUS 461	Channel and Retail Marketing	3
ARE 321	Agricultural Financial Management	3	BUS 462	Marketing Research	3
ARE 336	Introduction to Resource and Environmental Economics	3	BUS 464	International Marketing	3
ARE 345	Global Agribusiness Management	3	BUS 465	Traditional and Digital Brand Promotion	3
ARE 404	Advanced Agribusiness Management	3	BUS 466	Personal Selling	3
ARE 413	Applied Agribusiness Marketing	3	BUS 467	Product and Brand Management	3
ARE 433	U.S. Agricultural Policy	3	BUS 468	Marketing Strategy	3
ARE 490	Career Seminar in Agriculture & Resource Economics	1	BUS 469	Digital Marketing Practicum	3
BUS 225	Personal Finance	3	BUS 470	Operations Modeling and Analysis	3
BUS 320	Financial Management	3	BUS 472	Operations Planning and Control Systems	3
BUS 340	Information Systems Management	3	BUS 473	Supply Chain Strategy	3
BUS 360	Marketing Methods	3	BUS 475	Purchasing and Supply Management	3
BUS 370	Operations and Supply Chain Management	3	BUS 479	Supply Chain Management Undergraduate Practicum	3
BUS 420	Financial Management of Corporations	3	EC 301	Intermediate Microeconomics	3
BUS 422	Investments and Portfolio Management	3	EC 336	Introduction to Resource and Environmental Economics	3
BUS 425	Advanced Personal Financial Management	3	FTM 482	Global Brand Management in Textiles and Apparel	3
BUS 426	International Financial Management	3	M 100	Personal and Professional Identity Development	1
BUS 440	Database Management	3			

MIE 201	Introduction to Business Processes	3	EC 302	Intermediate Macroeconomics	3
MIE 305	Legal and Regulatory Environment	3	EC 305	A Closer Look at Capitalism	3
MIE 330	Human Resource Management	3	EC 336	Introduction to Resource and Environmental Economics	3
MIE 335	Organizational Behavior	3	EC 348	Introduction to International Economics	3
MIE 432	Employee Relations	3	EC 351	Econometrics I	3
MIE 434	Compensation Systems	3	EC 404	Money, Financial Markets, and the Economy	3
MIE 435	Leadership and Management	3	EC 410	Public Finance	3
MIE 436	Training and Development	3	EC 413	Industrial Organization	3
MIE 438	Staffing	3	EC 431	Labor Economics	3
MIE 480	Business Policy and Strategy	3	EC 437		3
PRT 406	Sports Law	3	EC 449	International Finance	3
Group B - Economics & Business			EC 451	Econometrics II	3
ACC 200	Introduction to Managerial Accounting	3	EC 474	Economics of Financial Institutions and Markets	3
ACC 220	Introduction to Managerial Accounting	3	EC 480		3
ACC 280	Survey of Financial and Managerial Accounting	3	EC 490	Research Seminar in Economics	3
ARE 301	Intermediate Microeconomics	3	FTM 482	Global Brand Management in Textiles and Apparel	3
ARE 332	Human Resource Management for Agribusiness	3	MIE 412	Finance and Accounting for Entrepreneurs	3
ARE 336	Introduction to Resource and Environmental Economics	3	MIE 413	New Venture Planning	3
ARE 412	Advanced Agribusiness Marketing	3	MIE 419	Entrepreneurship Practicum	3
BUS 340	Information Systems Management	3	PRT 406	Sports Law	3
BUS 449	Information Technology Capstone	3	Group C - Applied Sci & Tech		
BUS 474	Logistics Management	3	AEE 101	Introduction to Career and Technical Education	1
EC 202	Principles of Macroeconomics	3	AEE 208	Agricultural Biotechnology: Issues and Implications	3
EC 301	Intermediate Microeconomics	3	AEE 230	Introduction to Cooperative Extension	3

AEE 303	Administration and Supervision of Student Organizations	3	AEE 460	Organizational Leadership Development in Agriculture and Life Sciences	3
AEE 311	Communication Methods and Media	3	AEE 478	Advanced Issues in Extension Education	3
AEE 322	Experiential Learning in Agriculture	3	AEE 490	Seminar in Agricultural and Extension Education	1
AEE 323	Leadership Development in Agriculture and Life Sciences	3	AEE 533	Leadership and Management of Volunteers in Agricultural and Extension Education	3
AEE 325	Planning and Delivering Non-Formal Education	3	BAET 201	Shop Processes and Management	3
AEE 326	Teaching Diverse Learners in AED	3	BAET 323	Water Management	3
AEE 327	Conducting Summer Programs in Agricultural Education	1	BAET 332	Management of Animal Environments	4
AEE 350	Personal Leadership Development in Agriculture and Life Sciences	3	BAET 343	Agricultural Electrification	4
AEE 360	Developing Team Leadership in Agriculture and Life Sciences	3	BAET 411	Agricultural Machinery and Power Units	4
AEE 423	Practicum in Agricultural Extension/ Industry	8	ALS 110	Academic and Career Skills Seminar	1
AEE 424	Planning Agricultural Educational Programs	3	ANS 150	Introduction to Animal Science	3
AEE 426	Methods of Teaching Agriculture	3	ANS 151	Introduction to Animal Science Lab	1
AEE 427	Student Teaching in Agriculture	8	ANS 201	Techniques of Animal Care	2
AEE 433	Leadership and Management of Volunteers in Agricultural and Extension Education	3	ANS 208	Agricultural Biotechnology: Issues and Implications	3
AEE 435	Professional Presentations in Agricultural Organizations	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	BAE 435	Precision Agriculture Technology	3
ANS 403	Swine Management	3	BAE 451	Engineering Design I	2
ANS 404	Dairy Cattle Management	3	BAE 452	Engineering Design II	2
ANS 408	Small Ruminant Management	3	BAE 462	Machinery Design and Applications	3
ANS 410	Equine Breeding Farm Management	3	BAE 472	Irrigation and Drainage	3
ANS 425	Feed Manufacturing Technology	3	BAE 473	Introduction to Hydrologic and Water Quality Modeling	3
ANS 440	Animal Genetic Improvement	3	BAE 474	Principles and Applications of Ecological Engineering	3
ANS 453	Physiology and Genetics of Growth and Development	3	BAE 481	Structures & Environment	3
ANS 454	Lactation, Milk and Nutrition	3	BAE 501	Sensors and Controls	3
ANS 525	Feed Manufacturing Technology	3	BAE 535	Precision Agriculture Technology	3
ANS 540	Animal Genetic Improvement	3	BAE 572	Irrigation and Drainage	3
ANS 553	Physiology and Genetics of Growth and Development	3	BAE 573	Introduction to Hydrologic and Water Quality Modeling	3
ANS 554	Lactation, Milk and Nutrition	3	BEC 330	Principles and Applications of Bioseparations	2
BAE 100	Introduction to Biological and Agricultural Engineering and Technology	1	BEC 436	Introduction to Downstream Process Development	2
BAE 202	Introduction to Biological and Agricultural Engineering Methods	4	BEC 440		3
BAE 302	Transport Phenomena	3	BEC 536	Introduction to Downstream Process Development	2
BAE 322	Introduction to Food Process Engineering	3	BEC 540		3
BAE 361	Analytical Methods in Engineering Design	3	BME 203		3
BAE 371	Fundamentals of Hydrology for Engineers	3	BME 207	Biomedical Electronics	4
BAE 401	Sensors and Controls	3	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	SSC 473	Introduction to Hydrologic and Water Quality Modeling	3
BME 525	Bioelectricity	3	SSC 540	Geographic Information Systems (GIS) in Soil Science and Agriculture	3
CS 470	Advanced Turfgrass Pest Management	2	SSC 573	Introduction to Hydrologic and Water Quality Modeling	3
ECI 424	Student Teaching in Modern Foreign Languages	12	USC 291	Service Learning Program Leader Development I	1
ENT 470	Advanced Turfgrass Pest Management	2	USC 292	Service Learning Program Leader Development II	2
FM 425	Feed Manufacturing Technology	3	Group C - Applied Sci & Tech		
FM 525	Feed Manufacturing Technology	3	AEC 420	Introduction to Fisheries Science	3
FS 322	Muscle Foods and Eggs	3	AEE 206	Introduction to Teaching Agriculture	3
FS 324	Milk and Dairy Products	3	AEE 303	Administration and Supervision of Student Organizations	3
FS 435	Food Safety Management Systems	3	AEE 322	Experiential Learning in Agriculture	3
FS 535	Food Safety Management Systems	3	AEE 327	Conducting Summer Programs in Agricultural Education	1
MSE 203		3	AEE 424	Planning Agricultural Educational Programs	3
NTR 425	Feed Manufacturing Technology	3	AEE 426	Methods of Teaching Agriculture	3
NTR 454	Lactation, Milk and Nutrition	3	AEE 427	Student Teaching in Agriculture	8
NTR 525	Feed Manufacturing Technology	3	ANS 322	Muscle Foods and Eggs	3
PB 208	Agricultural Biotechnology: Issues and Implications	3	ANS 324	Milk and Dairy Products	3
PO 322	Muscle Foods and Eggs	3	ANS 330	Laboratory Animal Science	3
PO 425	Feed Manufacturing Technology	3	ANS 411	Management of Growing and Performance Horses	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			

ANS 425	Feed Manufacturing Technology	3	BME 452	BME Senior Design: Product Implementation and Strategy	3
ANS 525	Feed Manufacturing Technology	3	BME 466	Polymeric Biomaterials Engineering	3
BAE 325	Introductory Geomatics	3	BME 467	Mechanics of Tissues & Implants Requirements	3
BAE 425	Industrial Microbiology and Bioprocessing	3	BME 483	Tissue Engineering Technologies	2
BAE 435	Precision Agriculture Technology	3	BME 484	Fundamentals of Tissue Engineering	3
BAE 525	Industrial Microbiology and Bioprocessing	3	BME 544	Orthopaedic Biomechanics	3
BAE 535	Precision Agriculture Technology	3	BME 566	Polymeric Biomaterials Engineering	3
BBS 201	Introduction to Biopharmaceutical Science	3	BME 583	Tissue Engineering Technologies	2
BBS 301	Process Validation Science	3	BME 584	Fundamentals of Tissue Engineering	3
BBS 426	Upstream Biomanufacturing Laboratory	2	CS 200	Introduction to Turfgrass Management	4
BBS 526	Upstream Biomanufacturing Laboratory	2	CS 210	Lawns and Sports Turf	3
BCH 220	Role of Biotechnology in Society	3	CS 213	Crop Science	3
BEC 426	Upstream Biomanufacturing Laboratory	2	CS 216	Southern Row Crop Production - Cotton, Peanuts, and Tobacco	3
BEC 483	Tissue Engineering Technologies	2	CS 218	Southern Row Crop Production - Corn, Small Grains and Soybeans	3
BEC 526	Upstream Biomanufacturing Laboratory	2	CS 230	Introduction to Agroecology	3
BEC 583	Tissue Engineering Technologies	2	CS 312		3
BME 375	Biomedical Microcontroller Applications	3	CS 400	Turf Cultural Systems	3
BME 444	Orthopaedic Biomechanics	3	CS 411	Crop Ecology	3
BME 451	BME Senior Design: Product Development	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	FS 290	Careers in Food and Bioprocessing Sciences	1
CS 524	Seed Physiology	3	FS 322	Muscle Foods and Eggs	3
CS 565	Turf Management Systems and Environmental Quality	3	FS 324	Milk and Dairy Products	3
CSSC 490	Senior Seminar in Crop Science and Soil Science	1	FS 330	Science of Food Preparation	3
ECI 424	Student Teaching in Modern Foreign Languages	12	FS 352	Introduction to Microbiological Food Safety Hazards	3
ENT 203	An Introduction to the Honey Bee and Beekeeping	3	FS 354	Food Sanitation	3
ENT 401	Honey Bee Biology and Management	3	FS 416	Quality Control in Food and Bioprocessing	3
ES 100	Introduction to Environmental Sciences	3	FS 421	Food Preservation	3
ES 200	Climate Change and Sustainability	3	FS 426	Upstream Biomanufacturing Laboratory	2
ES 300	Energy and Environment	3	FS 435	Food Safety Management Systems	3
ES 400	Analysis of Environmental Issues	3	FS 453	Food Laws and Regulations	3
FM 425	Feed Manufacturing Technology	3	FS 462	Postharvest Physiology	3
FM 460	Feed Mill Operations and Leadership	3	FS 475	Problems and Design in Food and Bioprocessing Science	3
FM 480	Feed Quality Assurance & Formulation	3	FS 516	Quality Control in Food and Bioprocessing	3
FM 490	Feed Science Seminar	1	FS 521	Food Preservation	3
FM 525	Feed Manufacturing Technology	3	FS 526	Upstream Biomanufacturing Laboratory	2
FOR 318	Forest Pathology	3	FS 535	Food Safety Management Systems	3
FOR 420	Watershed and Wetlands Hydrology	4	FS 553	Food Laws and Regulations	3
FOR 472	Forest Soils	4	FS 562	Postharvest Physiology	3
FOR 520	Watershed and Wetlands Hydrology	4	FW 221	Conservation of Natural Resources	3
FS 201	Introduction to Food Science	3	FW 311	Piedmont Wildlife Ecology and Management	3

FW 312	Fisheries Techniques and Management	1	NR 460	Renewable Natural Resource Management and Policy	3
FW 313	Mountain Wildlife Ecology and Management	1	NR 520	Watershed and Wetlands Hydrology	4
FW 314	Coastal Ecology and Management	1	NR 560	Renewable Natural Resource Management and Policy	3
FW 353	Wildlife Management	3	NTR 425	Feed Manufacturing Technology	3
FW 403	Urban Wildlife Management	3	NTR 525	Feed Manufacturing Technology	3
FW 411	Human Dimensions of Wildlife and Fisheries	3	PO 322	Muscle Foods and Eggs	3
FW 453	Principles of Wildlife Science	4	PO 424	Poultry Meat Production	3
FW 460	International Wildlife Management and Conservation	3	PO 425	Feed Manufacturing Technology	3
FW 465	African Ecology and Conservation	4	PO 435	Poultry Incubation & Breeding	4
FW 511	Human Dimensions of Wildlife and Fisheries	3	NTR 525	Feed Manufacturing Technology	3
FW 560	International Wildlife Management and Conservation	3	PP 318	Forest Pathology	3
FW 565	African Ecology and Conservation	4	SSC 440	Geographic Information Systems (GIS) in Soil Science and Agriculture	3
GPH 201	Fundamentals of Global Public Health	3	SSC 462	Soil-Crop Management Systems	3
HS 432	Introduction to Permaculture	3	SSC 540	Geographic Information Systems (GIS) in Soil Science and Agriculture	3
HS 462	Postharvest Physiology	3	TE 466	Polymeric Biomaterials Engineering	3
HS 532	Introduction to Permaculture	3	TE 467	Mechanics of Tissues & Implants Requirements	3
HS 562	Postharvest Physiology	3	TE 566	Polymeric Biomaterials Engineering	3
IDS 303	Humans and the Environment	3	VMP 401	Poultry Diseases	4
NR 303	Humans and the Environment	3	VMP 420	Disease of Farm Animals	3
NR 350	International Sustainable Resource Use	4			
NR 406	Conservation of Biological Diversity	3			
NR 420	Watershed and Wetlands Hydrology	4			

Group C - Applied Sci & Tech

AEC 419	Freshwater Ecology	4	FS 322	Muscle Foods and Eggs	3
AEC 423	Introduction to Fisheries Sciences Laboratory	1	FS 435	Food Safety Management Systems	3
AEC 519	Freshwater Ecology	4	FS 462	Postharvest Physiology	3
ANS 322	Muscle Foods and Eggs	3	FS 535	Food Safety Management Systems	3
ANS 425	Feed Manufacturing Technology	3	FS 562	Postharvest Physiology	3
ANS 525	Feed Manufacturing Technology	3	FW 221	Conservation of Natural Resources	3
BAET 323	Water Management	3	FW 404	Wildlife Habitat Management	3
BIO 227	Understanding Structural Diversity through Biological Illustration	3	FW 460	International Wildlife Management and Conservation	3
BME 204		3	FW 560	International Wildlife Management and Conservation	3
BME 217	Biomedical Electronics Laboratory	1	HS 200	Home Horticulture	3
BME 298	Biomedical Engineering Design and Manufacturing I	2	HS 201	The World of Horticulture: Principles and Practices	3
BME 398	Biomedical Engineering Design and Manufacturing II	2	HS 203	Home Plant Propagation	3
CS 470	Advanced Turfgrass Pest Management	2	HS 242	Introduction to Small Scale Landscape Design	3
CSSC 490	Senior Seminar in Crop Science and Soil Science	1	HS 250	Home Landscape Design: Creating Garden Spaces	3
ENT 470	Advanced Turfgrass Pest Management	2	HS 252	Landscape Graphic Communication	2
FM 425	Feed Manufacturing Technology	3	HS 272	Landscape Design/Build	6
FM 525	Feed Manufacturing Technology	3	HS 290	Horticulture: Careers and Opportunities	1
FOR 318	Forest Pathology	3	HS 301	Plant Propagation	4
FOR 420	Watershed and Wetlands Hydrology	4	HS 302	Gardening with Herbaceous Perennials	3
FOR 472	Forest Soils	4	HS 303	Ornamental Plant Identification I	3
FOR 520	Watershed and Wetlands Hydrology	4	HS 304	Ornamental Plant Identification II	3

HS 357	Landscape Grading and Drainage	4	NR 520	Watershed and Wetlands Hydrology	4
HS 400	Residential Landscaping	6	NR 521	Wetland Science and Management	3
HS 411	Nursery Management	3	NR 560	Renewable Natural Resource Management and Policy	3
HS 416	Planting Design	4	NTR 420		3
HS 421	Temperate-Zone Tree Fruits: Physiology and Culture	3	NTR 425	Feed Manufacturing Technology	3
HS 422	Small Fruit Production	3	NTR 525	Feed Manufacturing Technology	3
HS 431	Vegetable Production	4	PO 201	Poultry Science and Production	3
HS 440	Greenhouse Management	3	PO 201A	Poultry Science and Production	3
HS 442	Floriculture Crop Production	3	PO 202	Poultry Science and Production Laboratory	1
HS 462	Postharvest Physiology	3	PO 202A	Poultry Science and Production Laboratory	1
HS 471	Landscape Ecosystem Management	4	PO 290	Exploring Opportunities in Poultry Science	1
HS 516	Planting Design	4	PO 322	Muscle Foods and Eggs	3
HS 521	Temperate-Zone Tree Fruits: Physiology and Culture	3	PO 340	Live Poultry and Poultry Product Evaluation, Grading, and Inspection	3
HS 523		3	PO 410	Production and Management of Game Birds in Confinement	3
HS 462	Postharvest Physiology	3	PO 411	Agrosecurity	3
HS 562	Postharvest Physiology	3	PO 421	Commercial Egg Production	3
IDS 303	Humans and the Environment	3	PO 425	Feed Manufacturing Technology	3
NR 300	Natural Resource Measurements	4	PO 433	Poultry Processing and Products	3
NR 303	Humans and the Environment	3	PO 525	Feed Manufacturing Technology	3
NR 400	Natural Resource Management	4	PO 533	Poultry Processing and Products	3
NR 420	Watershed and Wetlands Hydrology	4	PP 315	Principles of Plant Pathology	4
NR 421	Wetland Science and Management	3	PP 318	Forest Pathology	3
NR 460	Renewable Natural Resource Management and Policy	3			
NR 484	Environmental Impact Assessment	4			
NR 500	Natural Resource Management	4			

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	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 Elective (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
Communications (p. 1)		3
Agri. and Resou. Econ. Elective (p. 2)		3

Hours 16

Spring Semester

BAET 323	Water Management	3
BAET 332	Management of Animal Environments	4
BAET 333	Processing Agricultural Products	4
Restricted Elective (p. 2)		3
Agri. and Resou. Econ. Elective (p. 2)		3

Hours 17

Fourth Year**Fall Semester**

BAET 432	Agricultural and Environmental Safety and Health	3
GEP Interdisciplinary Perspectives (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-interdisciplinary-perspectives/)		2
AEE 323	Leadership Development in Agriculture and Life Sciences	3
GEP Humanities (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/)		3
Restricted Elective (p. 2)		3

Hours	14
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Spring Semester

BAE 435	Precision Agriculture Technology	3
BAET 411	Agricultural Machinery and Power Units	4
Restricted Elective (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

Hours	16
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Total Hours	120
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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.

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/>)