

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

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

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

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

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

Plan Requirements

Biological and Agricultural Engineering Technology (BS): Agricultural Systems Management Concentration: 120 Total Units

Code	Title	Hours
Orientation		
ALS 103	Freshman Transitions and Diversity in Agriculture & Life Sciences	1
or ALS 303	Transfer Transitions and Diversity in Agriculture & Life Sciences	
Communication		
Select one of the following:		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	Chemistry - A Molecular Science	3
CH 102	General Chemistry Laboratory	1
PY 211	College Physics I	4
BIO 181	Introductory Biology: Ecology, Evolution, and Biodiversity	4
SSC 200	Soil Science	3
SSC 201	Soil Science Laboratory	1
Select one of the following:		4
CH 201 & CH 202	Chemistry - A Quantitative Science and Quantitative Chemistry Laboratory	
PY 212	College Physics II	

AES Major Requirements

BAE 100	Introduction to Biological Engineering	1
BAET 201	Shop Processes and Management	3
BAET 323	Water Management	3
BAET 332	Management of Animal Environments	4
BAET 343	Agricultural Electrification	4
BAET 432	Agricultural and Environmental Safety and Health	3
CSC 200	Introduction to Computers and Their Uses	3
or AEE 226	Computer Applications and Information Technology in Agricultural & Extension Ed	
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 13

BAE 325	Introductory Geomatics	
BAET 443	Environmental Restoration Implementation	
or GIS 510	Fundamentals of Geospatial Information Science and Technology	
BAE 325	Introductory Geomatics	
BAE 435	Precision Agriculture Technology	
BAET 411	Agricultural Machinery and Power Units	

ARE Electives

ARE Electives (p. 2)	6
Restricted Elective (p. 2)	15

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 Additional Breadth (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/) (Humanities/Social Sciences/Visual and Performing Arts)		3
GEP Interdisciplinary Perspectives (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-interdisciplinary-perspectives/)		5
GEP U.S. Diversity (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-us-diversity/) (verify requirement)		

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
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	Gene Expression Analysis: Microarrays	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	Genome Mapping	2
BIT 476	Applied Bioinformatics	2
BIT 481	Plant Tissue Culture and Transformation	2
BIT 501	Ethical Issues in Biotechnology	1
BIT 562	Gene Expression Analysis: Microarrays	2
BIT 563	Fermentation of Recombinant Microorganisms	2
BIT 564	Protein Purification	2
BIT 566	Animal Cell Culture Techniques	2
BIT 567	PCR and DNA Fingerprinting	2
BIT 568	Genome Mapping	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	PP 150	Introduction to Plant Molecular Biology	3
FW 313	Mountain Wildlife Ecology and Management	1	PP 222	Kingdom of Fungi	3
FW 353	Wildlife Management	3	Group A - Biological Sciences		
FW 403	Urban Wildlife Management	3	AEC 419	Freshwater Ecology	4
FW 404	Wildlife Habitat Management	3	AEC 420	Introduction to Fisheries Science	3
FW 453	Principles of Wildlife Science	4	AEC 423	Introduction to Fisheries Sciences Laboratory	1
HS 215	Agricultural Genetics	3	AEC 441	Biology of Fishes	3
MB 101	Introduction to Microbiology and Biochemistry Laboratory Practices	3	AEC 442	Biology of Fishes Laboratory	1
MB 405	Food Microbiology	3	AEC 460	Field Ecology and Methods	4
MB 406	Food Microbiology Lab	1	AEC 519	Freshwater Ecology	4
MB 505	Food Microbiology	3	ANS 215	Agricultural Genetics	3
MB 506	Food Microbiology Lab	1	ANS 415	Comparative Nutrition	3
NTR 301	Introduction to Human Nutrition	3	ANS 515	Comparative Nutrition	3
NTR 401	Advanced Nutrition and Metabolism	3	BEC 463	Fermentation of Recombinant Microorganisms	2
NTR 415	Comparative Nutrition	3	BEC 563	Fermentation of Recombinant Microorganisms	2
NTR 419	Human Nutrition and Chronic Disease	3	BIO 140	Survey of Animal Diversity	3
NTR 454	Lactation, Milk and Nutrition	3	BIO 141	Animal Diversity Laboratory	1
NTR 501	Advanced Nutrition and Metabolism	3	BIO 227	Understanding Structural Diversity through Biological Illustration	3
NTR 515	Comparative Nutrition	3	BIO 315	General Parasitology	3
PB 103	Perspectives on Botany	1	BIO 330	Evolutionary Biology	3
PB 200	Plant Life	4	BIO 361	Developmental Biology	3
PB 205	Our Green World	3	BIO 370	Developmental Anatomy of the Vertebrates	3
PB 208	Agricultural Biotechnology: Issues and Implications	3	BIO 375	Developmental Anatomy Laboratory	2
PB 213	Plants and Civilization	3	BIO 405	Functional Histology	3
PB 215	Medicinal Plants	3	BIO 414	Cell Biology	3
PB 219	Plants in Folklore, Myth, and religion	3	BIO 424	Endocrinology	3
PB 220	Local Flora	3	BIO 482	Capstone Course in Molecular, Cellular, and Developmental Biology	3
PB 250	Plant Biology	4	BIO 483	Capstone Course in Integrative Physiology and Neurobiology	3
PB 277	Space Biology	3	BIO 484	Capstone Course in Human Biology	3
PB 321	Introduction to Whole Plant Physiology	3	BIO 485	Capstone Course in Ecology, Evolution, and Conservation Biology	3
PB 360	Ecology	4	BIO 488	Neurobiology	3
PB 400	Plant Diversity and Evolution	4	BIO 588	Neurobiology	3
PB 403	Systematic Botany	4	BIT 210	Phage Hunters	3
PB 413	Plant Anatomy	2	BIT 211	Phage Genomics	2
PB 421	Plant Physiology	3	BIT 463	Fermentation of Recombinant Microorganisms	2
PB 445	Paleobotany	4	BIT 563	Fermentation of Recombinant Microorganisms	2
PB 464	Rare Plants of North Carolina	3	BME 301	Human Physiology : Electrical Analysis	4
PB 480	Introduction to Plant Biotechnology	3	BME 302	Human Physiology: Mechanical Analysis	4
PB 481	Plant Tissue Culture and Transformation	2	CHE 463	Fermentation of Recombinant Microorganisms	2
PB 503	Systematic Botany	4	CHE 563	Fermentation of Recombinant Microorganisms	2
PB 513	Plant Anatomy	2	CS 211	Plant Genetics	3
PB 545	Paleobotany	4	ENT 425	General Entomology	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	Comparative Reproductive Physiology and Biotechnology	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	PO 504	Avian Anatomy and Physiology	4
GN 421	Molecular Genetics	3	PO 515	Comparative Nutrition	3
GN 423	Population, Quantitative and Evolutionary Genetics	3	SSC 200	Soil Science	3
GN 425	Advanced Genetics Laboratory	2	SSC 201	Soil Science Laboratory	1
GN 434	Genes and Development	3	SSC 332	Environmental Soil Microbiology	3
GN 441	Human and Biomedical Genetics	3	SSC 470	Wetland Soils	3
GN 451	Genome Science	3	SSC 570	Wetland Soils	3
GN 490	Genetics Colloquium	1	ZO 233	Human-Animal Interactions	3
GN 521	Molecular Genetics	3	ZO 250	Animal Anatomy and Physiology	4
GN 541	Human and Biomedical Genetics	3	ZO 317	Primate Ecology and Evolution	3
HS 215	Agricultural Genetics	3	ZO 333	Captive Animal Biology	3
HS 451	Plant Nutrition	3	ZO 350	Animal Phylogeny and Diversity	4
HS 551	Plant Nutrition	3	ZO 402	Invertebrate Biology	4
MB 180	Introduction to Microbial Bioprocessing	3	ZO 410	Introduction to Animal Behavior	3
MB 200	The Fourth Horseman: Plagues that Changed the World	3	ZO 486	Capstone Course in Zoology	3
MB 210	Phage Hunters	3	Group A - Biological Sciences		
MB 211	Phage Genomics	2	ANS 225	Principles of Animal Nutrition	3
MB 351	General Microbiology	3	BIT 100	Current Topics in Biotechnology	4
MB 352	General Microbiology Laboratory	1	BIT 465	Real-time PCR Techniques	2
MB 354	Inquiry-Guided Microbiology Lab	1	BIT 471	RNA Interference and Model Organisms	2
MB 405	Food Microbiology	3	BIT 473	Protein Interactions	2
MB 406	Food Microbiology Lab	1	BIT 474	Plant Genetic Engineering	2
MB 411	Medical Microbiology	3	BIT 565	Real-time PCR Techniques	2
MB 412	Medical Microbiology Laboratory	1	BIT 571	RNA Interference and Model Organisms	2
MB 414	Microbial Metabolic Regulation	3	BIT 573	Protein Interactions	2
MB 420	Fundamentals of Microbial Cell Biotransformations	2	BIT 574	Plant Genetic Engineering	2
MB 441	Immunology	3	ENT 305	Introduction to Forensic Entomology	3
MB 451	Microbial Diversity	3	Group A - Physical Sciences		
MB 452	Microbial Diversity Lab	2	AEE 226	Computer Applications and Information Technology in Agricultural & Extension Ed	3
MB 455	Microbial Biotechnology	3	BAE 200	Computer Methods in Biological Engineering	2
MB 461	Molecular Virology	3	BMA 573	Mathematical Modeling of Physical and Biological Processes I	3
MB 480	Current Issues in Microbiology	1	BMA 574	Mathematical Modeling of Physical and Biological Processes II	3
MB 505	Food Microbiology	3	BUS 340	Information Systems Management	3
MB 506	Food Microbiology Lab	1	BUS 350	Economics and Business Statistics	3
MB 520	Fundamentals of Microbial Cell Biotransformations	2	CE 435	Engineering Geology	3
MEA 200	Introduction to Oceanography	3	CE 479	Air Quality	3
MEA 210	Oceanography Lab	1	CE 581	Fluid Mechanics in Natural Environments	3
MEA 220	Marine Biology	3	CH 230	Computational Chemistry Lab I	1
MEA 250	Introduction to Coastal Environments	3	CH 232	Computational Chemistry Lab II	1
MEA 251	Introduction to Coastal Environments Laboratory	1	CH 315	Quantitative Analysis	3
MEA 369	Life on Earth: Principles of Paleontology	3	CH 316	Quantitative Analysis Laboratory	1
NTR 301	Introduction to Human Nutrition	3	CH 331	Introductory Physical Chemistry	4
NTR 415	Comparative Nutrition	3	CH 401	Systematic Inorganic Chemistry I	3
NTR 419	Human Nutrition and Chronic Disease	3	CH 403	Systematic Inorganic Chemistry II	3
NTR 420	Applied Nutrition Education	3	CH 415	Analytical Chemistry II	3
NTR 421	Life Cycle Nutrition	3	CH 431	Physical Chemistry I	3
NTR 490	Senior Capstone Experience in Nutrition	4	CH 433	Physical Chemistry II	3
NTR 515	Comparative Nutrition	3	CH 435	Introduction to Quantum Chemistry	3
NTR 521	Life Cycle Nutrition	3	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	CSC 462	Advanced Computer Graphics Projects	3
CH 444	Advanced Synthetic Techniques II	4	CSC 467	Multimedia Technology	3
CH 452	Advanced Measurement Techniques I	4	CSC 474	Network Security	3
CH 454	Advanced Measurement Techniques II	4	CSC 481	Game Engine Foundations	3
CH 463	Molecular Origins of Life	3	CSC 482	Advanced Computer Game Projects	3
CH 563	Molecular Origins of Life	3	CSC 484	Building Game AI	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	Special Topics in Computer Science	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	Introduction to Computers and Their Uses	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 for Computer Scientists	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	Web Page Development	1	CSC 519	DevOps: Modern Software Engineering Practices	3
CSC 255	String Processing Languages	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
			ECE 460	Embedded System Architectures	3
			ECE 506	Architecture Of Parallel Computers	3

ECE 514	Random Processes	3	MA 432	Mathematical Models in Life and Social Sciences	3
ECE 517	Object-Oriented Design and Development	3	MA 437	Applications of Algebra	3
ECE 547	Cloud Computing Technology	3	MA 440	Game Theory	3
ECE 560	Embedded System Architectures	3	MA 444	Problem Solving Strategies for Competitions	1
ECE 570	Computer Networks	3	MA 450	Methods of Applied Mathematics I	3
ECE 573	Internet Protocols	3	MA 451	Methods of Applied Mathematics II	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 Math	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	Geometry For Secondary Teachers	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	Advanced Calculus II	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	Elements of Matrix Computations	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	Algebraic Geometry	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	Financial Mathematics	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 427	Introduction to Numerical Analysis I	3			
MA 428	Introduction to Numerical Analysis II	3			
MA 430	Mathematical Models in the Physical Sciences	3			

MA 583	Introduction to Parallel Computing	3	MEA 481	Geomorphology: Earth's Dynamic Surface	3
MA 584	Numerical Solution of Partial Differential Equations--Finite Difference Methods	3	MEA 485	Introduction to Hydrogeology	3
MA 587	Numerical Solution of Partial Differential Equations--Finite Element Method	3	MEA 488	Meteorology for Media	3
MA 591	Special Topics	1-6	MEA 493	Special Topics in MEAS	1-6
MBA 528	Options and Derivatives Pricing	3	MEA 495	Junior Seminar in the Marine, Earth, and Atmospheric Sciences	1
MEA 100	Earth System Science: Exploring the Connections	4	MEA 498	Internship in MEAS	1-6
MEA 101	Geology I: Physical	3	MEA 507	Discipline-based Education Research in the Geosciences	3
MEA 110	Geology I Laboratory	1	MEA 510	Air Pollution Meteorology	3
MEA 130	Introduction to Weather and Climate	3	MEA 511	Introduction to Meteorological Remote Sensing	3
MEA 135	Introduction to Weather and Climate Laboratory	1	MEA 514	Advanced Physical Meteorology	3
MEA 202	Geology II: Historical	3	MEA 515	Climate Dynamics	3
MEA 211	Geology II Laboratory	1	MEA 517	Fundamentals of Climate Change Science	3
MEA 300	Environmental Geology	4	MEA 518	Climate Risk Analysis	3
MEA 312	Atmospheric Thermodynamics	4	MEA 519	Barriers to Climate Change Literacy	3
MEA 315	Mathematics Methods in Atmospheric Sciences	4	MEA 525	Introduction to Atmospheric Chemistry	3
MEA 320	Fundamentals of Air Pollution	3	MEA 540	Principles of Physical Oceanography	3
MEA 321	Fundamentals of Air Quality and Climate Change	3	MEA 549	Principles of Biological Oceanography	3
MEA 323	Geochemistry of Natural Waters	3	MEA 553	Estuarine Biogeochemistry	3
MEA 409	Watershed Forensics	3	MEA 554	Marine Physical-Biological Interactions	3
MEA 410	Introduction to Mineralogy and Petrology	4	MEA 562	Marine Sediment Transport	3
MEA 411	Marine Sediment Transport	3	MEA 570	Geological Oceanography	3
MEA 412	Atmospheric Physics	3	MEA 573	Principles of Chemical Oceanography	3
MEA 415	Climate Dynamics	3	MEA 574	Advanced Igneous Petrology	3
MEA 421	Atmospheric Dynamics I	3	MEA 577	Electron Microprobe Analysis of Geologic Material	2
MEA 422	Atmospheric Dynamics II	3	MEA 579	Principles of Air Quality Engineering	3
MEA 425	Introduction to Atmospheric Chemistry	3	MEA 580	Air Quality Modeling and Forecasting	4
MEA 440	Igneous and Metamorphic Petrology	4	MEA 581	Fluid Mechanics in Natural Environments	3
MEA 443	Synoptic Weather Analysis and Forecasting	4	MEA 582	Geospatial Modeling	3
MEA 444	Mesoscale Analysis and Forecasting	4	MEA 585	Physical Hydrogeology	3
MEA 449	Principles of Biological Oceanography	3	MEA 591	Special Topics in Marine Science	1-6
MEA 450	Introductory Sedimentology and Stratigraphy	4	MEA 592	Special Topics in Earth Sciences	1-6
MEA 451	Structural Geology	4	MEA 593	Special Topics in Atmospheric Science	1-6
MEA 454	Marine Physical-Biological Interactions	3	MEA 599	Regional Geology of North America	1-6
MEA 455	Micrometeorology	3	OR 504	Introduction to Mathematical Programming	3
MEA 458	Introduction to Tropical Meteorology	3	OR 505	Linear Programming	3
MEA 459	Field Investigation of Coastal Processes	5	OR 531	Dynamic Systems and Multivariable Control I	3
MEA 460	Principles of Physical Oceanography	3	OR 565	Graph Theory	3
MEA 462	Observational Methods and Data Analysis in Marine Physics	3	OR 579	Introduction to Computer Performance Modeling	3
MEA 463	Fluid Physics	3	PSY 240	Introduction to Behavioral Research I	3
MEA 464	Ocean Circulation Systems	3	PSY 241	Introduction to Behavioral Research I Lab	1
MEA 465	Geologic Field Camp	4	PSY 242	Introduction to Behavioral Research II	3
MEA 466	Preparatory Course for Field Camp	1	PSY 243	Introduction to Behavioral Research II Lab	2
MEA 467	Marine Meteorology	3	PY 414	Electromagnetism I	3
MEA 469	Ecology of coastal Resources	3	PY 415	Electromagnetism II	3
MEA 470	Introduction to Geophysics	3	PY 514	Electromagnetism I	3
MEA 471	Exploration and Engineering Geophysics	3	PY 515	Electromagnetism II	3
MEA 473	Principles of Chemical Oceanography	3	ST 350	Economics and Business Statistics	3
MEA 476	Worldwide River and Delta Systems: Their Evolution and Human Impacts	3	ST 412	Long-Term Actuarial Models	3
MEA 479	Air Quality	3	ST 413	Short-Term Actuarial Models	3
			ST 442	Introduction to Data Science	3

ST 546	Probability and Stochastic Processes I	3	PY 512	Mechanics II	3
Group A - Physical Sciences			PY 514	Electromagnetism I	3
BME 201	Computer Methods in Biomedical Engineering	3	PY 515	Electromagnetism II	3
CSC 442	Introduction to Data Science	3	PY 516	Physical Optics	3
EC 351	Econometrics I	3	PY 517	Atomic and Molecular Physics	3
ECE 489	Solid State Solar and Thermal Energy Harvesting	3	PY 519	Biological Physics	3
ECE 589	Solid State Solar and Thermal Energy Harvesting	3	PY 525	Computational Physics	3
ECG 561	Applied Econometrics I	3	PY 528	Introduction to Plasma Physics and Fusion Energy	3
EMS 519	Teaching and Learning of Statistical Thinking	3	PY 529	Plasma Physics and Fusion Energy II	3
GPH 404	Epidemiology and Statistics in Global Public Health	3	PY 543	Astrophysics	3
MA 412	Long-Term Actuarial Models	3	PY 552	Condensed Matter Physics I	3
MA 413	Short-Term Actuarial Models	3	PY 570	Polymer Physics	3
MA 546	Probability and Stochastic Processes I	3	PY 581	Matter & Interactions for Teachers I	3
MA 555	Introduction to Manifold Theory	3	PY 582	Matter & Interactions for Teachers II	3
MEA 150	Environmental Issues in Water Resources	4	PY 589	Solid State Solar and Thermal Energy Harvesting	3
MEA 463	Fluid Physics	3	PY 590	Special Topics In Physics	1-6
MSE 489	Solid State Solar and Thermal Energy Harvesting	3	PY 599	Special Topics in Physics	1-6
MSE 589	Solid State Solar and Thermal Energy Harvesting	3	SSC 200	Soil Science	3
NE 528	Introduction to Plasma Physics and Fusion Energy	3	SSC 201	Soil Science Laboratory	1
NE 529	Plasma Physics and Fusion Energy II	3	ST 311	Introduction to Statistics	3
PSY 240	Introduction to Behavioral Research I	3	ST 312	Introduction to Statistics II	3
PSY 241	Introduction to Behavioral Research I Lab	1	ST 370	Probability and Statistics for Engineers	3
PSY 242	Introduction to Behavioral Research II	3	ST 371	Introduction to Probability and Distribution Theory	3
PSY 243	Introduction to Behavioral Research II Lab	2	ST 372	Introduction to Statistical Inference and Regression	3
PY 123	Stellar and Galactic Astronomy	3	ST 380	Probability and Statistics for the Physical Sciences	3
PY 124	Solar System Astronomy	3	ST 401	Experiences in Data Analysis	4
PY 125	Astronomy Laboratory	1	ST 404	Epidemiology and Statistics in Global Public Health	3
PY 131	Conceptual Physics	4	ST 405	Applied Nonparametric Statistics	3
PY 203	University Physics III	4	ST 412	Long-Term Actuarial Models	3
PY 301	Introduction to Quantum Mechanics	3	ST 413	Short-Term Actuarial Models	3
PY 328	Stellar and Galactic Astrophysics	3	ST 421	Introduction to Mathematical Statistics I	3
PY 341	Relativity, Gravitation and Cosmology	3	ST 422	Introduction to Mathematical Statistics II	3
PY 401	Quantum Physics I	3	ST 430	Introduction to Regression Analysis	3
PY 402	Quantum Physics II	3	ST 431	Introduction to Experimental Design	3
PY 407	Introduction to Modern Physics	3	ST 432	Introduction to Survey Sampling	3
PY 411	Mechanics I	3	ST 433	Applied Spatial Statistics	3
PY 412	Mechanics II	3	ST 434	Applied Time Series	3
PY 413	Thermal Physics	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 498	Independent Study In Statistics	1-6
PY 501	Quantum Physics I	3	ST 501	Fundamentals of Statistical Inference I	3
PY 502	Quantum Physics II	3	ST 502	Fundamentals of Statistical Inference II	3
PY 506	Nuclear and Subatomic Physics	3	ST 503	Fundamentals of Linear Models and Regression	3
PY 507	Elementary Particle Physics	3			
PY 509	General Relativity	3			
PY 511	Mechanics I	3			

ST 505	Applied Nonparametric Statistics	3	ARE 301	Intermediate Microeconomics	3
ST 506	Sampling Animal Populations	3	ARE 303	Farm Management	3
ST 507	Statistics For the Behavioral Sciences I	3	ARE 304	Agribusiness Management	3
ST 508	Statistics For the Behavioral Sciences II	3	ARE 306	Agricultural Law	3
ST 511	Statistical Methods For Researchers I	3	ARE 309	Environmental Law & Economic Policy	3
ST 512	Statistical Methods For Researchers II	3	ARE 311	Agricultural Markets	3
ST 513	Statistics for Management I	3	ARE 312	Agribusiness Marketing	3
ST 514	Statistics For Management and Social Sciences II	3	ARE 321	Agricultural Financial Management	3
ST 515	Experimental Statistics for Engineers I	3	ARE 336	Introduction to Resource and Environmental Economics	3
ST 516	Experimental Statistics For Engineers II	3	ARE 345	Global Agribusiness Management	3
ST 517	Applied Statistical Methods I	3	ARE 404	Advanced Agribusiness Management	3
ST 519	Teaching and Learning of Statistical Thinking	3	ARE 413	Applied Agribusiness Marketing	3
ST 520	Statistical Principles of Clinical Trials	3	ARE 433	U.S. Agricultural Policy	3
ST 524	Statistics In Plant Science	3	ARE 490	Career Seminar in Agriculture & Resource Economics	1
ST 533	Applied Spatial Statistics	3	BUS 225	Personal Finance	3
ST 534	Applied Time Series	3	BUS 320	Financial Management	3
ST 535	Statistical Methods for Quality and Productivity Improvement	3	BUS 340	Information Systems Management	3
ST 537	Applied Multivariate and Longitudinal Data Analysis	3	BUS 360	Marketing Methods	3
ST 540	Applied Bayesian Analysis	3	BUS 370	Operations and Supply Chain Management	3
ST 542	Statistical Practice	3	BUS 420	Financial Management of Corporations	3
ST 544	Applied Categorical Data Analysis	3	BUS 422	Investments and Portfolio Management	3
ST 546	Probability and Stochastic Processes I	3	BUS 425	Advanced Personal Financial Management	3
ST 555	Statistical Programming I	3	BUS 426	International Financial Management	3
ST 556	Statistical Programming II	3	BUS 440	Database Management	3
ST 557	Using Technology to Teach Statistics	3	BUS 441	Business Data Communications and Networking	3
ST 558	Data Science for Statisticians	3	BUS 442	Information Systems Development	3
ST 561	Applied Econometrics I	3	BUS 443	Web Development for Business Applications	3
ST 562	Data Mining with SAS Enterprise Miner	3	BUS 444	Systems Analysis and Design	3
ST 563	Introduction to Statistical Learning	3	BUS 461	Channel and Retail Marketing	3
ST 590	Special Topics	1-6	BUS 462	Marketing Research	3
ST 701	Statistical Theory I	3	BUS 464	International Marketing	3
ST 702	Statistical Theory II	3	BUS 465	Traditional and Digital Brand Promotion	3
ST 705	Linear Models and Variance Components	3	BUS 466	Personal Selling	3
TE 570	Polymer Physics	3	BUS 467	Product and Brand Management	3
Group B - Economics & Business			BUS 468	Marketing Strategy	3
ACC 200	Introduction to Managerial Accounting	3	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	Advanced Textile Brand Management and Marketing	3
ACC 420	Cost Accounting for Effective Management	3	M 100	Personal and Professional Identity Development	1
ACC 440	Enterprise Resource Planning Systems	3	MIE 201	Introduction to Business Processes	3
ACC 450	Auditing and Assurance Services	3	MIE 305	Legal and Regulatory Environment	3
ACC 451	Internal Auditing	3	MIE 330	Human Resource Management	3
ACC 460	Governmental and Nonprofit Accounting	3			
ARE 215	Small Business Accounting	3			

MIE 335	Organizational Behavior	3	AEE 323	Leadership Development in Agriculture and Life Sciences	3
MIE 432	Labor and Employee Relations	3	AEE 325	Planning and Delivering Non-Formal Education	3
MIE 434	Compensation Systems	3	AEE 326	Teaching Diverse Learners in AED	3
MIE 435	Leadership and Management	3	AEE 327	Conducting Summer Programs in Agricultural Education	1
MIE 436	Training and Development	3	AEE 350	Personal Leadership Development in Agriculture and Life Sciences	3
MIE 438	Staffing	3	AEE 360	Developing Team Leadership in Agriculture and Life Sciences	3
MIE 480	Business Policy and Strategy	3	AEE 423	Practicum in Agricultural Extension/Industry	8
PRT 406	Sports Law	3	AEE 424	Planning Agricultural Educational Programs	3
Group B - Economics & Business			AEE 426	Methods of Teaching Agriculture	3
ACC 200	Introduction to Managerial Accounting	3	AEE 427	Student Teaching in Agriculture	8
ACC 220	Introduction to Managerial Accounting	3	AEE 433	Leadership and Management of Volunteers in Agricultural and Extension Education	3
ACC 280	Survey of Financial and Managerial Accounting	3	AEE 435	Professional Presentations in Agricultural Organizations	3
ARE 301	Intermediate Microeconomics	3	AEE 460	Organizational Leadership Development in Agriculture and Life Sciences	3
ARE 332	Human Resource Management for Agribusiness	3	AEE 478	Advanced Issues in Extension Education	3
ARE 336	Introduction to Resource and Environmental Economics	3	AEE 490	Seminar in Agricultural and Extension Education	1
ARE 412	Advanced Agribusiness Marketing	3	AEE 533	Leadership and Management of Volunteers in Agricultural and Extension Education	3
BUS 340	Information Systems Management	3	BAET 201	Shop Processes and Management	3
BUS 449	Information Technology Capstone	3	BAET 323	Water Management	3
BUS 474	Logistics Management	3	BAET 332	Management of Animal Environments	4
EC 202	Principles of Macroeconomics	3	BAET 343	Agricultural Electrification	4
EC 301	Intermediate Microeconomics	3	BAET 411	Agricultural Machinery and Power Units	4
EC 302	Intermediate Macroeconomics	3	ALS 110	Academic and Career Skills Seminar	1
EC 305	A Closer Look at Capitalism	3	ANS 150	Introduction to Animal Science	3
EC 336	Introduction to Resource and Environmental Economics	3	ANS 151	Introduction to Animal Science Lab	1
EC 348	Introduction to International Economics	3	ANS 201	Techniques of Animal Care	2
EC 351	Econometrics I	3	ANS 208	Agricultural Biotechnology: Issues and Implications	3
EC 404	Money, Financial Markets, and the Economy	3	ANS 225	Principles of Animal Nutrition	3
EC 410	Public Finance	3	ANS 303	Principles of Equine Evaluation	2
EC 413	Industrial Organization	3	ANS 304	Dairy Cattle Evaluation	2
EC 431	Labor Economics	3	ANS 309	Livestock Evaluation	3
EC 437	Health Economics	3	ANS 322	Muscle Foods and Eggs	3
EC 449	International Finance	3	ANS 324	Milk and Dairy Products	3
EC 451	Econometrics II	3	ANS 400	Companion Animal Management	3
EC 474	Economics of Financial Institutions and Markets	3	ANS 403	Swine Management	3
EC 480	Introduction to Economic Research	3	ANS 404	Dairy Cattle Management	3
EC 490	Research Seminar in Economics	3	ANS 408	Small Ruminant Management	3
FTM 482	Advanced Textile Brand Management and Marketing	3	ANS 410	Equine Breeding Farm Management	3
MIE 412	Finance and Accounting for Entrepreneurs	3	ANS 425	Feed Manufacturing Technology	3
MIE 413	New Venture Planning	3	ANS 440	Animal Genetic Improvement	3
MIE 419	Entrepreneurship Practicum	3	ANS 453	Physiology and Genetics of Growth and Development	3
PRT 406	Sports Law	3	ANS 454	Lactation, Milk and Nutrition	3
Group C - Applied Sci & Tech			ANS 525	Feed Manufacturing Technology	3
AEE 101	Introduction to Career and Technical Education	1	ANS 540	Animal Genetic Improvement	3
AEE 208	Agricultural Biotechnology: Issues and Implications	3	ANS 553	Physiology and Genetics of Growth and Development	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			

ANS 554	Lactation, Milk and Nutrition	3	PB 208	Agricultural Biotechnology: Issues and Implications	3
BAE 100	Introduction to Biological Engineering	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	Expression Systems in Biomanufacturing 1	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	Expression Systems in Biomanufacturing 1	3	ANS 425	Feed Manufacturing Technology	3
BME 203	Introduction to the Materials Science of Biomaterials	3	ANS 525	Feed Manufacturing Technology	3
BME 207	Biomedical Electronics	4	BAE 325	Introductory Geomatics	3
BME 342	Analytical and Experimental Methods for Biomedical Engineers	3	BAE 425	Industrial Microbiology and Bioprocessing	3
BME 365	Linear Systems in Biomedical Engineering	3	BAE 435	Precision Agriculture Technology	3
BME 385	Bioinstrumentation	3	BAE 525	Industrial Microbiology and Bioprocessing	3
BME 412	Biomedical Signal Processing	3	BAE 535	Precision Agriculture Technology	3
BME 425	Bioelectricity	3	BBS 201	Introduction to Biopharmaceutical Science	3
BME 525	Bioelectricity	3	BBS 301	Process Validation Science	3
CS 470	Advanced Turfgrass Pest Management	2	BBS 426	Upstream Biomanufacturing Laboratory	2
ECI 424	Student Teaching in Modern Foreign Languages	12	BBS 526	Upstream Biomanufacturing Laboratory	2
ENT 470	Advanced Turfgrass Pest Management	2	BCH 220	Role of Biotechnology in Society	3
FM 425	Feed Manufacturing Technology	3	BEC 426	Upstream Biomanufacturing Laboratory	2
FM 525	Feed Manufacturing Technology	3	BEC 483	Tissue Engineering Technologies	2
FS 322	Muscle Foods and Eggs	3	BEC 526	Upstream Biomanufacturing Laboratory	2
FS 324	Milk and Dairy Products	3	BEC 583	Tissue Engineering Technologies	2
FS 435	Food Safety Management Systems	3	BME 375	Biomedical Microcontroller Applications	3
FS 535	Food Safety Management Systems	3	BME 444	Orthopaedic Biomechanics	3
MSE 203	Introduction to the Materials Science of Biomaterials	3	BME 451	Biomedical Engineering Senior Design I	3
NTR 425	Feed Manufacturing Technology	3	BME 452	Biomedical Engineering Senior Design II	3
NTR 454	Lactation, Milk and Nutrition	3	BME 466	Polymeric Biomaterials Engineering	3
NTR 525	Feed Manufacturing Technology	3	BME 467	Mechanics of Tissues & Implants Requirements	3
			BME 483	Tissue Engineering Technologies	2

BME 484	Fundamentals of Tissue Engineering	3	FS 421	Food Preservation	3
BME 544	Orthopaedic Biomechanics	3	FS 426	Upstream Biomanufacturing Laboratory	2
BME 566	Polymeric Biomaterials Engineering	3	FS 435	Food Safety Management Systems	3
BME 583	Tissue Engineering Technologies	2	FS 453	Food Laws and Regulations	3
BME 584	Fundamentals of Tissue Engineering	3	FS 462	Postharvest Physiology	3
CS 200	Introduction to Turfgrass Management	4	FS 475	Problems and Design in Food and Bioprocessing Science	3
CS 210	Lawns and Sports Turf	3	FS 516	Quality Control in Food and Bioprocessing	3
CS 213	Crop Science	3	FS 521	Food Preservation	3
CS 216	Southern Row Crop Production - Cotton, Peanuts, and Tobacco	3	FS 526	Upstream Biomanufacturing Laboratory	2
CS 218	Southern Row Crop Production - Corn, Small Grains and Soybeans	3	FS 535	Food Safety Management Systems	3
CS 230	Introduction to Agroecology	3	FS 553	Food Laws and Regulations	3
CS 312	Grassland Management for Natural Resources Conservation	3	FS 562	Postharvest Physiology	3
CS 400	Turf Cultural Systems	3	FW 221	Conservation of Natural Resources	3
CS 411	Crop Ecology	3	FW 311	Piedmont Wildlife Ecology and Management	3
CS 413	Plant Breeding	2	FW 312	Fisheries Techniques and Management	1
CS 414	Weed Science	4	FW 313	Mountain Wildlife Ecology and Management	1
CS 415	Integrated Pest Management	3	FW 314	Coastal Ecology and Management	1
CS 424	Seed Physiology	3	FW 353	Wildlife Management	3
CS 430	Advanced Agroecology	4	FW 403	Urban Wildlife Management	3
CS 465	Turf Management Systems and Environmental Quality	3	FW 411	Human Dimensions of Wildlife and Fisheries	3
CS 524	Seed Physiology	3	FW 453	Principles of Wildlife Science	4
CS 565	Turf Management Systems and Environmental Quality	3	FW 460	International Wildlife Management and Conservation	3
CSSC 490	Senior Seminar in Crop Science and Soil Science	1	FW 465	African Ecology and Conservation	4
ECI 424	Student Teaching in Modern Foreign Languages	12	FW 511	Human Dimensions of Wildlife and Fisheries	3
ENT 203	An Introduction to the Honey Bee and Beekeeping	3	FW 560	International Wildlife Management and Conservation	3
ENT 401	Honey Bee Biology and Management	3	FW 565	African Ecology and Conservation	4
ES 100	Introduction to Environmental Sciences	3	GPH 201	Fundamentals of Global Public Health	3
ES 200	Climate Change and Sustainability	3	HS 432	Introduction to Permaculture	3
ES 300	Energy and Environment	3	HS 462	Postharvest Physiology	3
ES 400	Analysis of Environmental Issues	3	HS 532	Introduction to Permaculture	3
FM 425	Feed Manufacturing Technology	3	HS 562	Postharvest Physiology	3
FM 460	Feed Mill Operations and Leadership	3	IDS 303	Humans and the Environment	3
FM 480	Feed Quality Assurance & Formulation	3	NR 303	Humans and the Environment	3
FM 490	Feed Science Seminar	1	NR 350	International Sustainable Resource Use	4
FM 525	Feed Manufacturing Technology	3	NR 406	Conservation of Biological Diversity	3
FOR 318	Forest Pathology	3	NR 420	Watershed and Wetlands Hydrology	4
FOR 420	Watershed and Wetlands Hydrology	4	NR 460	Renewable Natural Resource Management and Policy	3
FOR 472	Forest Soils	4	NR 520	Watershed and Wetlands Hydrology	4
FOR 520	Watershed and Wetlands Hydrology	4	NR 560	Renewable Natural Resource Management and Policy	3
FS 201	Introduction to Food Science	3	NTR 425	Feed Manufacturing Technology	3
FS 290	Careers in Food and Bioprocessing Sciences	1	NTR 525	Feed Manufacturing Technology	3
FS 322	Muscle Foods and Eggs	3	PO 322	Muscle Foods and Eggs	3
FS 324	Milk and Dairy Products	3	PO 424	Poultry Meat Production	3
FS 330	Science of Food Preparation	3	PO 425	Feed Manufacturing Technology	3
FS 352	Introduction to Microbiological Food Safety Hazards	3	PO 435	Poultry Incubation & Breeding	4
FS 354	Food Sanitation	3	NTR 525	Feed Manufacturing Technology	3
FS 416	Quality Control in Food and Bioprocessing	3	PP 318	Forest Pathology	3

SSC 440	Geographic Information Systems (GIS) in Soil Science and Agriculture	3	HS 272	Landscape Design/Build	6
SSC 462	Soil-Crop Management Systems	3	HS 290	Horticulture: Careers and Opportunities	1
SSC 540	Geographic Information Systems (GIS) in Soil Science and Agriculture	3	HS 301	Plant Propagation	4
TE 466	Polymeric Biomaterials Engineering	3	HS 302	Gardening with Herbaceous Perennials	3
TE 467	Mechanics of Tissues & Implants Requirements	3	HS 303	Ornamental Plant Identification I	3
TE 566	Polymeric Biomaterials Engineering	3	HS 304	Ornamental Plant Identification II	3
VMP 401	Poultry Diseases	4	HS 357	Landscape Grading and Drainage	4
VMP 420	Disease of Farm Animals	3	HS 400	Residential Landscaping	6
Group C - Applied Sci & Tech			HS 411	Nursery Management	3
AEC 419	Freshwater Ecology	4	HS 416	Planting Design	4
AEC 423	Introduction to Fisheries Sciences Laboratory	1	HS 421	Temperate-Zone Tree Fruits: Physiology and Culture	3
AEC 519	Freshwater Ecology	4	HS 422	Small Fruit Production	3
ANS 322	Muscle Foods and Eggs	3	HS 431	Vegetable Production	4
ANS 425	Feed Manufacturing Technology	3	HS 440	Greenhouse Management	3
ANS 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	Biomedical Measurements	3	HS 516	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	Viticulture	3
BME 398	Biomedical Engineering Design and Manufacturing II	2	HS 462	Postharvest Physiology	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 Assessment, Delineation and Regulation	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 Assessment, Delineation and Regulation	3
FS 535	Food Safety Management Systems	3	NR 560	Renewable Natural Resource Management and Policy	3
FS 562	Postharvest Physiology	3	NTR 420	Applied Nutrition Education	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	Poultry Seminar	1
HS 242	Introduction to Small Scale Landscape Design	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 Graphic Communication	2	PO 410	Production and Management of Game Birds in Confinement	3
			PO 411	Agrosecurity	3
			PO 421	Commercial Egg Production	3

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

Semester Sequence

This is a sample.

Course	Title	Hours
First Year		
Fall Semester		
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 Science		3
ENG 101	Academic Writing and Research	4
MA 114	Introduction to Finite Mathematics with Applications	3
Hours		15
Spring Semester		
CH 101	Chemistry - A Molecular Science	3
CH 102	General Chemistry Laboratory	1
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 Engineering	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	Soil Science	3
SSC 201	Soil Science Laboratory	1
Hours		13

Spring Semester

GEP Interdisciplinary Perspectives (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-interdisciplinary-perspectives/)		3
--	--	---

Select one of the following: 4

CH 201 & CH 202	Chemistry - A Quantitative Science and Quantitative Chemistry Laboratory	
PY 212	College Physics II	
Group A, B, or C Elective		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
Select one of the following:		3
ENG 331	Communication for Engineering and Technology	
ENG 332	Communication for Business and Management	
ENG 333	Communication for Science and Research	
Agri. and Resou. Econ. Elective		3
Hours		16

Spring Semester

BAET 323	Water Management	3
BAET 332	Management of Animal Environments	4
BAET 333	Processing Agricultural Products	4
Group A, B, or C Elective		3
Agri. and Resou. Econ. Elective		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
Group A, B, or C Elective		3
Hours		14
Spring Semester		
BAE 435	Precision Agriculture Technology	3
BAET 411	Agricultural Machinery and Power Units	4
Group A, B, or C Elective		3
BAET 450	Biological and Agricultural Engineering Technology Capstone	3
GEP Additional Breadth (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/)		3
Hours		16
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.