

# Agricultural Business Management (BS): Biological Sciences Concentration

The Bachelor of Science degree in Agricultural Business Management prepares graduates for increasing opportunities to enter managerial positions in ag-related businesses. The academic program combines core courses in agricultural business and economics with courses in science and technology. Students learn to apply the concepts, principles and terminology of business and economics to real-world issues and opportunities.

The concentration in biological sciences combines training in science with business and economics and leads to a Bachelor of Science degree in Agricultural Business Management with a concentration in the Biological Sciences/Business Management (BBM). The concentration prepares graduates for management, marketing, and sales careers in fields such as biotechnology, pharmaceuticals, health care, environmental protection, and food processing. Graduates specializing in agribusiness entrepreneurship are trained in value creation and prepared to address the strong demand in agtech, biotech, and foodtech.

For more information about this program, including contact information, visit our website (<https://cals.ncsu.edu/agricultural-and-resource-economics/students/undergraduate/#undergraduate-offerings>).

## John Russ

Undergraduate Programs Coordinator

Office: 3346 Nelson Hall

Phone: 919.515.4677

Email: russ@ncsu.edu

## Plan Requirements

Code	Title	Hours
<b>Orientation</b>		
ALS 103	First-year Success in Agriculture and Life Sciences	1
or ALS 303	Transfer Success in Agriculture and Life Sciences	
<b>Communications &amp; Tech Fluency</b>		
Communications Course:		3
COM 110	Public Speaking	
COM 112	Interpersonal Communication	
COM 201	Introduction to Persuasion Theory	
COM 211	Argumentation and Advocacy	
Advanced Writing Course:		3
ENG 331	Communication for Engineering and Technology	
ENG 332	Communication for Business and Management	
ENG 333	Communication for Science and Research	
AEE 226	Computer Applications and Information Technology in Agricultural & Extension Ed	3
or CSC 200		
<b>Mathematical Sciences</b>		
Select one of the following:		3-4
MA 121	Elements of Calculus	

MA 131	Calculus for Life and Management Sciences A	
MA 141	Calculus I	
Select one of the following:		3-4
MA 114	Introduction to Finite Mathematics with Applications	
MA 231	Calculus for Life and Management Sciences B	
MA 241	Calculus II	
Statistics Course:		3
BUS 350	Economics and Business Statistics	
ST 311	Introduction to Statistics	
ST 350	Economics and Business Statistics	
<b>Natural Sciences</b>		
BIO 181	Introductory Biology: Ecology, Evolution, and Biodiversity	4
Select one of the following:		4
BIO 183	Introductory Biology: Cellular and Molecular Biology	
PB 200	Plant Life	
PB 250	Plant Biology	
GN 301	Genetics in Human Affairs	3
or GN 311	Principles of Genetics	
Physics Course:		4
PY 131	Conceptual Physics	
PY 205 & PY 206	Physics for Engineers and Scientists I and Physics for Engineers and Scientists I Laboratory	
PY 211	College Physics I	
CH 101 & CH 102	Chemistry - A Molecular Science and General Chemistry Laboratory	4
Chemistry Course:		4
CH 201 & CH 202	Chemistry - A Quantitative Science and Quantitative Chemistry Laboratory	
CH 220	Introductory Organic Chemistry	
CH 221 & CH 222	Organic Chemistry I and Organic Chemistry I Lab	
Biology Course:		4
AEC 360	Ecology	
MB 351 & MB 352	General Microbiology and General Microbiology Laboratory	
PB 360	Ecology	
PB 400	Plant Diversity and Evolution	
ZO 250	Animal Anatomy and Physiology	
<b>Department Course Requirements</b>		
ARE 201	Introduction to Agricultural & Resource Economics	3
or EC 201	Principles of Microeconomics	
ACC 220	Introduction to Managerial Accounting	3
or ACC 210	Concepts of Financial Reporting	
ARE 304	Agribusiness Management	3
ARE 306	Agricultural Law	3
or ARE 309	Environmental Law & Economic Policy	
Marketing Course:		3
ARE 311	Agricultural Markets	
ARE 312	Agribusiness Marketing	
BUS 360	Marketing Methods	

ARE 321	Agricultural Financial Management	3
or BUS 320	Financial Management	
ARE 301	Intermediate Microeconomics	3
or EC 301	Intermediate Microeconomics	
ARE/EC Elective:		3
ARE 332	Human Resource Management for Agribusiness	
ARE 345	Global Agribusiness Management	
EC 302	Intermediate Macroeconomics	
EC 348	Introduction to International Economics	
EC 431	Labor Economics	
ARE 490	Career Seminar in Agriculture & Resource Economics	1
ARE Electives (p. 2)		3
<b>Restricted Electives</b>		
Restricted Electives (p. 3)		12
<b>GEP Courses</b>		
ENG 101	Academic Writing and Research <sup>1</sup>	4
GEP Humanities ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/</a> )		6
GEP Social Sciences ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-social-sciences/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-social-sciences/</a> )		3
GEP Health and Exercise Studies ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/</a> )		2
GEP Elective ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/</a> )		3
GEP Interdisciplinary Perspectives ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-interdisciplinary-perspectives/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-interdisciplinary-perspectives/</a> )		5
GEP Global Knowledge ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-global-knowledge/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-global-knowledge/</a> ) (verify requirement)		
GEP Foundations of American Democracy ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-fad/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-fad/</a> ) (verify requirement)		
World Language Proficiency ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/world-language-proficiency/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/world-language-proficiency/</a> ) (verify requirement)		
<b>Free Electives</b>		
Free Electives (12 Hr S/U Lmt)		11
Select courses with enough credits to meet the minimum graduation requirement of 120 total credit hours.		
<b>Total Hours</b>		<b>120</b>

<sup>1</sup> A grade of C- or higher is required.

## ARE Electives

Code	Title	Hours
ARE 215	Small Business Accounting	3
ARE 260	Marketing and Risk Management in the Pork Industry	1
ARE 270	Principles of Agribusiness Entrepreneurship	3
ARE 295	Special Topics in Agricultural & Resource Economics (200 Level)	1-6
ARE 301	Intermediate Microeconomics	3

ARE 303	Farm Management	3
ARE 304	Agribusiness Management	3
ARE 306	Agricultural Law	3
ARE 309	Environmental Law & Economic Policy	3
ARE 311	Agricultural Markets	3
ARE 312	Agribusiness Marketing	3
ARE 321	Agricultural Financial Management	3
ARE 323	Agribusiness Finance	3
ARE 332	Human Resource Management for Agribusiness	3
ARE 336	Introduction to Resource and Environmental Economics	3
ARE 345	Global Agribusiness Management	3
ARE 370	Agribusiness New Venture Development	3
ARE 395	Special Topics in Agricultural and Resource Economics (300 level)	1-6
ARE 404	Advanced Agribusiness Management	3
ARE 412	Advanced Agribusiness Marketing	3
ARE 413	Applied Agribusiness Marketing	3
ARE 415	Introduction to Commodity Futures Markets	3
ARE 420	Taxation in Agriculture, Production, and Agribusiness	3
ARE 425	Contracts and Organizations in Agriculture	3
ARE 433	U.S. Agricultural Policy	3
ARE 444	Ethics in Agribusiness	3
ARE 448	International Agricultural Trade	3
ARE 455	Agribusiness Analytics	3
ARE 470	Agribusiness Entrepreneurship Clinical Skills Development	3
ARE 475	Food Policy	3
ARE 490	Career Seminar in Agriculture & Resource Economics	1
ARE 492	External Learning Experience	1-6
ARE 493	Special Problems/Research Exploration	1-6
ARE 494	Agribusiness Study Abroad	1-6
ARE 495	Special Topics in Agricultural and Resource Economics	1-6
ARE 590	Special Topics in ARE	1-99
EC 301	Intermediate Microeconomics	3
EC 336	Introduction to Resource and Environmental Economics	3
ECG 505		3
ECG 506		3
ECG 512		3
ECG 515	Environmental and Resource Policy	3
ECG 528	Options and Derivatives Pricing	3
ECG 530	Topics in Labor Economics	3
ECG 537	Health Economics	3
ECG 540	Economic Development	3
ECG 548	International Economics	3
ECG 561	Applied Econometrics I	3
ECG 562	Applied Econometrics II	3
ECG 563	Applied Microeconometrics	3
ECG 580		3

ECG 590	Special Economics Topics	1-6
FIM 528	Options and Derivatives Pricing	3
MA 528	Options and Derivatives Pricing	3
MBA 528	Options and Derivatives Pricing	3
ST 561	Applied Econometrics I	3

## Restricted Electives

Code	Title	Hours
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Before registering for these courses students should check to make sure they have met the necessary prerequisites and that credit restrictions do not apply: e.g. credit is not allowed for both BIO 105 and BIO 181.

### Business/Economics Set

Note: 300-Level BUS courses are restricted to students in the Business minor and 400-level BUS courses are restricted to Business majors.

ACC 210	Concepts of Financial Reporting	3
ACC 220	Introduction to Managerial Accounting	3
ACC 230	Individual Income Taxation	3
ACC 280	Survey of Financial and Managerial Accounting	3
ACC 295	Special Topics in Accounting	1-6
ACC 310	Intermediate Financial Accounting I	3
ACC 311	Intermediate Financial Accounting II	3
ACC 330	An Introduction To Income Taxation	3
ACC 340	Accounting Information Systems	3
ACC 411	Business Valuation	3
ACC 420	Cost Accounting for Effective Management	3
ACC 440	Enterprise Resource Planning Systems: Implementation, Risk, and Analytics	3
ACC 450	Auditing and Assurance Services	3
ACC 451	Internal Auditing	3
ACC 460	Governmental and Nonprofit Accounting	3
ACC 495	Special Topics in Accounting	1-6
ACC 498	Independent Study in Accounting	1-6
ACC 499	Internship in ACC	1-6
ACC 508	Advanced Commercial Law	3
ACC 510	Advanced Financial Accounting	3
ACC 519	Applied Financial Management	3
ACC 520	Advanced Management Accounting	3
ACC 530	Advanced Income Tax	3
ACC 533	Accounting and Tax Research	3
ACC 540	IT Risks and Controls	3
ACC 550	Advanced Auditing	3
ACC 560	Tools for Tax Analytics	1
ACC 561	Database Management in Tax	1
ACC 562	Forecasting Effective Tax Rates and Scenario Analysis - Introduction	1
ACC 563	Forecasting Effective Tax Rates and Scenario Analysis - Advanced Application	1
ACC 564	Project Management and Process Documentation in Tax	1
ACC 565	Visual Analytics in Tax	1
ACC 566	Database Management Applications in Tax	1
ACC 567		1

ACC 568		1
ACC 569	Advanced Visual Analytics in Tax	1
ACC 570	Data Security and Warehousing in Tax	1
ACC 571		1
ACC 588	Special Topics in Accounting	1-6
ARE 215	Small Business Accounting	3
ARE 260	Marketing and Risk Management in the Pork Industry	1
ARE 270	Principles of Agribusiness Entrepreneurship	3
ARE 295	Special Topics in Agricultural & Resource Economics (200 Level)	1-6
ARE 301	Intermediate Microeconomics	3
ARE 303	Farm Management	3
ARE 304	Agribusiness Management	3
ARE 306	Agricultural Law	3
ARE 309	Environmental Law & Economic Policy	3
ARE 311	Agricultural Markets	3
ARE 312	Agribusiness Marketing	3
ARE 321	Agricultural Financial Management	3
ARE 323	Agribusiness Finance	3
ARE 332	Human Resource Management for Agribusiness	3
ARE 336	Introduction to Resource and Environmental Economics	3
ARE 345	Global Agribusiness Management	3
ARE 370	Agribusiness New Venture Development	3
ARE 395	Special Topics in Agricultural and Resource Economics (300 level)	1-6
ARE 404	Advanced Agribusiness Management	3
ARE 412	Advanced Agribusiness Marketing	3
ARE 413	Applied Agribusiness Marketing	3
ARE 415	Introduction to Commodity Futures Markets	3
ARE 420	Taxation in Agriculture, Production, and Agribusiness	3
ARE 425	Contracts and Organizations in Agriculture	3
ARE 433	U.S. Agricultural Policy	3
ARE 444	Ethics in Agribusiness	3
ARE 448	International Agricultural Trade	3
ARE 455	Agribusiness Analytics	3
ARE 470	Agribusiness Entrepreneurship Clinical Skills Development	3
ARE 475	Food Policy	3
ARE 490	Career Seminar in Agriculture & Resource Economics	1
ARE 492	External Learning Experience	1-6
ARE 493	Special Problems/Research Exploration	1-6
ARE 494	Agribusiness Study Abroad	1-6
ARE 495	Special Topics in Agricultural and Resource Economics	1-6
ARE 590	Special Topics in ARE	1-99
BUS 225	Personal Finance	3
BUS 295	Special Topics in Business Management	1-6
BUS 320	Financial Management	3
BUS 340	Information Systems Management	3

BUS 350	Economics and Business Statistics	3	EC 413	Industrial Organization	3
BUS 351	Introduction to Business Analytics	3	EC 431	Labor Economics	3
BUS 360	Marketing Methods	3	EC 437	Health Economics	3
BUS 370	Operations and Supply Chain Management	3	EC 449	International Finance	3
BUS 420	Financial Management of Corporations	3	EC 451	Econometrics II	3
BUS 422	Investments and Portfolio Management	3	EC 468	Game Theory	3
BUS 425	Advanced Personal Financial Management	3	EC 474	Economics of Financial Institutions and Markets	3
BUS 426	International Financial Management	3	EC 480		3
BUS 428	Financial Analytics	3	EC 490	Research Seminar in Economics	3
BUS 429	Financial Modeling	3	EC 495	Special Topics in Economics	1-6
BUS 440	Database Management	3	EC 498	Independent Study in Economics	1-6
BUS 441	Business Data Communications and Networking	3	ECG 512		3
BUS 442	Information Systems Development	3	FTM 482	Global Brand Management in Textiles and Apparel	3
BUS 443	Web Development for Business Applications	3	M 100	Personal and Professional Identity Development	1
BUS 444	Systems Analysis and Design	3	MBA 577	Technology Entrepreneurship and Commercialization II	3
BUS 449	Information Technology Practicum	3	MIE 201	Introduction to Business	3
BUS 458	Analytics: From Data to Decisions	3	MIE 295	Special Topics in MIE	1-6
BUS 459	Business Analytics Practicum	3	MIE 305	Legal and Regulatory Environment	3
BUS 460	Consumer Behavior	3	MIE 306	Managing Ethics in Organizations	3
BUS 461	Channel and Retail Marketing	3	MIE 310	Introduction to Entrepreneurship	3
BUS 462	Marketing Research	3	MIE 330	Managing People	3
BUS 464	International Marketing	3	MIE 335	Organizational Behavior	3
BUS 465	Traditional and Digital Brand Promotion	3	MIE 410	Business Opportunity Analysis	3
BUS 466	Personal Selling	3	MIE 411	Managing the Growth Venture	3
BUS 467	Product and Brand Management	3	MIE 412	Finance and Accounting for Entrepreneurs	3
BUS 468	Marketing Strategy	3	MIE 413	New Venture Planning	3
BUS 469	Digital Marketing Practicum	3	MIE 416	The Legal Dynamics of Entrepreneurship	3
BUS 470	Operations Modeling and Analysis	3	MIE 418	Social Entrepreneurship Practicum	3
BUS 472	Operations Planning and Control Systems	3	MIE 419	Entrepreneurship Practicum	3
BUS 473	Supply Chain Strategy	3	MIE 430	Teamwork in Organizations	3
BUS 474	Logistics Management	3	MIE 432	Employee Relations	3
BUS 475	Purchasing and Supply Management	3	MIE 434	Rewards and Relationship Management	3
BUS 476	Decision Modeling and Analysis	3	MIE 435	Leading in a Changing World	3
BUS 479	Supply Chain Management Undergraduate Practicum	3	MIE 436	Consultative Skills	3
BUS 495	Special Topics in Business Management	1-6	MIE 438	Talent Management	3
BUS 498	Independent Study in Business Management	1-6	MIE 439	Management Practicum	3
BUS 501	Strategic Management Foundations	3	MIE 480	Business Policy and Strategy	3
BUS 554	Project Management	3	MIE 495	Special Topics in MIE	1-6
BUS 571	High Growth Entrepreneurship	3	MIE 498	Independent Study in MIE	1-6
BUS 585		3	MSE 577	Technology Entrepreneurship and Commercialization II	3
BUS 590	Special Topics In Business Management	1-6	PRT 406	Sports Law	3
EC 202	Principles of Macroeconomics	3	ST 350	Economics and Business Statistics	3
EC 301	Intermediate Microeconomics	3	TTM 585	Market Research In Textiles	3
EC 302	Intermediate Macroeconomics	3	<b>Science Set</b>		
EC 305	A Closer Look at Capitalism	3	AEC 360	Ecology	4
EC 336	Introduction to Resource and Environmental Economics	3	AEC 380	Water Resources: Global Issues in Ecology, Policy, Management, and Advocacy	3
EC 348	Introduction to International Economics	3	AEC 419	Freshwater Ecology	4
EC 351	Econometrics I	3	AEC 420	Introduction to Fisheries Science	3
EC 404	Money, Financial Markets, and the Economy	3	AEC 423	Introduction to Fisheries Sciences Laboratory	1
EC 410	Public Finance	3	AEC 441	Biology of Fishes	3

AEC 442	Biology of Fishes Laboratory	1	AEE 507	Comparative Agricultural and Extension Education	3
AEC 460	Field Ecology and Methods	4	AEE 521	Program Planning in Agricultural Extension and Human Sciences	3
AEC 509	Ecology and Conservation of Freshwater Invertebrates	3	AEE 522	Occupational Experience in Agriculture	3
AEC 515	Fish Physiology	3	AEE 523	Adult Education in Agriculture	3
AEC 519	Freshwater Ecology	4	AEE 524	Coordinating the High School Agricultural Education Program	3
AEC 586		3	AEE 526	Information Technologies in Agricultural and Extension Education	3
AEC 587		1	AEE 529	Curriculum Development in Agricultural and Extension Education	3
AEC 761	Conservation and Climate Science	3	AEE 533	Leadership and Management of Volunteers in Agricultural and Extension Education	3
AEE 101	Introduction to Career and Technical Education	1	AEE 535	Teaching Agriculture in Secondary Schools	3
AEE 103	Fundamentals of Agricultural and Extension Education	1	AEE 545	Methods of Change in Agricultural and Human Sciences	3
AEE 208	Agricultural Biotechnology: Issues and Implications	3	AEE 560	Organizational Behavior and Administrative Leadership in Agricultural & Human Science	3
AEE 226	Computer Applications and Information Technology in Agricultural & Extension Ed	3	AEE 577	Evaluation in Agricultural and Human Sciences	3
AEE 230	Introduction to Cooperative Extension	3	AEE 578	Scientific Inquiry in Agricultural and Extension Education	3
AEE 303	Administration and Supervision of Student Organizations	3	AEE 579	Research Proposal Development in Agricultural Education and Human Sciences	3
AEE 311	Communication Methods and Media	3	AEE 595	Special Topics in Agricultural and Extension Education	1-6
AEE 322	Experiential Learning in Agriculture	3	ALS 103	First-year Success in Agriculture and Life Sciences	1
AEE 323	Leadership Development in Agriculture and Life Sciences	3	ALS 303	Transfer Success in Agriculture and Life Sciences	1
AEE 325	Planning and Delivering Non-Formal Education	3	ANS 105	Introduction to Companion Animal Science	3
AEE 326	Teaching Diverse Learners in AED	3	ANS 110	Introduction to Equine Science	3
AEE 327	Conducting Summer Programs in Agricultural Education	1	ANS 150	Introduction to Animal Science	3
AEE 350	Personal Leadership Development in Agriculture and Life Sciences	3	ANS 151	Introduction to Animal Science Lab	1
AEE 360	Developing Team Leadership in Agriculture and Life Sciences	3	ANS 201	Techniques of Animal Care	2
AEE 423	Practicum in Agricultural Extension/Industry	8	ANS 205	Physiology of Domestic Animals	3
AEE 424	Planning Agricultural Educational Programs	3	ANS 206	Anatomy of Domestic Animals Lab	1
AEE 426	Methods of Teaching Agriculture	3	ANS 208	Agricultural Biotechnology: Issues and Implications	3
AEE 427	Student Teaching in Agriculture	8	ANS 215	Agricultural Genetics	3
AEE 433	Leadership and Management of Volunteers in Agricultural and Extension Education	3	ANS 220	Reproductive Physiology	3
AEE 435	Professional Presentations in Agricultural Organizations	3	ANS 221	Reproductive Physiology Lab	1
AEE 460	Organizational Leadership Development in Agriculture and Life Sciences	3	ANS 225	Principles of Animal Nutrition	3
AEE 478	Advanced Issues in Extension Education	3	ANS 230	Animal Nutrition	3
AEE 490	Seminar in Agricultural and Extension Education	1	ANS 231	Animal Nutrition Lab	1
AEE 491	Seminar in Agricultural Education	1	ANS 240	Livestock Merchandising	3
AEE 492	External Learning Experience in Agricultural and Extension Education	1-6	ANS 240A	Livestock Merchandising	3
AEE 493	Special Problems in Agriculture and Extension Education	1-6	ANS 260	Basic Swine Science	2
AEE 495	Special Topics in Agricultural and Extension Education	1-3	ANS 261	Swine Health and Biosecurity	1
AEE 500	Agricultural Education, Schools and Society	3	ANS 262	Swine Breeding and Gestation Management	1
AEE 501	Foundations Of Agricultural and Extension Education	3	ANS 263	Farrowing Management	1
AEE 503	Youth Program Management	3	ANS 264	Swine Nursery and Finishing Management	1
AEE 505	Trends and Issues in Agricultural Education and Human Sciences	3	ANS 265	Contemporary Issues in the Swine Industry	1
			ANS 266	Swine Environment Management	1
			ANS 267	Swine Manure and Nutrient Management	1
			ANS 268	Employee Management for the Swine Industry	1
			ANS 269	Internship in the Swine Industry	1



ANS 270	Pork Export Markets from a Swine Production Perspective	1	BAE 202	Introduction to Biological and Agricultural Engineering Methods	4
ANS 271	Swine Nutrition	1	BAE 203	Introduction to AutoCAD Civil 3D for Environmental & Ecological Engineers	2
ANS 281	Professional Development of PreVeterinary Track Students	1	BAE 204	Introduction to Environmental and Ecological Engineering	2
ANS 290	Professional Development for Animal Science Careers	2	BAE 302	Transport Phenomena	3
ANS 303	Principles of Equine Evaluation	2	BAE 305	Biological Engineering Circuits	4
ANS 304	Dairy Cattle Evaluation	2	BAE 321	Bioprocessing Engineering Fundamentals	3
ANS 309	Livestock Evaluation	3	BAE 322	Introduction to Food Process Engineering	3
ANS 322	Muscle Foods and Eggs	3	BAE 325	Introductory Geomatics	3
ANS 324	Milk and Dairy Products	3	BAE 361	Analytical Methods in Engineering Design	3
ANS 330	Laboratory Animal Science	3	BAE 371	Fundamentals of Hydrology for Engineers	3
ANS 395	Animal Science Study Abroad	1-6	BAE 376	Watershed Assessment and Water Quality Protection	3
ANS 400	Companion Animal Management	3	BAE 401	Sensors and Controls	3
ANS 402	Beef Cattle Management	3	BAE 425	Industrial Microbiology and Bioprocessing	3
ANS 403	Swine Management	3	BAE 435	Precision Agriculture Technology	3
ANS 404	Dairy Cattle Management	3	BAE 451	Engineering Design I	2
ANS 408	Small Ruminant Management	3	BAE 452	Engineering Design II	2
ANS 410	Equine Breeding Farm Management	3	BAE 462	Machinery Design and Applications	3
ANS 411	Management of Growing and Performance Horses	3	BAE 472	Irrigation and Drainage	3
ANS 415	Comparative Nutrition	3	BAE 473	Introduction to Hydrologic and Water Quality Modeling	3
ANS 425	Feed Manufacturing Technology	3	BAE 474	Principles and Applications of Ecological Engineering	3
ANS 440	Animal Genetic Improvement	3	BAE 478	Circular Approach to Manure Management	3
ANS 452	Comparative Reproductive Physiology and Biotechnology	3	BAE 481	Structures & Environment	3
ANS 453	Physiology and Genetics of Growth and Development	3	BAE 488	Postharvest Engineering	3
ANS 454	Lactation, Milk and Nutrition	3	BAE 492	External Learning Experience	1-6
ANS 480	Judging Team	1	BAE 493	Special Problems in Biological and Agricultural Engineering	1-6
ANS 492	Professional Internship Experience in the Animal Sciences	1-3	BAE 495	Special Topics in Biological and Agricultural Engineering	1-3
ANS 493	Research Experience in the Animal Sciences	1-3	BAE 501	Sensors and Controls	3
ANS 494	Teaching Experience in the Animal Sciences	1-3	BAE 502	Instrumentation for Hydrologic Applications	3
ANS 495	Special Topics in Animal Science	1-3	BAE 525	Industrial Microbiology and Bioprocessing	3
ANS 515	Comparative Nutrition	3	BAE 528	Biomass to Renewable Energy Processes	3
ANS 525	Feed Manufacturing Technology	3	BAE 535	Precision Agriculture Technology	3
ANS 530		3	BAE 536	GIS Applications in Precision Agriculture	1
ANS 531		1	BAE 560	Aerosol Science and Engineering	3
ANS 540	Animal Genetic Improvement	3	BAE 561	Agricultural Air Quality	3
ANS 550	Applied Ruminant Nutrition	3	BAE 572	Irrigation and Drainage	3
ANS 552	Comparative Reproductive Physiology and Biotechnology	3	BAE 573	Introduction to Hydrologic and Water Quality Modeling	3
ANS 553	Physiology and Genetics of Growth and Development	3	BAE 574		3
ANS 554	Lactation, Milk and Nutrition	3	BAE 575	Design of Structural Stormwater Best Management Practices	3
ANS 561	Equine Nutrition	3	BAE 576		3
ANS 571	Regulation of Metabolism	3	BAE 577	Wetlands Design and Restoration	3
ANS 575		3	BAE 578	Circular Approach to Manure Management	3
ANS 590	Topical Problems in Animal Science	1-3	BAE 580	Introduction to Land and Water Engineering	3
BAE 100	Introduction to Biological and Agricultural Engineering and Technology	1	BAE 581	Open Channel Hydraulics for Natural Systems	3
BAE 200	Computer Methods in Biological Engineering	2			

BAE 582	Risk and Failure Assessment of Stream Restoration Structures	1	BIO 183	Introductory Biology: Cellular and Molecular Biology	4
BAE 583	Stream Corridor 3 Es: Ecohydraulics, Engineering and Ethics	3	BIO 227	Understanding Structural Diversity through Biological Illustration	3
BAE 584	Introduction to Fluvial Geomorphology	3	BIO 230	The Science of Studying Dinosaurs	3
BAE 585		1	BIO 240	Principles of Human Anatomy & Physiology (A): Nervous, Skeletal, Muscular, & Digestive Systems	4
BAE 590	Special Problems	1-6	BIO 245	Principles of Human Anatomy & Physiology (B): Endocrine, Cardiovascular, Respiratory & Renal Systems	4
BAE 591	Master's Research Methods I	1	BIO 267	Research in the Life Sciences I: Research Skills	3
BAE 592	Master's Research Methods II	1	BIO 269	Research in the Life Sciences II: Guided Research	3
BAE 593	Introduction to Research Communications	1	BIO 310	Quantitative Approaches to Biological Problems	3
BBS 325	Introduction to Brewing Science and Technology	3	BIO 315	General Parasitology	3
BBS 426	Upstream Biomanufacturing Laboratory	2	BIO 325	Paleontological Field Methods	4
BBS 526	Upstream Biomanufacturing Laboratory	2	BIO 330	Evolutionary Biology	3
BCH 101	Introduction to Microbiology and Biochemistry Laboratory Practices	3	BIO 361	Developmental Biology	3
BCH 571	Regulation of Metabolism	3	BIO 370	Developmental Anatomy of the Vertebrates	3
BEC 220	Introduction to Drug Development and Careers in Biomanufacturing	1	BIO 375	Developmental Anatomy Laboratory	2
BEC 330	Principles and Applications of Bioseparations	2	BIO 405	Functional Histology	3
BEC 363		2	BIO 414	Cell Biology	3
BEC 426	Upstream Biomanufacturing Laboratory	2	BIO 416	Cancer Cell Biology	3
BEC 436	Introduction to Downstream Process Development	2	BIO 418	Cell Biology Research Lab	2
BEC 440		3	BIO 424	Endocrinology	3
BEC 441		3	BIO 432	Evolutionary Medicine	3
BEC 462	Fundamentals of Bio-Nanotechnology	3	BIO 434	Hormones and Behavior	3
BEC 463	Fermentation of Recombinant Microorganisms	2	BIO 440	The Human Animal: An Evolutionary Perspective	3
BEC 475	Global Regulatory Affairs for Medical Products	3	BIO 444	The Biology of Love and Sex	3
BEC 480	cGMP Fermentation Operations	2	BIO 481	Senior Capstone Project	1
BEC 483		2	BIO 482	Capstone Course in Molecular, Cellular, and Developmental Biology	3
BEC 485	cGMP Downstream Operations	2	BIO 483	Capstone Course in Integrative Physiology and Neurobiology	3
BEC 488	Animal Cell Culture Engineering	2	BIO 484	Capstone Course in Human Biology	3
BEC 495	Special Topics in Biomanufacturing	1-4	BIO 485	Capstone Course in Ecology, Evolution, and Conservation Biology	3
BEC 497	Biomanufacturing Research Projects	1-3	BIO 488	Neurobiology	3
BEC 515	Biopharmaceutical Product Characterization Techniques	2	BIO 498		3
BEC 526	Upstream Biomanufacturing Laboratory	2	BIO 499		3
BEC 532	Foundations of Downstream Processing and Formulation	2	BIO 518		3
BEC 536	Introduction to Downstream Process Development	2	BIO 560	Population Ecology	3
BEC 540		3	BIO 570	Evolutionary Ecology	3
BEC 541		3	BIO 572	Proteomics	3
BEC 562	Fundamentals of Bio-Nanotechnology	3	BIO 588	Neurobiology	3
BEC 563	Fermentation of Recombinant Microorganisms	2	BIO 592	Topical Problems	1-3
BEC 575	Global Regulatory Affairs for Medical Products	3	BIT 210	Phage Hunters	3
BEC 577	Advanced Biomanufacturing and Biocatalysis	3	BIT 211	Phage Genomics	2
BEC 580	cGMP Fermentation Operations	2	BIT 463	Fermentation of Recombinant Microorganisms	2
BEC 583		2	BIT 466	Animal Cell Culture Techniques	2
BEC 585	cGMP Downstream Operations	2	BIT 476	Applied Bioinformatics	2
BEC 590	Industry Practicum in Biomanufacturing	3	BIT 481	Plant Tissue Culture and Transformation	2
BEC 595	Special Topics in Biomanufacturing	1-6	BIT 563	Fermentation of Recombinant Microorganisms	2
BIO 140		3	BIT 566	Animal Cell Culture Techniques	2
BIO 141		1			
BIO 165		5			

BIT 572	Proteomics	3	CH 441	Forensic Chemistry	3
BMA 560	Population Ecology	3	CH 442	Advanced Synthetic Techniques	4
BME 483	Tissue Engineering Technologies	2	CH 444	Advanced Synthetic Techniques II	4
BME 583	Tissue Engineering Technologies	2	CH 452	Advanced Measurement Techniques I	4
BSC 295	Special Topics in Biological Sciences	1-6	CH 454	Advanced Measurement Techniques II	4
BSC 492	Professional Experience	1-3	CH 463	Molecular Origins of Life	3
BSC 493	Research Experience	1-3	CH 495	Special Topics in Chemistry	1-4
BSC 495	Special Topics in Biological Sciences	1-6	CH 499	Undergraduate Research in Chemistry	1-3
CE 435	Engineering Geology	3	CH 563	Molecular Origins of Life	3
CE 479	Air Quality	3	CH 572	Proteomics	3
CE 581	Fluid Mechanics in Natural Environments	3	CHE 462	Fundamentals of Bio-Nanotechnology	3
CH 100	Chemistry and Society	4	CHE 463	Fermentation of Recombinant Microorganisms	2
CH 101	Chemistry - A Molecular Science	3	CHE 488	Animal Cell Culture Engineering	2
CH 102	General Chemistry Laboratory	1	CHE 562	Fundamentals of Bio-Nanotechnology	3
CH 103	General Chemistry I for Students in Chemical Sciences	3	CHE 563	Fermentation of Recombinant Microorganisms	2
CH 104	General Chemistry Laboratory I for Students in Chemical Sciences	1	CHE 577	Advanced Biomanufacturing and Biocatalysis	3
CH 111	Preparatory Chemistry	3	CS 200	Introduction to Turfgrass Management	4
CH 201	Chemistry - A Quantitative Science	3	CS 210	Lawns and Sports Turf	3
CH 202	Quantitative Chemistry Laboratory	1	CS 211	Plant Genetics	3
CH 203	General Chemistry II for Students in Chemical Sciences	3	CS 213	Crop Science	3
CH 204	General Chemistry Laboratory II for Students in Chemical Sciences	1	CS 214	Crop Science Laboratory	1
CH 220	Introductory Organic Chemistry	3	CS 216	Southern Row Crop Production - Cotton, Peanuts, and Tobacco	3
CH 221	Organic Chemistry I	3	CS 218	Southern Row Crop Production - Corn, Small Grains and Soybeans	3
CH 222	Organic Chemistry I Lab	1	CS 224	Seeds, Biotechnology and Societies	3
CH 223	Organic Chemistry II	3	CS 230	Introduction to Agroecology	3
CH 224	Organic Chemistry II Lab	1	CS 312		3
CH 225	Organic Chemistry I for Students in Chemical Sciences	3	CS 400	Turf Cultural Systems	3
CH 226	Organic Chemistry Laboratory I for Students in Chemical Sciences	1	CS 410	Community Food Systems	3
CH 227	Organic Chemistry II for Students in Chemical Sciences	3	CS 411		3
CH 228	Organic Chemistry Laboratory II for Students in Chemical Sciences	1	CS 413	Plant Breeding	2
CH 230	Computational Chemistry Lab I	1	CS 414	Weed Science	4
CH 232	Computational Chemistry Lab II	1	CS 415	Integrated Pest Management	3
CH 295	Special Topics in Chemistry	1-3	CS 418	Introduction to Regulatory Science in Agriculture	3
CH 315	Quantitative Analysis	3	CS 424	Seed Physiology	3
CH 316	Quantitative Analysis Laboratory	1	CS 430	Advanced Agroecology	4
CH 331	Introductory Physical Chemistry	4	CS 465	Turf Management Systems and Environmental Quality	3
CH 335	Principles of Green Chemistry	4	CS 470	Advanced Turfgrass Pest Management	2
CH 345	Chemistry and War	3	CS 480	Sustainable Food Production (capstone)	1
CH 401	Systematic Inorganic Chemistry I	3	CS 502	Plant Disease: Methods & Diagnosis	2
CH 403	Systematic Inorganic Chemistry II	3	CS 518	Introduction to Regulatory Science in Agriculture	3
CH 415	Analytical Chemistry II	3	CS 524	Seed Physiology	3
CH 431	Physical Chemistry I	3	CS 541	Plant Breeding Methods	3
CH 433	Physical Chemistry II	3	CS 565	Turf Management Systems and Environmental Quality	3
CH 435	Introduction to Quantum Chemistry	3	CS 590	Special Topics	1-6
CH 437	Physical Chemistry for Engineers	4	CS 591		1-6
			CSSC 290	Professional Development in Crop & Soil Sciences	1
			CSSC 490	Senior Seminar in Crop Science and Soil Science	1
			CSSC 492	Professional Internship Experience in Crop and Soil Sciences	1-3



CSSC 493	Research Experience in Crop and Soil Sciences	1-3	ET 120	Introduction to Renewable Energy Technologies and Assessments	3
CSSC 495	Special Topics in Crop and Soil Sciences	1-6	ET 201	Environmental Technology Laboratory I	1
ECE 488	Systems Biology Modeling of Plant Regulation	3	ET 202	Environmental Technology Laboratory II	1
ECE 489	Solid State Solar and Thermal Energy Harvesting	3	ET 203	Pollution Prevention	1
ECE 588	Systems Biology Modeling of Plant Regulation	3	ET 220	Solar Photovoltaics Assessment	3
ECE 589	Solid State Solar and Thermal Energy Harvesting	3	ET 255	Hydro, Wind, and Bioenergy Assessment	3
ECI 424	Student Teaching in Modern Foreign Languages	12	ET 262	Renewable Energy Adoption: Barriers and Incentives	3
ENT 201	Insects and People	3	ET 293	Independent Study in Environmental Technology & 1-6 Management	
ENT 203	An Introduction to the Honey Bee and Beekeeping	3	ET 294	Independent Study in Environmental Technology & 1-6 Management	
ENT 207	Insects and Human Disease	3	ET 295	Special Topics in Environmental Technology & 1-6 Management	
ENT 212	Basic Entomology	1	ET 301	Environmental Technology Laboratory III	1
ENT 305	Introduction to Forensic Entomology	3	ET 302	Environmental Technology Laboratory IV	1
ENT 401	Honey Bee Biology and Management	3	ET 303	Laboratory Safety Systems and Management	1
ENT 402	Forest Entomology	3	ET 310	Environmental Monitoring and Analysis	3
ENT 425	General Entomology	3	ET 320	Fundamentals of Air Pollution	3
ENT 470	Advanced Turfgrass Pest Management	2	ET 330	Environmental Technology Practicum	3
ENT 492	External Learning Experience	1-6	ET 401	Environmental Technology Laboratory V	1
ENT 493	Special Problems in Entomology	1-6	ET 455	Adaptive Management and Governance	3
ENT 495	Special Topics in Entomology	1-3	ET 460	Practice of Environmental Technology	3
ENT 502	Insect Diversity	4	ET 493	Independent Study in Environmental Technology & 1-6 Management	
ENT 503	Insect Morphology and Physiology	3	ET 494	Independent Study in Environmental Technology & 1-6 Management	
ENT 504	Professional Development for Agriculture and the Life Sciences	2	ET 495	Special Topics in Environmental Technology & 1-6 Management	
ENT 506	Principles of Genetic Pest Management	3	FM 425	Feed Manufacturing Technology	3
ENT 509	Ecology and Conservation of Freshwater Invertebrates	3	FM 426	Feed Manufacturing Technology Laboratory	1
ENT 510	Writing Proposals in Agriculture, Biology, and Ecology	2	FM 525	Feed Manufacturing Technology	3
ENT 520	Insect Behavior	3	FM 580	Feed and Ingredient Quality Assurance	3
ENT 526	Organic Agriculture: Principles and Practices	3	FOR 150	Critical Thinking and Data Analysis	2
ENT 550	Fundamentals of Arthropod Management	3	FOR 172	Forest System Mapping and Mensuration I	2
ENT 560		3	FOR 204	Silviculture	2
ENT 582	Medical and Veterinary Entomology	3	FOR 248	Forest History, Technology and Society	3
ENT 591	Special Topics In Entomology	1-6	FOR 250	Professional Development II: Communications in Natural Resources	1
ES 100	Introduction to Environmental Sciences	3	FOR 252	Introduction to Forest Science	3
ES 111	Applications of Environmental Sciences	1	FOR 260	Forest Ecology	4
ES 113	Earth from Space	3	FOR 261	Forest Communities	2
ES 150	Water and the Environment	3	FOR 264	Forest Wildlife	1
ES 200	Climate Change and Sustainability	3	FOR 265	Fire Management	1
ES 295	Special Topics in Environmental Science	1-4	FOR 273	Forest System Mapping and Mensuration II	3
ES 300	Energy and Environment	3	FOR 293	Independent Study in Forest Management	1-6
ES 400	Analysis of Environmental Issues	3	FOR 294	Independent Study in Forest Management	1-6
ES 449	Human Dimensions of Natural Resources in Australia/New Zealand	3	FOR 295	Special Topics in Forestry	1-6
ES 450	Sustaining Natural Resources in Australia/New Zealand	3	FOR 303	Silvics and Forest Tree Physiology	3
ES 495	Special Topics in Environmental Science	1-6	FOR 304	Theory of Silviculture	4
ES 496	Environmental Science Internship	1-3	FOR 318	Forest Pathology	3
ES 497	Professional Development in Environmental Science	1-3	FOR 319	Forest Economics	3
ES 498	Research in Environmental Science	1-3	FOR 330	North Carolina Forests	3
ES 499	Thesis in Environmental Science	3			
ET 105	Introduction to Environmental Regulations	1			

FOR 334	Operations Research Applications in Natural Resources	1	FS 201	Introduction to Food Science	3
FOR 339		4	FS 231	Principles of Food and Bioprocess Engineering	4
FOR 350	Professional Development III: Ethical Dilemmas in Natural Resource Management	1	FS 250	Basics of Food Safety & Quality	3
FOR 353	GIS and Remote Sensing for Environmental Analysis and Assessment	3	FS 290	Careers in Food and Bioprocessing Sciences	1
FOR 374	Forest Measurement, Modeling, and Inventory	3	FS 295	Special Topics in Food Science	1-4
FOR 402	Forest Entomology	3	FS 301	Introduction to Human Nutrition	3
FOR 405	Forest Management	4	FS 322	Muscle Foods and Eggs	3
FOR 406	Forest Inventory, Analysis and Planning	4	FS 324	Milk and Dairy Products	3
FOR 408	Hardwood Management: Natural Forest Silviculture	3	FS 325	Introduction to Brewing Science and Technology	3
FOR 411	Forest Genetics	3	FS 330	Science of Food Preparation	3
FOR 414	World Forestry	3	FS 352	Introduction to Microbiological Food Safety Hazards	3
FOR 415	World Forestry Study Tour	1	FS 354	Food Sanitation	3
FOR 420	Watershed and Wetlands Hydrology	4	FS 401	Advanced Nutrition and Metabolism	3
FOR 422	Consulting Forestry	3	FS 402	Chemistry of Food and Bioprocessed Materials	4
FOR 430	Forest Health and Protection	3	FS 403	Analytical Techniques in Food & Bioprocessing Science	4
FOR 434	Forest Operations and Analysis	3	FS 405	Food Microbiology	3
FOR 472	Forest Soils	4	FS 406	Food Microbiology Lab	1
FOR 491	Special Topics in Forestry and Related Natural Resources	1-4	FS 416	Quality Control in Food and Bioprocessing	3
FOR 493	Independent Study in Forest Management	1-6	FS 421	Food Preservation	3
FOR 494	Independent Study in Forest Management	1-6	FS 426	Upstream Biomanufacturing Laboratory	2
FOR 501	Dendrology	3	FS 435	Food Safety Management Systems	3
FOR 502	Forest Measurements	1	FS 453	Food Laws and Regulations	3
FOR 503	Silvics and Forest Tree Physiology	1	FS 462	Postharvest Physiology	3
FOR 504	The Practice of Silviculture	3	FS 471	Professionalism & Project Preparation in Food & Bioprocessing Science	1
FOR 505	Forest Management	4	FS 475	Problems and Design in Food and Bioprocessing Science	3
FOR 506	Silviculture Laboratory	1	FS 481	Research Experience in Food and Bioprocessing Sciences	3
FOR 507	Silviculture Mini Course	1	FS 492	Professional Internship Experience in Food Science	1-6
FOR 508	Hardwood Management: Natural Forest Silviculture	3	FS 493	Research Experience in Food Science	1-6
FOR 509	Forest Resource Policy	1	FS 495	Special Topics in Food Science	1-3
FOR 510	Introduction to GPS	1	FS 501	Advanced Nutrition and Metabolism	3
FOR 513	Silviculture for Intensively Managed Plantations	3	FS 502	Chemistry of Food and Bioprocessed Materials	4
FOR 514	Woodland Stewardship	3	FS 505	Food Microbiology	3
FOR 519	Forest Economics	3	FS 506	Food Microbiology Lab	1
FOR 520	Watershed and Wetlands Hydrology	4	FS 516	Quality Control in Food and Bioprocessing	3
FOR 522	Consulting Forestry	3	FS 520	Pre-Harvest Food Safety	3
FOR 531	Wildland Fire Science	3	FS 521	Food Preservation	3
FOR 532	Wildland Firefighter	3	FS 522	Food Packaging	3
FOR 534	Forest Operations and Analysis	3	FS 526	Upstream Biomanufacturing Laboratory	2
FOR 540	Advanced Dendrology	3	FS 530	Post-Harvest Food Safety	3
FOR 561	Forest Communities of the Southeastern Coastal Plain	1	FS 535	Food Safety Management Systems	3
FOR 562	Forest Communities of the Southern Appalachians	1	FS 540	Food Safety and Public Health	3
FOR 565	Plant Community Ecology	4	FS 550	Food Industry Study Tour	2
FOR 574		3	FS 553	Food Laws and Regulations	3
FOR 575	Advanced Terrestrial Ecosystem Ecology	3	FS 554	Lactation, Milk, and Nutrition	3
FOR 583	Tropical Forestry	3	FS 555	Exercise Nutrition	3
FOR 595	Special Topics	1-6	FS 557	Nutraceuticals and Functional Foods	3
			FS 562	Postharvest Physiology	3

FS 567	Sensory Analysis of Foods	3	GIS 530	Spatial Data Foundations	3
FS 580	Professional Development and Ethics in Food Safety	1	GIS 550	Geospatial Data Structures and Web Services	3
FS 591	Special Problems In Food Science	1-6	GIS 582	Geospatial Modeling	3
FS 592	Special Research Projects in Food Science	1-6	GN 301	Genetics in Human Affairs	3
FSA 520	Pre-Harvest Food Safety	3	GN 311	Principles of Genetics	4
FSA 530	Post-Harvest Food Safety	3	GN 312	Elementary Genetics Laboratory	1
FSA 540	Food Safety and Public Health	3	GN 421	Molecular Genetics	3
FSA 580	Professional Development and Ethics in Food Safety	1	GN 423	Population, Quantitative and Evolutionary Genetics	3
FW 221	Conservation of Natural Resources	3	GN 425	Advanced Genetics Laboratory	2
FW 293	Independent Study in Fisheries, Wildlife, and Conservation Biology	1-6	GN 427	Introductory Bioinformatics	3
FW 294	Independent Study in Fisheries, Wildlife, and Conservation Biology	1-6	GN 428	Introduction to Machine Learning in Biology	3
FW 311	Piedmont Wildlife Ecology and Management	3	GN 434	Genes and Development	3
FW 312	Fisheries Techniques and Management	1	GN 441	Human and Biomedical Genetics	3
FW 313	Mountain Wildlife Ecology and Management	1	GN 451	Genome Science	3
FW 314	Coastal Ecology and Management	1	GN 453	Personal Genomics	3
FW 333	Conservation Biology in Practice	3	GN 456	Epigenetics, Development, and Disease	3
FW 353	Wildlife Management	3	GN 461	Advanced Bioinformatics	3
FW 373	Vertebrate Natural History	3	GN 490	Genetics Colloquium	1
FW 403	Urban Wildlife Management	3	GN 496	Genetics Research Experience	3
FW 404	Wildlife Habitat Management	3	GN 497	Genetics Teaching Experience	3
FW 405	Tropical Wildlife Ecology	3	GN 521	Molecular Genetics	3
FW 411	Human Dimensions of Wildlife and Fisheries	3	GN 541	Human and Biomedical Genetics	3
FW 415	Professional Development in Fisheries, Wildlife, and Conservation Biology	1	HS 131	Fruit & Vegetable Production	3
FW 444	Mammalogy	3	HS 144	Weeds & Diseases of Ornamentals	3
FW 445	Human Dimensions of Conservation Biology in the Bahamas	3	HS 200	Home Horticulture	3
FW 453	Principles of Wildlife Science	4	HS 201	The World of Horticulture: Principles and Practices	3
FW 460	International Wildlife Management and Conservation	3	HS 202	Home Plant Identification	3
FW 465	African Ecology and Conservation	4	HS 203	Home Plant Propagation	3
FW 492	External Learning Experience	1-6	HS 204	Home Landscape Maintenance	3
FW 493	Independent Study in Fisheries, Wildlife, and Conservation Biology	1-6	HS 205	Home Food Production	3
FW 494	Independent Study in Fisheries, Wildlife, and Conservation Biology	1-6	HS 215	Agricultural Genetics	3
FW 495	Special Topics in Fisheries and Wildlife Science	1-3	HS 242	Landscape Design Introduction	3
FW 511	Human Dimensions of Wildlife and Fisheries	3	HS 250	Home Landscape Design: Creating Garden Spaces	3
FW 515	Fish Physiology	3	HS 252	Landscape Design Graphic Communication	2
FW 544	Mammalogy	3	HS 272	Landscape Design/Build	6
FW 553	Principles of Wildlife Science	3	HS 280	Hands-On-Horticulture	3
FW 560	International Wildlife Management and Conservation	3	HS 290	Horticulture: Careers and Opportunities	1
FW 565	African Ecology and Conservation	4	HS 301	Plant Propagation	4
FW 586		3	HS 302	Gardening with Herbaceous Perennials	3
FW 587		1	HS 303	Ornamental Plant Identification I	3
FW 595	Special Topics in Fisheries and Wildlife Sciences	1-6	HS 304	Ornamental Plant Identification II	3
GES 506	Principles of Genetic Pest Management	3	HS 357	Landscape Design Grading and Drainage	4
GIS 512	Introduction to Environmental Remote Sensing	3	HS 400	Residential Landscaping	6
GIS 515	Cartographic Design	2	HS 410	Community Food Systems	3
			HS 411	Nursery Management	3
			HS 416	Landscape Planting Design	4
			HS 418	Landscape Design Digital Media Graphics	3
			HS 420	Green Infrastructure	3
			HS 421	Temperate-Zone Tree Fruits: Physiology and Culture	3
			HS 422	Small Fruit Production	3

HS 423		3	MB 406	Food Microbiology Lab	1
HS 428	Soil Management Principles for Sustainable Agriculture	1	MB 411	Medical Microbiology	3
HS 431	Vegetable Production	4	MB 412	Medical Microbiology Laboratory	1
HS 432	Introduction to Permaculture	3	MB 414	Microbial Metabolic Regulation	3
HS 433	Public Garden Administration	3	MB 420	Fundamentals of Microbial Cell Biotransformations	2
HS 440	Greenhouse Management	3	MB 435	Bacterial Pathogenesis	3
HS 442	Floriculture Crop Production	3	MB 441	Immunology	3
HS 451	Plant Nutrition	3	MB 451	Microbial Diversity	3
HS 462	Postharvest Physiology	3	MB 452	Microbial Diversity Lab	2
HS 471	Landscape Ecosystem Management	4	MB 455	Microbial Biotechnology	3
HS 475		3	MB 461	Molecular Virology	3
HS 476	Crop Physiology and Production in Controlled Environments	3	MB 470	Emerging and Re-emerging Infectious Diseases	3
HS 480	Sustainable Food Production (capstone)	1	MB 480	Current Issues in Microbiology	1
HS 491	Sustainable Agriculture Entrepreneurship Study Abroad	3	MB 492	External Learning Experience	1-6
HS 492	Horticulture Internship	1-3	MB 501	Biology of Plant Pathogens	3
HS 493	Research Experience in Horticultural Science	1-3	MB 505	Food Microbiology	3
HS 494	Teaching Experience in Horticultural Science	1-3	MB 506	Food Microbiology Lab	1
HS 495	Experimental Courses in Horticultural Science	1-6	MB 520	Fundamentals of Microbial Cell Biotransformations	2
HS 502	Plant Disease: Methods & Diagnosis	2	MB 532	Soil Microbiology	4
HS 516	Landscape Planting Design	4	MB 535	Bacterial Pathogenesis	3
HS 520	Green Infrastructure	3	MB 555	Microbial Biotechnology	3
HS 521	Temperate-Zone Tree Fruits: Physiology and Culture	3	MB 575	Introduction to Mycology	4
HS 523		3	MB 585	Biotechnology Industry Practicum I	3
HS 532	Introduction to Permaculture	3	MB 590	Topical Problems	1-3
HS 533	Public Garden Administration	3	MEA 100	Earth System Science: Exploring the Connections	4
HS 541	Plant Breeding Methods	3	MEA 101	Geology I: Physical	3
HS 550	Environmental Nursery Production	3	MEA 110	Geology I Laboratory	1
HS 551	Plant Nutrition	3	MEA 130	Introduction to Weather and Climate	3
HS 562	Postharvest Physiology	3	MEA 135	Introduction to Weather and Climate Laboratory	1
HS 576	Crop Physiology and Production in Controlled Environments	3	MEA 150	Environmental Issues in Water Resources	4
HS 583		3	MEA 200	Introduction to Oceanography	3
HS 590	Special Problems in Horticultural Science	1-6	MEA 202	Geology II: Historical	3
IDS 303	Humans and the Environment	3	MEA 210	Oceanography Lab	1
MA 315	Mathematics Methods in Atmospheric Sciences	4	MEA 211	Geology II Laboratory	1
MA 555	Introduction to Manifold Theory	3	MEA 215	Introduction to Atmospheric Sciences	4
MB 101	Introduction to Microbiology and Biochemistry Laboratory Practices	3	MEA 217	Introduction to Computing in the Geosciences	3
MB 103	Introductory Topics in Microbiology	1	MEA 220	Marine Biology	3
MB 180	Introduction to Microbial Bioprocessing	3	MEA 240	The Planets of Our Solar System	3
MB 200	The Fourth Horseman: Plagues that Changed the World	3	MEA 250	Introduction to Coastal Environments	3
MB 210	Phage Hunters	3	MEA 251	Introduction to Coastal Environments Laboratory	1
MB 211	Phage Genomics	2	MEA 252	Biology of Marine Mammals	3
MB 351	General Microbiology	3	MEA 300	Environmental Geology	4
MB 352	General Microbiology Laboratory	1	MEA 312	Atmospheric Thermodynamics	4
MB 354	Inquiry-Guided Microbiology Lab	1	MEA 315	Mathematics Methods in Atmospheric Sciences	4
MB 360	Scientific Inquiry in Microbiology: At the Bench	3	MEA 320	Fundamentals of Air Pollution	3
MB 405	Food Microbiology	3	MEA 321	Fundamentals of Air Quality and Climate Change	3
			MEA 323	Geochemistry of Natural Waters	3
			MEA 350	Marine Conservation Biology	3
			MEA 369	Life on Earth: Principles of Paleontology	3
			MEA 409	Watershed Forensics	3
			MEA 410	Introduction to Mineralogy	4
			MEA 411	Marine Sediment Transport	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	MSE 489	Solid State Solar and Thermal Energy Harvesting	3
MEA 458	Introduction to Tropical Meteorology	3	MSE 589	Solid State Solar and Thermal Energy Harvesting	3
MEA 459	Field Investigation of Coastal Processes	5	NE 528	Introduction to Plasma Physics and Fusion Energy	3
MEA 460	Principles of Physical Oceanography	3	NE 529	Plasma Physics and Fusion Energy II	3
MEA 462	Observational Methods and Data Analysis in Marine Physics	3	NR 219	Natural Resource Markets	3
MEA 463	Fluid Physics	3	NR 293	Independent Study in Natural Resources	1-6
MEA 464	Ocean Circulation Systems	3	NR 294	Independent Study in Natural Resources	1-6
MEA 465	Geologic Field Camp	4	NR 295	Special Topics in Natural Resources	1-3
MEA 466	Preparatory Course for Field Camp	1	NR 300	Natural Resource Measurements	4
MEA 467	Marine Meteorology	3	NR 301	Practicum for Professional Development I	1
MEA 469	Ecology of Coastal Resources	3	NR 303	Humans and the Environment	3
MEA 470	Introduction to Geophysics	3	NR 350	International Sustainable Resource Use	4
MEA 471	Exploration and Engineering Geophysics	3	NR 360	Internship Experience	3
MEA 473	Principles of Chemical Oceanography	3	NR 400	Natural Resource Management	4
MEA 476	Worldwide River and Delta Systems: Their Evolution and Human Impacts	3	NR 406	Conservation of Biological Diversity	3
MEA 479	Air Quality	3	NR 420	Watershed and Wetlands Hydrology	4
MEA 481	Geomorphology: Earth's Dynamic Surface	3	NR 421	Wetland Science and Management	3
MEA 485	Introduction to Hydrogeology	3	NR 460	Renewable Natural Resource Management and Policy	3
MEA 488	Meteorology for Media	3	NR 484	Environmental Impact Assessment	4
MEA 493	Special Topics in MEAS	1-6	NR 491	Special Topics in Forestry and Related Natural Resources	1-4
MEA 495	Junior Seminar in the Marine, Earth, and Atmospheric Sciences	1	NR 493	Independent Study in Natural Resources	1-6
MEA 498	Internship in MEAS	1-6	NR 500	Natural Resource Management	4
MEA 507	Discipline-based Education Research in the Geosciences	3	NR 494	Independent Study in Natural Resources	1-6
MEA 510	Air Pollution Meteorology	3	NR 510	Military Land Sustainability	3
MEA 511	Introduction to Meteorological Remote Sensing	3	NR 511	Managing Natural Resources in an Arena of Conflict	3
MEA 514	Advanced Physical Meteorology	3	NR 512	Land Use Policy & Management	3
MEA 515	Climate Dynamics	3	NR 520	Watershed and Wetlands Hydrology	4
MEA 517	Fundamentals of Climate Change Science	3	NR 521	Wetland Science and Management	3
MEA 518	Adaptation to Climate Change	3	NR 548	Historical Environments	3
MEA 519	Barriers to Climate Change Literacy	3	NR 554	Introduction to Data Analysis in Natural Resources	3
MEA 525	Introduction to Atmospheric Chemistry	3	NR 560	Renewable Natural Resource Management and Policy	3
MEA 540	Principles of Physical Oceanography	3	NR 571	Current Issues in Natural Resource Policy	3
MEA 549	Principles of Biological Oceanography	3	NR 595	Special Topics in Natural Resources	1-6
MEA 553	Estuarine Biogeochemistry	3	NTR 210	Introduction to Community Food Security	3
MEA 554	Marine Physical-Biological Interactions	3	NTR 220	Food and Culture in Italy	3
MEA 562	Marine Sediment Transport	3	NTR 301	Introduction to Human Nutrition	3
MEA 570	Geological Oceanography	3			



NTR 302	Introduction to Nutrition Research, Communication, and Careers	3	PB 481	Plant Tissue Culture and Transformation	2
NTR 320		3	PB 488	Systems Biology Modeling of Plant Regulation	3
NTR 330	Public Health Nutrition	3	PB 492	External Learning Experience	1-6
NTR 401	Advanced Nutrition and Metabolism	3	PB 493	Plant Biology Supervised Undergraduate Research Experience	1-6
NTR 410	Maternal and Infant Nutrition	3	PB 495	Special Topics in Plant Biology	1-6
NTR 415	Comparative Nutrition	3	PB 501	Biology of Plant Pathogens	3
NTR 419	Human Nutrition and Chronic Disease	3	PB 503	Systematic Botany	4
NTR 420		3	PB 513	Plant Anatomy	2
NTR 421		3	PB 545	Paleobotany	4
NTR 425	Feed Manufacturing Technology	3	PB 559	Plant Water Relations	2
NTR 454	Lactation, Milk and Nutrition	3	PB 564	Rare Plants of North Carolina	3
NTR 490	Senior Capstone Experience in Nutrition	4	PB 570	Plant Functional Ecology	3
NTR 492	Professional Internship Experience in Nutrition Science	1-3	PB 575	Introduction to Mycology	4
NTR 493	Research Experience in Nutrition Science	1-3	PB 580	Introduction to Plant Biotechnology	3
NTR 495	Special Topics in Nutrition	1-6	PB 595	Special Topics in Plant Biology	1-6
NTR 500	Principles of Human Nutrition	3	PHY 452		3
NTR 501	Advanced Nutrition and Metabolism	3	PHY 524	Comparative Endocrinology	3
NTR 510	Maternal and Infant Nutrition	3	PHY 552	Comparative Reproductive Physiology and Biotechnology	3
NTR 515	Comparative Nutrition	3	PO 201	Poultry Science and Production	3
NTR 521		3	PO 201A	Poultry Science and Production	3
NTR 525	Feed Manufacturing Technology	3	PO 202	Poultry Science and Production Laboratory	1
NTR 550	Applied Ruminant Nutrition	3	PO 202A	Poultry Science and Production Laboratory	1
NTR 554	Lactation, Milk, and Nutrition	3	PO 212	Poultry and People	3
NTR 555	Exercise Nutrition	3	PO 215	Applied Avian and Aquaculture Nutrition	3
NTR 557	Nutraceuticals and Functional Foods	3	PO 290	Exploring Opportunities in Poultry Science	1
NTR 561	Equine Nutrition	3	PO 322	Muscle Foods and Eggs	3
NTR 594	Special Topics in Nutrition	1-6	PO 340	Live Poultry and Poultry Product Evaluation, Grading, and Inspection	3
PB 103	Perspectives on Botany	1	PO 404	Avian Anatomy and Physiology	4
PB 200	Plant Life	4	PO 406	Physiological Aspects of Poultry Management	3
PB 205	Our Green World	3	PO 407	Physiological Aspects of Poultry Management Laboratory	1
PB 208	Agricultural Biotechnology: Issues and Implications	3	PO 410	Production and Management of Game Birds in Confinement	3
PB 213	Plants and Civilization	3	PO 411	Agrosecurity	3
PB 215	Medicinal Plants	3	PO 412	Emerging Topics in Poultry Science	3
PB 219	Plants in Folklore, Myth, and religion	3	PO 415	Comparative Nutrition	3
PB 220	Local Flora	3	PO 421	Commercial Egg Production	3
PB 250	Plant Biology	4	PO 424	Poultry Meat Production	3
PB 277	Space Biology	3	PO 425	Feed Manufacturing Technology	3
PB 295	Special Topics in Botany	1-4	PO 426	Feed Manufacturing Technology Laboratory	1
PB 321	Introduction to Whole Plant Physiology	3	PO 433	Poultry Processing and Products	3
PB 325	Culinary Botany	3	PO 435	Poultry Incubation & Breeding	4
PB 345	Economic Botany	3	PO 466	Animal Cell Culture Techniques	2
PB 346	Economic Botany Lab	1	PO 492	External Learning Experience	1-6
PB 360	Ecology	4	PO 493	Special Problems in Poultry Science	1-6
PB 400	Plant Diversity and Evolution	4	PO 495	Special Topics in Poultry Science	1-3
PB 403	Systematic Botany	4	PO 504	Avian Anatomy and Physiology	4
PB 413	Plant Anatomy	2	PO 506	Physiological Aspects of Poultry Management	3
PB 421	Plant Physiology	3	PO 510	Poultry Product Safety	3
PB 445	Paleobotany	4	PO 515	Comparative Nutrition	3
PB 464	Rare Plants of North Carolina	3			
PB 480	Introduction to Plant Biotechnology	3			

PO 524	Comparative Endocrinology	3	PY 507	Elementary Particle Physics	3
PO 525	Feed Manufacturing Technology	3	PY 509	General Relativity	3
PO 533	Poultry Processing and Products	3	PY 511	Mechanics I	3
PO 566	Animal Cell Culture Techniques	2	PY 512	Mechanics II	3
PO 580	Feed and Ingredient Quality Assurance	3	PY 514	Electromagnetism I	3
PO 590	Special Problems in Poultry Science	1-6	PY 515	Electromagnetism II	3
PP 144	Weeds & Diseases of Ornamentals	3	PY 516	Physical Optics	3
PP 222	Kingdom of Fungi	3	PY 517	Atomic and Molecular Physics	3
PP 318	Forest Pathology	3	PY 519	Biological Physics	3
PP 470	Advanced Turfgrass Pest Management	2	PY 525	Computational Physics	3
PP 501	Biology of Plant Pathogens	3	PY 528	Introduction to Plasma Physics and Fusion Energy	3
PP 502	Plant Disease: Methods & Diagnosis	2	PY 529	Plasma Physics and Fusion Energy II	3
PP 575	Introduction to Mycology	4	PY 543	Astrophysics	3
PRT 449	Human Dimensions of Natural Resources in Australia/New Zealand	3	PY 552	Condensed Matter Physics I	3
PRT 450	Sustaining Natural Resources in Australia/New Zealand	3	PY 570	Polymer Physics	3
PSE 335	Principles of Green Chemistry	4	PY 581	Matter & Interactions for Teachers I	3
PY 123	Stellar and Galactic Astronomy	3	PY 582	Matter & Interactions for Teachers II	3
PY 124	Solar System Astronomy	3	PY 589	Solid State Solar and Thermal Energy Harvesting	3
PY 125	Astronomy Laboratory	1	PY 590	Special Topics In Physics	1-6
PY 131	Conceptual Physics	4	PY 599	Special Topics in Physics	1-6
PY 201	University Physics I	4	SMT 202	Anatomy and Properties of Renewable Materials	3
PY 202	University Physics II	4	SSC 185	Land and Life	3
PY 203	University Physics III	4	SSC 200	Soil Science	3
PY 205	Physics for Engineers and Scientists I	3	SSC 201	Soil Science Laboratory	1
PY 206	Physics for Engineers and Scientists I Laboratory	1	SSC 332	Environmental Soil Microbiology	3
PY 208	Physics for Engineers and Scientists II	3	SSC 341	Soil Fertility and Nutrient Management	3
PY 209	Physics for Engineers and Scientists II Laboratory	1	SSC 342	Soil and Plant Nutrient Analysis	1
PY 211	College Physics I	4	SSC 410	Soil Judging for Land Evaluation	1
PY 212	College Physics II	4	SSC 421		3
PY 251	Introduction to Scientific Computing	3	SSC 427	Biological Approaches to Sustainable Soil Systems	3
PY 252	Instrumental and Data Analysis for Physics	2	SSC 428	Soil Management Principles for Sustainable Agriculture	1
PY 299	Special Problems in Physics	1-3	SSC 440	Geographic Information Systems (GIS) in Soil Science and Agriculture	3
PY 301	Introduction to Quantum Mechanics	3	SSC 442	Soil and Environmental Biogeochemistry	3
PY 328	Stellar and Galactic Astrophysics	3	SSC 452	Soil Classification	4
PY 341	Relativity, Gravitation and Cosmology	3	SSC 455	Soils, Environmental Quality and Global Challenges	3
PY 401	Quantum Physics I	3	SSC 461	Soil Physical Properties and Plant Growth	3
PY 402	Quantum Physics II	3	SSC 462	Soil-Crop Management Systems	3
PY 407	Introduction to Modern Physics	3	SSC 470	Wetland Soils	3
PY 411	Mechanics I	3	SSC 473	Introduction to Hydrologic and Water Quality Modeling	3
PY 412	Mechanics II	3	SSC 511	Soil Physics	4
PY 413	Thermal Physics	3	SSC 521	Soil Chemistry	3
PY 414	Electromagnetism I	3	SSC 532	Soil Microbiology	4
PY 415	Electromagnetism II	3	SSC 540	Geographic Information Systems (GIS) in Soil Science and Agriculture	3
PY 452	Advanced Physics Laboratory	3	SSC 541	Soil Fertility	3
PY 489	Solid State Solar and Thermal Energy Harvesting	3	SSC 545		3
PY 495	Special Topics in Physics	1-4	SSC 551	Soil Morphology, Genesis and Classification	3
PY 499	Independent Research in Physics	1-6	SSC 562	Environmental Applications Of Soil Science	3
PY 501	Quantum Physics I	3	SSC 570	Wetland Soils	3
PY 502	Quantum Physics II	3			
PY 506	Nuclear and Subatomic Physics	3			

SSC 573	Introduction to Hydrologic and Water Quality Modeling	3
SSC 590	Special Problems in Soil Science	1-6
TE 570	Polymer Physics	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
TOX 515	Environmental Toxicology	4
TOX 595	Special Topics	1-6
USC 291	Service Learning Program Leader Development I	1
USC 292	Service Learning Program Leader Development II	2
VMP 401	Poultry Diseases	4
VMP 420	Disease of Farm Animals	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
ZO 524		3
ZO 553		3
ZO 582	Medical and Veterinary Entomology	3

## Semester Sequence

This is a sample.

### First Year

Fall Semester		Hours
ALS 103	First-year Success in Agriculture and Life Sciences	1
ARE 201 or EC 201	Introduction to Agricultural & Resource Economics <sup>1</sup> or Principles of Microeconomics	3
BIO 181	Introductory Biology: Ecology, Evolution, and Biodiversity	4
ENG 101	Academic Writing and Research	4
Mathematics Requirement (p. 1)		3
<b>Hours</b>		<b>15</b>

### Spring Semester

Select one of the following:		4
BIO 183	Introductory Biology: Cellular and Molecular Biology	
PB 200	Plant Life	
PB 250	Plant Biology	
Mathematics Requirement (p. 1)		3
GEP Humanities ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/</a> )		3
GEP Social Sciences ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-social-sciences/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-social-sciences/</a> )		3

GEP Health and Exercise Studies ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/</a> )		1
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**Hours 14**

### Second Year

#### Fall Semester

CH 101 & CH 102	Chemistry - A Molecular Science and General Chemistry Laboratory	4
AEE 226	Computer Applications and Information Technology in Agricultural & Extension Ed	3
PY 131 or PY 211	Conceptual Physics or College Physics I	4
Communications Requirement (p. 1)		3
GEP Health and Exercise Studies ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/</a> )		1

**Hours 15**

#### Spring Semester

ACC 220 or ACC 210	Introduction to Managerial Accounting or Concepts of Financial Reporting	3
Chemistry Requirement (p. 1)		4
Statistics Requirement (p. 1)		3
GEP Interdisciplinary Perspectives ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-interdisciplinary-perspectives/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-interdisciplinary-perspectives/</a> )		3
GEP Elective ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/</a> )		3

**Hours 16**

### Third Year

#### Fall Semester

ARE 301	Intermediate Microeconomics	3
ARE 306 or ARE 309	Agricultural Law or Environmental Law & Economic Policy	3
ARE 490	Career Seminar in Agriculture & Resource Economics	1

Biology Elective Requirement (p. 1)		4
ARE or EC Elective (p. 1)		3
GEP Interdisciplinary Perspectives ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-interdisciplinary-perspectives/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-interdisciplinary-perspectives/</a> )		2-3

**Hours 16**

#### Spring Semester

Marketing Requirement (p. 1)		3
GN 311	Principles of Genetics	4
ARE 304	Agribusiness Management	3
Restricted Elective (p. 3)		3
GEP Humanities ( <a href="http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/">http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/</a> )		3

**Hours 16**

### Fourth Year

#### Fall Semester

ARE 321 or BUS 320	Agricultural Financial Management or Financial Management	3
ARE/EC Elective (p. 1)		3

Free Elective <sup>2</sup>	2
Restricted Elective (p. 3)	3
Restricted Elective (p. 3)	3
<b>Hours</b>	<b>14</b>
<b>Spring Semester</b>	
Advanced Writing Requirement (p. 1)	3
Restricted Elective (p. 3)	3
Free Electives <sup>2</sup>	8-9
<b>Hours</b>	<b>14</b>
<b>Total Hours</b>	<b>120</b>

<sup>1</sup> A grade of C- or higher is required.

<sup>2</sup> For Free Elective, select courses with enough credits to meet the minimum graduation requirement of 120 total credit hours.

## Career Opportunities

The Agricultural Business Management Program prepares graduates for careers in management, marketing, sales, finance, supply chain, entrepreneurship, and related fields. The program has sufficient flexibility to provide more extensive course work in science and math for those students desiring to prepare for advanced graduate study. The concentration in biological sciences prepares graduates for management, marketing, and sales careers in fields such as biotechnology, pharmaceuticals, health care, environmental protection, and food processing. Graduates specializing in agribusiness entrepreneurship are trained in value creation and prepared to address the strong demand in agtech, biotech, and foodtech.

## Career Titles

- Agricultural Inspector
- Agricultural Technician
- Aquaculture Specialist
- Bank and Branch Managers
- Buyer
- Farm and Ranch Manager
- Farm Management Advisor
- Farm Product Buyer
- Farm Products Purchasing Agent
- Farmers and Ranchers
- Financial Analyst
- Food & Drug Inspector
- Greenhouse and Nursery Manager
- Insurance Agent
- Loan Officer
- Market Research Analyst
- Purchasing Manager
- Real Estate Broker
- Sales Representative (Agricultural Products)
- Winemaker / Vintner

## Learn More About Careers

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

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

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

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

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

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

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

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

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

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

Agricultural and Applied Economics Association (<https://www.aaea.org/employmenttopps/>)

AgCareers.com (<https://www.agcareers.com/newsletters/>)

AgCareers.com-Electronic-Internship-Flyer.htm)

National Agri-Marketing Association (<https://www.nama.org/>)