MAS Elective Courses

- At least 17 credits required. Any elective courses selected must differ from those taken to fulfill core course requirements.
- Only 6 credit hours of 400-level courses are allowed. Cross-listed Animal Science 400-level courses are not allowed.
- Piggybacked 400-level courses that are taken as an undergraduate cannot be taken as a 500 level course.
- Additional elective courses not on the general elective course list may be included in a MAS degree plan of work with mentor’s permission and DGP approval.
- 900 level Vet School courses are not considered graduate courses and will not count towards an M.S., MAS or Ph.D. degree. M.S. or MAS students who get accepted to Vet School before they receive their master’s degree will not be able to transfer 900-level courses from the Vet curriculum into their Graduate Plan of Work. There will be no exceptions to this rule.

General Departmental Listings for MAS Graduate Program Elective Courses

*Agriculture and Extension Education* [http://catalog.ncsu.edu/undergraduate/coursedescriptions/aeed/](http://catalog.ncsu.edu/undergraduate/coursedescriptions/aeed/)

- **AEE 426** - Methods of Teaching Agriculture
- **AEE 470** - Agricultural Communications
- **AEE 478** - Extension as Non-Formal Education
- **AEE 500** - Agricultural Education, Schools and Society
- **AEE 501** - Foundations of Agricultural and Extension Education
- **AEE 503** - Youth Program Management
- **AEE 505** - Trends and Issues in Agricultural and Extension Education
- **AEE 507** - Comparative Agricultural and Extension Education
- **AEE 521** - Program Planning in Agricultural and Extension Education
- **AEE 522** - Occupational Experience in Agriculture
- **AEE 523** - Adult Education in Agriculture
- **AEE 524** – Coordinating the High School Agricultural Education Program
- **AEE 526** - Information Technologies in Agricultural and Extension Education
- **AEE 528** - Instructional Design in Agricultural and Extension Education
- **AEE 529** - Curriculum Development in Agricultural and Extension Education
- **AEE 530** - Priority Management in Agricultural and Extension Education
- **AEE 533** – Leadership and Management of Volunteers in Agricultural and Extension Education
- **AEE 535** - Teaching Agriculture in Secondary Schools
- **AEE 560** - Organizational and Administrative Leadership in Agricultural and Extension Education
- **AEE 577** - Evaluation in Agricultural and Extension Education
- **AEE 578** - Scientific Inquiry in Agricultural and Extension Education
- **AEE 735** - Effective Teaching in Agriculture and Life Sciences
- **AEE 740** - Extension in Developing Countries
Animal Science [link]

ANS 530 - Advanced Applied Animal Reproduction
ANS 531 - Advanced Applied Animal Reproduction Lab
ANS 540 - Selection of Domestic Animals
ANS 550 - Applied Ruminant Nutrition
ANS 552 - Advanced Reproductive Physiology & Biotechnology
ANS 553 - Growth and Development of Domestic Animals
ANS 554 - Lactation, Milk, and Nutrition
ANS 561 - Equine Nutrition
ANS 571 - Regulation of Metabolism
ANS 575 - Current Topics in Genomics and Proteomics in Animal Science
ANS 601 – Animal Science Seminar
ANS 602 - Seminar In Biology of Reproduction
ANS 603 - Reproductive Physiology Seminar
ANS 604 - Animal Breeding and Genetics Seminar
ANS 610 - Topical Problems in Animal Science
ANS 685 - Master's Supervised Teaching
ANS 701 - Protein and Amino Acid Metabolism
ANS 702 - Reproductive Physiology of Mammals
ANS 706 - Mammalian Embryo Manipulation
ANS 708 - Genetics of Animal Improvement
ANS 709 - Energy Metabolism
ANS 713 - Quantitative Genetics and Breeding
ANS 726 – Advanced Topics in Quantitative Genetics and Breeding
ANS 764 - Advances in Gastrointestinal Pathophysiology
ANS 775 - Mineral Metabolism
ANS 780 - Mammalian Endocrinology
ANS 785 - Digestion and Metabolism in Ruminants

Agricultural Resource Economics [link]

ARE 404 – Advanced Agribusiness Management
ARE 412 – Advanced Agribusiness Marketing
ARE 413 – Applied Agribusiness Marketing
ARE 433 - U.S. Agricultural Policy
ARE 436 - Environmental Economics

Biology [link]

BIO 402 - Invertebrate Zoology
BIO 405 - Functional Histology
BIO 410 - Introduction to Animal Behavior
BIO 413 - Cell Biology
BIO 421 - Advanced Human Anatomy & Physiology Lab
BIO 422 - Biological Clocks
BIO 424 - Endocrinology
BIO 425 - General Entomology
BIO 430 - Fisheries and Wildlife Administration
BIO 460 – Field Ecology and Methods
BIO 434 – Hormones and Behavior
BIO 449 - Principles of Biological Oceanography
BIO 488 - Neurobiology

**Biological and Agricultural Engineering**  [http://catalog.ncsu.edu/undergraduate/coursedescriptions/dae/]

**BAE 435** - Precision Agriculture Technology
**BAE 442** - Systems Approach to Agricultural and Environmental Issues
**BAE 472** - Irrigation and Drainage
**BAE 501** - Instrumentation for Biological Systems
**BAE 535** - Precision Agriculture Technology
**BAE 572** - Irrigation and Drainage
**BAE 573** - Introduction to Surface Hydrologic/Water Quality Modeling
**BAE 576** - Watershed Monitoring and Assessment
**BAE 578** - Agricultural Waste Management
**BAE 771** - Theory of Drainage – Saturated Flow
**BAE 785** - Food Rheology

**Business Administration**  [http://catalog.ncsu.edu/undergraduate/coursedescriptions/mba/]

**MBA 514** - Technology, Law, and the Internet
MBA 515 – Enterprise Systems
MBA 520 – Managerial Finance
**MBA 554** - Project Management
**MBA 570** - Managing the Growth Venture
**MBA 576** - Technology Evaluation and Commercialization Concepts
**MBA 577** - Technology Evaluation and Strategy
MBA 580 - Global Strategy
MBA 585 - Current Topics in BioSciences Management
MBA 586 - Legal and Marketing Dynamics in Pharmaceutical and Biotechnology

**Business Management**  [http://catalog.ncsu.edu/undergraduate/coursedescriptions/bus/]

BUS 590 – Special Topics in Business Management

**Molecular and Structural Biochemistry**  [http://catalog.ncsu.edu/undergraduate/coursedescriptions/bch/]

**BCH 451** - Principles of Biochemistry
**BCH 452** - Introductory Biochemistry Laboratory
**BCH 453** - Biochemistry of Gene Expression
**BCH 454** - Advanced Biochemistry Laboratory
**BCH 455** - Proteins and Molecular Mechanisms
**BCH 552** - Experimental Biochemistry
**BCH 553** - Biochemistry of Gene Expression
**BCH 555** - Proteins and Molecular Mechanisms
**BCH 571** - Regulation of Metabolism
**BCH 703** - Macromolecular Synthesis and Regulation
**BCH 705** – Biological Scanning Electron Microscopy
BCH 751 - Biophysical Chemistry
BCH 761 - Advanced Molecular Biology of the Cell
BCH 763 - Biochemistry of Hormone Action
BCH 768 - Nucleic Acids: Structure and Function

Biotechnology [http://catalog.ncsu.edu/undergraduate/coursedescriptions/bit/]

BIT 410 - Manipulation of Recombinant DNA
BIT 462 - Gene Expression Analysis: Microarrays
BIT 464 - Protein Purification
BIT 465 - Real-time PCR Techniques
BIT 466 - Animal Cell Culture Techniques
BIT 467 - PCR and DNA Fingerprinting
BIT 468 - Genome Mapping
BIT 501 - Ethical Issues in Biotechnology
BIT 510 - Core Technologies in Molecular and Cellular Biology
BIT 562 - Gene Expression: Microarrays
BIT 564 - Protein Purification
BIT 565 - Real-time PCR Techniques
BIT 566 - Animal Cell Culture Techniques
BIT 568 - Genome Mapping
BIT 569 - RNA Purification and Analysis

Comparative Biomedical Sciences [http://catalog.ncsu.edu/undergraduate/coursedescriptions/cbs/]

CBS 662 - Professional Conduct in Biomedical Research
CBS 730 - Veterinary Histology
CBS 731 - Applied Veterinary Anatomy I
CBS 732 - Biological Light and Electron Microscopy: Principles and Practice
CBS 754 - Principles Of Analytical Epidemiology
CBS 755 - Immunoparasitology
CBS 760 - Molecular Technologies for Epidemiologic Investigation
CBS 762 - Principles of Pharmacology
CBS 770 - Cell Biology
CBS 771 - Cancer Biology
CBS 773 - Advanced Developmental Biology
CBS 774 - Epidemiology Of Infectious Diseases Of International Importance
CBS 780 - Veterinary Production Epidemiology
CBS 782 - Marine Mammal Medicine
CBS 783 - Advanced Immunology
CBS 785 - Advanced and Molecular Pharmacology
CBS 787 - Pharmacokinetics

Crop Science [http://catalog.ncsu.edu/undergraduate/coursedescriptions/cs/]

CS 411 - Crop Ecology
CS 414 - Weed Science
CS 415 - Integrated Pest Management
CS 430 - Advanced Agroecology
CS 462 - Soil-Crop Management Systems
CS 717 - Weed Management Systems

Economics  http://catalog.ncsu.edu/undergraduate/coursedescriptions/ec/
EC 404 - Money, Financial Markets, and the Economy
EC 410 - Public Finance
EC 413 - Competition, Monopoly and Public Policy
EC 431 - Labor Economics
EC 436 - Environmental Economics
EC 437 - Health Economics
EC 448 - International Trade
EC 449 - International Finance
EC 451 - Introduction to Econometrics
EC 471 - Evolution of the American Economy
EC 474 - Economics of Financial Institutions and Markets

Economics - Graduate
ECG 505 - Applied Microeconomic Analysis
ECG 506 - Applied Macroeconomic Analysis
ECG 512 - Law and Economics
ECG 515 - Environmental and Resource Policy
ECG 537 - Health Economics
ECG 540 - Economic Development
ECG 700 - Fundamentals of Microeconomics
ECG 703 - Fundamentals of Macroeconomics
ECG 706 - Industrial Organization
ECG 715 - Environmental and Resource Economics
ECG 730 - Labor Economics
ECG 741 - Agricultural Production and Supply
ECG 742 - Consumption, Demand and Market Interdependency
ECG 748 - Theory of International Trade
ECG 749 - Monetary Aspects of International Trade

Entomology  http://catalog.ncsu.edu/undergraduate/coursedescriptions/ent/
ENT 425 - General Entomology
ENT 503 - Insect Morphology and Physiology
ENT 550 - Fundamentals of Arthropod Management
ENT 582 - Medical and Veterinary Entomology
ENT 726 - Biological Control of Insects and Weeds
ENT 762 - Insect Pest Management In Agricultural Crops

Food Science  http://catalog.ncsu.edu/undergraduate/coursedescriptions/fs/
FS 402 - Chemistry of Food and Bioprocessed Materials
FS 403 - Analytical Techniques in Food & Bioprocessing Science
FS 405 - Food Microbiology
FS 406 - Food Microbiology Lab
FS 407 - Risk Analysis and Hazard Analysis in Food Safety
FS 416 - Quality Control in Food and Bioprocessing
FS 421 - Food Preservation
FS 435 - Food Laws and Regulations
FS 462 - Postharvest Physiology
FS 520 - Pre-Harvest Food Safety
FS 530 - Post-Harvest Food Safety
FS 540 - Food Safety and Public Health
FS 553 - Food Laws and Regulations
FS 554 - Lactation, Milk, and Nutrition
FS 555 - Exercise Nutrition
FS 562 - Post-harvest Physiology
FS 567 - Sensory Analysis of Foods
FS 580 - Professional Development and Ethics in Food Safety
FS 706 - Vitamin Metabolism
FS 725 - Fermentation Microbiology
FS 730 - Human Nutrition

Fisheries and Wildlife Sciences  
http://catalog.ncsu.edu/undergraduate/coursedescriptions/fw/
FW 453 - Principles of Wildlife Science
FW 515 - Fish Physiology
FW 533 - Principles of Wildlife Science
FW 560 - International Wildlife Management and Conservation
FW 586 - Aquaculture I

Genetics  
http://catalog.ncsu.edu/undergraduate/coursedescriptions/gn/
GN 513 - Advanced Genetics
GN 701 - Molecular Genetics
GN 702 - Cellular and Developmental Genetics
GN 703 - Population and Quantitative Genetics
GN 708 - Genetics of Animal Improvement
GN 713 - Quantitative Genetics and Breeding
GN 725 - Genetic Data Analysis
GN 735 - Functional Genomics
GN 740 - Evolutionary Genetics
GN 750 - Developmental Genetics
GN 755 - Population Genetics
GN 757 - Statistics for Molecular Quantitative Genetics
GN 761 - Advanced Molecular Biology of the Cell
GN 768 - Nucleic Acids: Structure and Function

Immunology  
http://catalog.ncsu.edu/undergraduate/coursedescriptions/imm/
IMM 705 - Immunotoxicology
IMM 751 - Immunology
IMM 755 - Immunoparasitology
IMM 783 - Advanced Immunology

Microbiology http://catalog.ncsu.edu/undergraduate/coursedescriptions/mb/
MB 405 - Food Microbiology
MB 406 - Food Microbiology Lab
MB 411 - Medical Microbiology
MB 412 - Medical Microbiology Laboratory
MB 414 - Microbial Metabolic Regulation
MB 441 - Immunology
MB 451 - Microbial Diversity
MB 455 - Microbial Biotechnology
MB 461 - Introduction to Molecular Virology
MB 714 - Microbial Metabolic Regulation
MB 718 - Introductory Virology
MB 725 - Fermentation Microbiology
MB 751 - Immunology
MB 758 - Prokaryotic Molecular Genetics
MB 771 - Molecular Virology of Animal Viruses
MB 783 - Advanced Immunology

Nutrition http://catalog.ncsu.edu/undergraduate/coursedescriptions/ntr/
NTR 420 - Community Nutrition
NTR 500 - Principles of Human Nutrition
NTR 550 - Applied Ruminant Nutrition
NTR 554 - Lactation, Milk, and Nutrition
NTR 555 - Exercise Nutrition
NTR 701 - Protein and Amino Acid Metabolism
NTR 706 - Vitamin Metabolism
NTR 708 - Energy Metabolism
NTR 730 - Human Nutrition
NTR 764 - Advances in Gastrointestinal Pathophysiology
NTR 775 - Mineral Metabolism
NTR 785 - Digestion and Metabolism in Ruminants

Philosophy http://catalog.ncsu.edu/undergraduate/coursedescriptions/phi/
PHI 420 - Global Justice
PHI 425 - Introduction to Cognitive Science
PHI 440 - The Scientific Method
PHI 475 - Ethical Theory
PHI 520 - Global Justice
PHI 540 - The Scientific Method
PHI 545 - Philosophy of Biology
PHI 575 - Ethical Theory
PHI 816 - Introduction to Research Ethics
**Physiology** [http://catalog.ncsu.edu/undergraduate/coursedescriptions/phy/](http://catalog.ncsu.edu/undergraduate/coursedescriptions/phy/)

- **PHY 503** - General Physiology I
- **PHY 504** - General Physiology II
- **PHY 524** - Comparative Endocrinology
- **PHY 552** - Advanced Reproductive Physiology & Biotechnology
- **PHY 702** - Reproductive Physiology of Mammals
- **PHY 764** - Advances in Gastrointestinal Pathophysiology
- **PHY 780** - Mammalian Endocrinology

**Poultry Science** [http://catalog.ncsu.edu/undergraduate/coursedescriptions/ecg/](http://catalog.ncsu.edu/undergraduate/coursedescriptions/ecg/)

- **PO 410** - Production and Management of Game Birds in Confinement
- **PO 421** - Commercial Egg Production
- **PO 422** - Incubation and Hatchery Management
- **PO 424** - Poultry Meat Production
- **PO 435** - Poultry Incubation & Breeding
- **PO 524** - Comparative Endocrinology
- **PO 566** - Animal Cell Culture Techniques
- **PO 757** - Comparative Immunology
- **PO 775** - Mineral Metabolism

**Plant Pathology** [http://catalog.ncsu.edu/undergraduate/coursedescriptions/pps/](http://catalog.ncsu.edu/undergraduate/coursedescriptions/pps/)

- **PP 530** - Agriculture, Ethics and the Environment

**Soil Science** [http://catalog.ncsu.edu/undergraduate/coursedescriptions/ssc/](http://catalog.ncsu.edu/undergraduate/coursedescriptions/ssc/)

- **SSC 440** - Geographic Information Systems (GIS) in Soil Science & Agriculture
- **SSC 452** - Soil Classification
- **SSC 461** - Soil Physical Properties and Plant Growth
- **SSC 462** - Soil-Crop Management Systems
- **SSC 470** - Wetland Soils
- **SSC 532** - Soil Microbiology
- **SSC 541** - Soil Fertility
- **SSC 545** - Remote Sensing Applications in Soil Science and Agriculture
- **SSC 551** - Soil Morphology, Genesis and Classification
- **SSC 562** - Environmental Applications of Soil Science
- **SSC 570** - Wetland Soils
- **SSC 701** - Tropical Soils: Characteristics and Management

**Statistics** [http://catalog.ncsu.edu/undergraduate/coursedescriptions/st/](http://catalog.ncsu.edu/undergraduate/coursedescriptions/st/)

- **ST 430** - Introduction to Regression Analysis
- **ST 431** - Introduction to Experimental Design
- **ST 432** - Introduction to Survey Sampling
- **ST 435** - Statistical Methods for Quality and Productivity Improvement
- **ST 445** - Introduction to Statistical Computing and Data Management
- **ST 505** - Applied Nonparametric Statistics
- **ST 506** - Sampling Animal Populations
ST 511 - Experimental Statistics for Biological Sciences I
ST 512 - Experimental Statistics for Biological Sciences II
ST 520 - Statistical Principles of Clinical Trials and Epidemiology
ST 524 - Statistics in Plant Science
ST 546 - Probability and Stochastic Processes I
ST 708 - Applied Least Squares
ST 711 - Design Of Experiments
ST 715 - Theory Of Sampling Applied To Survey Design
ST 721 - Genetic Data Analysis
ST 730 - Applied Time Series Analysis
ST 731 - Applied Multivariate Statistical Analysis
ST 732 - Applied Longitudinal Data Analysis
ST 733 - Applied Spatial Statistics
ST 747 - Probability and Stochastic Processes II
ST 748 - Stochastic Differential Equations
ST 757 - Statistics for Molecular Quantitative Genetics
ST 771 - Biomathematics I
ST 772 - Biomathematics II

Toxicology [http://catalog.ncsu.edu/undergraduate/coursedescriptions/tox/]

TOX 401 - Principles of Toxicology
TOX 415 - Environmental Toxicology and Chemistry
TOX 501 - Principles of Toxicology
TOX 701 – Fundamentals of Toxicology
TOX 704 - Chemical Risk Assessment
TOX 705 - Immunotoxicology
TOX 710 – Molecular and Biochemical Toxicology
TOX 715 - Environmental Toxicology
TOX 727 - Pesticide Behavior and Fate in the Environment
TOX 771 - Cancer Biology

Zoology [http://catalog.ncsu.edu/undergraduate/coursedescriptions/zo/]

ZO 503 - General Physiology I
ZO 504 - General Physiology II
ZO 512 - Animal Symbiosis
ZO 513 - Comparative Physiology
ZO 522 - Biological Clocks
ZO 524 - Comparative Endocrinology
ZO 544 - Mammology
ZO 553 - Principles of Wildlife Science
ZO 582 - Medical and Veterinary Entomology
ZO 588 - Neurobiology
ZO 718 - Community Ecology
ZO 756 - Ecology of Fishes
ZO 791 - Topics in Animal Behavior