826 Livestock Immunogenetics
Fall of odd years. 4(3-2) P:NM: (ANS 404 or ANS 425)
Evaluation and exploration of indicator traits and candidate genes of immunocompetence that contribute to resistance or susceptibility to infectious diseases of livestock.

827 Integrated Risk Assessment of Environmental Hazards
Spring of odd years. 3(3-0) R: Open only to graduate students in the College of Agriculture and Natural Resources or College of Engineering or College of Human Medicine or College of Natural Science or College of Osteopathic Medicine or College of Veterinary Medicine.
Alternative approaches to assessing environmental and health risk. Analyzing, interpreting, and using scientific data from ecology, agriculture, environmental chemodynamics, biology, geological sciences, and toxicology in the risk assessment process.

841 Advanced Endocrine Physiology and Pharmacology
Fall. 4(4-0) Interdepartmental with Physiology; Pharmacology and Toxicology; Psychology. Administered by Department of Physiology. P:NM: (BMB 461 and PSL 432) R: Open only to graduate students in the Colleges of Human Medicine, Osteopathic Medicine, Veterinary Medicine, Natural Science, and Agriculture and Natural Resources.
Basic and advanced concepts of endocrine and reproductive physiology and pharmacology.

842 Population Genetics, Genealogy and Genomics
Fall. 3(3-0) Interdepartmental with Forestry; Crop and Soil Sciences; Genetics; Fisheries and Wildlife; Horticulture. Administered by Department of Forestry. RB: Pre-calculus, basic genetics
Population genetic processes underlying patterns of molecular genetic variation. Genealogical approaches to the study of genomic diversity, phylogenetic reconstruction, and molecular ecology.

870 Techniques of Analyzing Unbalanced Research Data
Spring. 4(4-0) Interdepartmental with Crop and Soil Sciences; Forestry; Fisheries and Wildlife; Horticulture. P:NM: (STT 464) R: Open only to graduate students in the College of Agriculture and Natural Resources. SA: ANS 943
Linear model techniques to analyze biological research data characterized by missing and unequal number of observations in classes. Simultaneous consideration of multiple factors. Prediction of breeding values and estimation of population parameters from variance and covariance components.

883 Applied Ruminant Nutrition
Summer. 3(2-2) P:NM: (ANS 313 or ANS 513 or PSL 511) RB: (ANS 483)
Nutritional and metabolic principles for dairy and beef cattle and sheep. Diet formulation. Nutritional assessment and feeding management. Field trips required.

890 Advanced Independent Study
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 8 credits in all enrollments for this course. R: Approval of department; application required.
Investigation of topics of special interest.

898 Master's Research
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 10 credits in all enrollments for this course. R: Open only to master's students in Animal Science. Approval of department. Application required.
Scholarly project for non-thesis (Plan B) master's degree.

899 Master's Thesis Research
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 99 credits in all enrollments for this course. R: Open only to master's students in Animal Science. Approval of department.
Master's thesis research.

901 Selected Topics in Animal Breeding and Genetics
Fall, Spring, Summer. 1 to 2 credits. A student may earn a maximum of 6 credits in all enrollments for this course.
Selected topics of current interest and importance in animal breeding and genetics.

905 Biology of the Extracellular Matrix
Spring of odd years. 2(2-0) P:NM: (BMB 461 and BMB 462) and (PSL 431 and PSL 432)
Extracellular matrix (ECM) composition and structure. Role of ECM in regulation of cell phenotype. Regulation of ECM remodeling. Biochemical and physiological properties of ECM degrading proteinases and their inhibitors. Integrins and cell signalling. ECM pathologies.

935 Nutrition: Lipid and Carbohydrate Metabolism
Fall of even years. 3(3-0) Interdepartmental with Human Nutrition and Foods. Administered by Department of Food Science and Human Nutrition.
Regulatory aspects of lipid and carbohydrate metabolism as influenced by nutritional status.

936 Protein Nutrition and Metabolism
Spring of even years. 3(3-0) Interdepartmental with Human Nutrition and Foods.
Nutritional and endocrine regulation of protein synthesis and degradation, protein quality assessment, protein status, protein-energy malnutrition. Protein metabolism during exercise. Metabolism, digestion, and absorption of amino acids and proteins.

937 Mineral Nutrition and Metabolism
Fall of even years. 3(3-0) Interdepartmental with Human Nutrition and Foods.
Forms and locations of mineral elements in the body, metabolic functions, deficiencies, and toxicities, interrelationships and quantitative requirements.

938 Nutrition: Metabolism and Function of Vitamins
Spring of odd years. 3(3-0) Interdepartmental with Human Nutrition and Foods. Administered by Department of Food Science and Human Nutrition.
Regulatory roles of vitamins at cellular and molecular levels.

970 Advanced Biometrical Methods for Quantitative Genetics
Fall of even years. 3(3-0) P:NM: (ANS 870 and STT 441)
Advanced biometrical methods applied to inferential problems in animal breeding and genetics. Likelihood and Bayesian methods for estimation of genetic parameters and prediction of genetic merits. Quantitative genetic analysis of discrete, censored, survival, and growth/lactation curve data.

976 Multivariate Methods in Agriculture and Natural Resources
Spring. 4(4-0) Interdepartmental with Forestry; Fisheries and Wildlife. Administered by Department of Forestry. P:NM: (STT 422 and MTH 314) R: Open only to graduate students in the College of Agriculture and Natural Resources and in the Interdepartmental Graduate Specializations in Ecology and Evolutionary Biology.
Application of multivariate methods to research problems. Hotelling's T-test, profile analysis, discriminant analysis, canonical correlation, principal components, principal coordinates, correspondence analysis, and cluster analysis.

999 Doctoral Dissertation Research
Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 99 credits in all enrollments for this course. R: Open only to doctoral students in Animal Science. Approval of department.
Doctoral dissertation research.

ANR EDUCATION AND COMMUNICATION SYSTEMS AEE

Department of ANR Education and Communication Systems
College of Agriculture and Natural Resources

110 Foundations of ANR Communications: Learning and Leadership
Fall. 2(1-2) R: Open only to students in Agriculture and Natural Resources Communications major or Agriscience major or the Agriculture and Natural Resources - No Preference undergraduate program. SA: AEE 101
Basic information systems applied to ANR communications, learning, and leadership. Communications skills, research techniques, learning theory, technology, and personal and professional development.

111 Applications of ANR Communications: Learning and Leadership
Spring. 2(1-2) P:NM: (AEE 110) R: Open only to students in the Agriculture and Natural Resources Communications major or Agriscience major or Agriculture and Natural Resources - No Preference undergraduate program. SA: AEE 101
Application of information systems theory, communications skills, research techniques, learning theory, and technology to agriculture and natural resource problems. Issue identification, critical thinking, problem solving, team building, and working with diversity.

202 Michigan's Agricultural and Natural Resources Heritage
Fall. 2(2-0) Interdepartmental with Agriculture and Natural Resources. Administered by Agriculture and Natural Resources. P:M: Completion of Tier I writing requirement.
Michigan's historical agricultural and natural resources. Orientation to sources for research and learning. Self-directed study integrating agricultural and natural resources heritage to family, community and careers.

210 Approaches to ANR Technology and Information Systems
Fall. 2(1-2) P:NM: (AEE 110 or concurrently or AEE 101) R: Open only to students in Agriculture and Natural Resources Communications or Agriscience major. SA: AEE 201
Development of technology and learning resources in agriculture and natural resources. Graphic design, electronic publishing, database management, evaluation techniques, and educational technology.

211 Applications of ANR Technology and Information Systems
Spring. 2(1-2) P:NM: (AEE 111 or concurrently or AEE 101) R: Open only to students in the Agriculture and Natural Resources Communications or Agriscience major. SA: AEE 201
Application of technology and learning resources and systems in agriculture and natural resources for external audiences. Production of graphic designs, publishing and production of other informational materials.

212 American Agrarian Movements
Spring. 3(3-0) SA: AEE 203
Historical perspectives of America by pioneers, farmers, ranchers and others who cultivated the land from 1700s to 1930. Agricultural movements, trends and development.

300 Approaches to Information Management and Evaluation in ANR
Fall. 2(1-2) P:M: Completion of Tier I writing requirement. P:NM: (AEE 211 or AEE 201) R: Open only to students in the Agriculture and Natural Resources Communications or Agriscience major. SA: AEE 301
Advanced information and evaluation techniques to plan, implement and assess domestic and international communication, marketing, and educational projects in agriculture and natural resources. Qualitative and quantitative methods of inquiry.

311 Applications of Information Management and Evaluation in ANR
Spring. 2(1-2) P:M: Completion of Tier I writing requirement. P:NM: (AEE 300) R: Open only to students in the Agriculture and Natural Resources Communications or Agriscience major. SA: AEE 301
Marketing, educational, and public relations campaigns to solve and address problems in agriculture and natural resources. Application of distance education technology and field work to domestic and international projects.

314 Issues in Agricultural and Environmental Education Programs
Fall. 3(2-2) P:NM: (AEE 110 or TE 150) and (FW 203) R: Not open to freshmen or sophomores. SA: AEE 303
Assessment and analysis of current issues and their impact on agricultural and environmental education programs.

401 Agricultural and Natural Resources Communications Campaigns
Fall, Spring, Summer. 3(3-0) P:M: Completion of Tier I writing requirement. R: Open only to juniors or seniors in the College of Agriculture and Natural Resources or the College of Communication Arts and Sciences. Not open to students with credit in AEE 300 or AEE 410.
Planning and execution of agricultural and natural resource communication campaigns. Emphasis on theories, strategies and techniques using mass and controlled media channels.

410 Approaches to Problems in ANR Communications and Education
Fall. 2(1-2) P:M: Completion of Tier I writing requirement. P:NM: (AEE 311 or AEE 301) R: Open only to students in the Agriculture and Natural Resources Communications or Agriscience major. Not open to students with credit in AEE 401.
Team approach to current issues in agriculture and natural resources communications and education. Solving advanced problems with peers and professionals. Professional standards and ethical practice.

411 Applications of Problems in ANR Communications and Education
Spring. 2(1-2) P:M: Completion of Tier I writing requirement. P:NM: (AEE 410) R: Open only to students in the Agriculture and Natural Resources Communications or Agriscience major. Not open to students with credit in AEE 401.
Developing solutions for client problems through field work in agriculture and natural resources communications and education. Transition into the world of work.

412 Agricultural and Natural Resources Leadership and Education
Fall, Spring, Summer. 3(3-0) R: Open only to juniors or seniors. SA: AEE 403
Characteristics of leadership and group dynamics. Development of personal leadership skills. Educational methods and learning styles.

475 International Studies in ANR Communications & Ag Science
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Approval of department; application required.
Study and travel experience emphasizing contemporary problems affecting Agriculture and Natural Resources in world, national, and local communities.

490 Independent Study
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 4 credits in all enrollments for this course. R: Open only to Agriscience or Agriculture and Natural Resources Communications majors. Approval of department; application required.
Individual study in areas of agriscience, extension education, or agricultural and natural resources communications.

491 Selected Topics
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Open only to Agriscience or Agriculture and Natural Resources Communications majors. Approval of department.
Topics in agriculture and natural resources communications or agriscience and natural resources education.

493 Professional Internship
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. P:NM: (AEE 210) R: Not open to freshmen. Approval of department; application required. A student may earn a maximum of 6 credits in all enrollments for any or all of these courses: ABM 493, AEE 493, ANR 493, ANS 493, CSS 493, FIM 493, FW 493, HRT 493, PKG 493, PRM 493, PRR 493, and RD 493.
Professional internship for students majoring in Agriculture Communications and Agriscience.

802 Educational Leadership in Agriculture and Natural Resources
Fall. 3(3-0)
Organizing and managing strategies for agriculture and natural resource programs.

803 Instructional Strategies in Agriculture and Natural Resources
Fall. 3(3-0)
Assessment of learning needs. Development, selection, use and evaluation of teaching strategies. Emphasis on agriscience education and adult learners.

804 Communication Strategies in Agriculture and Natural Resources
Spring. 3(3-0) R: Open only to seniors or graduate students in the College of Agriculture and Natural Resources.
Information delivery systems and presentation techniques for varied agriculture and natural resources audiences.

806 Program Planning and Evaluation in Agriculture and Natural Resources
Spring. 3(3-0)
Principles, theories, and practices in developing and evaluating state and local agriculture and natural resources programs.

807 Educational Research Methods in Agriculture and Natural Resources
Spring. 3(3-0) R: Open only to graduate students in the College of Agriculture and Natural Resources.
Planning, designing, conducting, and reporting research in agriculture and natural resources.

808 Learning at a Distance
Fall. 3(3-0) RB: (AEE 804 and AEE 806)
Development, implementation and evaluation of distance education programs.

811 U.S. Land Grant System and the Extension Model
Fall. 3(3-0)
Function, organization, and operation of extension education programs with special emphasis on the U.S. Land Grant System and the extension delivery system.

812 Adult Learner in Agriculture and Natural Resources
Fall of even years. 3(3-0) Not open to students with credit in AEE 911. C: AEE 911 concurrently.
Theories and philosophies of the adult as a learner in out-of-school settings. Particular emphasis on implications for agriculture and natural resources.

822 Experiential Education in Agriculture and Natural Resources
Summer of odd years. 3(3-0) R: Open only to graduate students in Agricultural and Extension Education.
Principles and practices of agriscience laboratory teaching in high schools.

875 International Studies in Agricultural and Extension Education
Fall, Spring, Summer. 1 to 4 credits.
Critical analysis of reflection on an international experience structured around the use of a reflective journal, relevant literature, and a series of structured writing exercises. Role of education within the agriculture and natural resources sector, issues of cultural influence, and future perspectives.

884 Outreach in Fisheries, Wildlife and Natural Resources Management
Spring of odd years. 3(3-0) Interdepartmental with Fisheries and Wildlife. Administered by Department of Fisheries and Wildlife. RB: Previous course in communications recommended.
Theory, research, practice and current issues in using outreach in fisheries, wildlife and natural resource management.

890 Independent Study in Agricultural and Extension Education
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 4 credits in all enrollments for this course. R: Approval of department.

891 Selected Topics in Agricultural and Extension Education
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Open only to graduate students in Agricultural and Extension Education.
Contemporary issues and problems in agricultural and extension education.

893 Professional Field Experience in Agricultural and Extension Education
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 4 credits in all enrollments for this course. R: Open only to graduate students in Agricultural and Extension Education.
Practice, observation, and analysis through field experiences.

898 Master's Applied Project
Fall, Spring, Summer. 1 to 5 credits. A student may earn a maximum of 5 credits in all enrollments for this course. R: Open only to master's students in the Agricultural and Extension Education major.
Master's Plan B applied project.

899 Master's Thesis Research
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 99 credits in all enrollments for this course. R: Open only to master's students in the Agricultural and Extension Education major.
Master's thesis research.

901 International Development Education in Agriculture and Natural Resources
Spring of odd years. 3(3-0)
Systems of agricultural and extension education in different countries. Philosophical and structural differences and similarities of selected countries and models throughout the world.

902 Advanced Educational Leadership in Agriculture and Natural Resources
Spring. 3(3-0) P:NM: (AEE 802) Not open to students with credit in AEE 912.
Advanced management and administration practices within agriculture and natural resources programs.

907 Advanced Educational Research in Agriculture and Natural Resources
Fall of odd years. 3(3-0) P:NM: (AEE 807 and STT 421)
Selection and development of research instruments and quantitative data analysis for educational research in agriculture and natural resources.

990 Advanced Independent Study in Agricultural and Extension Education
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 4 credits in all enrollments for this course.

991 Advanced Selected Topics in Agricultural and Extension Education
Fall, Spring. 3(3-0) A student may earn a maximum of 6 credits in all enrollments for this course.
Contemporary issues and problems in agricultural and extension education.

993 Advanced Professional Field Experience in Agricultural and Extension Education
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 4 credits in all enrollments for this course.
Practice, observation, and analysis through field experiences.

999 Doctoral Dissertation Research
Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 99 credits in all enrollments for this course. R: Open only to Ph.D. students in Agricultural and Extension Education.
Doctoral dissertation research.

ANTHROPOLOGY ANP

Department of Anthropology
College of Social Science

101 Introduction to Anthropology
Fall, Spring, Summer. 3(3-0)
Human culture worldwide and throughout human history. Major subfields, methods, theories, and issues. World cultural diversity. Culture and world problems.

201 Sociocultural Diversity
Fall, Spring, Summer. 3(3-0)
Origins and diversity of cultural systems. Theories of culture. Patterns of kinship. Religious, economic, and political institutions.

202 Biocultural Evolution
Fall, Spring, Summer. 3(3-0)
Nature and function of culture and its relationship to human biology. Principles of change from hominid origins to present.

203 Introduction to Archaeology
Fall. 3(3-0) SA: ANP 360
Theory, methodology, and techniques of archaeology. Applications to questions about past human behavior. History and concepts of archaeology as an anthropological subdiscipline.

220 Gender Relations in Comparative Perspective
Spring. 3(3-0)
Gender relations in different cultures. Economic and domestic division of labor between the sexes as a factor underlying power differentials.

264 Great Discoveries in Archaeology
Spring. 3(3-0)
Great discoveries in archaeology that have captured the public's imagination and shaped Western thought, from Olduvai Gorge and Stonehenge to Macchu Pichu.

270 Women and Health: Anthropological and International Perspectives
Fall. 3(3-0)
Cross cultural perspectives on the health implications of differing life circumstances for women. Women as health-care consumers and providers. Health and women's life cycles.

280 The Anthropological Film
Spring. 4(3-2)
Ethnographic film as a record of vanishing cultures, as a tool for ethnological analysis, and as a source of perspectives on different cultures and variability within cultures.

320 Social and Cultural Analysis
Fall, Spring. 4(4-0) P:M: (ANP 101 or ANP 201) and completion of Tier I writing requirement.
Major theoretical traditions of cultural anthropology. Functionalism, symbolism, structuralism, and contemporary developments.

321 Anthropology of Social Movements
Fall. 3(3-0) P:M: (ANP 101 or ANP 201)
How social movements within different cultures around the world organize, create or impede change on the basis of class, religion, race, ethnicity, language, and territory.

322 Peasants and Social Change in the Developing World
Spring. 3(3-0) P:M: (ANP 101 or ANP 201)
Cross-cultural perspective on patterns and variations in peasant systems worldwide. Social mechanisms with which they respond to change.

330 Race, Ethnicity, and Nation: Anthropological Approaches to Collective Identity
Spring. 3(3-0) P:M: (ANP 101 or ANP 201 or ISS 215) Not open to students with credit in SOC 215.
Understanding race and ethnicity. Models analyzing racial, ethnic, and national identities; boundaries; and collective identities and differentiations. Case studies from cultures worldwide.

340 Introduction to Physical Anthropology
Fall. 4(3-2)
Problems, data, and methods of physical anthropology. Human genetics, hominid evolution, primate studies, human osteology, and human diversity. Field trips at the student's expense may be required.

361 Paleolithic Archaeology
Fall. 3(3-0) P:M: (ANP 101 or ANP 264 or ANP 203 or ISS 220)
Stone Age archaeology from the dawn of tool making to the specialized hunters and cave artists of the late Ice Age.

363 Rise of Civilization
Spring. 3(3-0) P:M: (ANP 101 or ANP 203 or ISS 220 or ANP 202)
Archaeological evidence for the appearance and development of the world's earliest prehistoric civilizations. The nature of complex societies and the comparative evolution of states.