986. Seminar: American Literature and Culture Fall, Winter, Spring. 3(3-0). May re-enroll for a maximum of 9 credits. American literature in a cultural context, drawing upon popular and fine arts, the history of ideas, the history of social movements.

987. Seminar: Special Topics in Comparative Literature Spring. 3(3-0) May re-enroll for a maximum of 9 credits. Advanced graduate. Interdepartmental with the departments of Romance Languages and German and Russian and administered by the Romance Languages Department.

999. Research Fall, Winter, Spring, Summer. Variable credit. Approval of department.

ENTOMOLOGY

College of Agriculture and Natural Resources
College of Natural Science

230. The Role of the Natural Sciences in Future Environments Fall. 4(4-0) Approval of department. Interdepartmental with the departments of Geology, Physics and Zoology and the College of Natural Science and administered by the College of Natural Science. Physical and biological science concepts relevant to understanding environmental issues. Options for action in areas of population size, energy and life support system. Illustrated by case studies.

250. Pesticides and Environmental Quality Winter. 3(4-0) Impact of agricultural pesticides on man and his environment. Emphasizes the effect of chemicals on food production and combating diseases and ecological imbalance. Presents pesticide alternatives for the future.

301. General Entomology Fall, Spring. 3(3-0) B S 211 and 212 recommended. Biological relationships of insects. Insect behavior, ecology, and classification. Metamorphosis and development of insects.

302. General Entomology Laboratory Fall, Spring. 2(0-6) 301 or concurrently. Experiments in morphology, physiology, behavior of insects. Populations and classification of major groups.

337. Forest and Shade Tree Entomology Fall. 4(3-2) Three terms of natural science. Provides an understanding of significance and nature of insect injury to forest and shade trees, based upon morphology, physiology, biology and taxonomy of insect and host. Analyzes biological, chemical, cultural and silvicultural approaches to insect control in order to equip student with competence to carry out survey and action program assignments.

401. Problems Fall, Winter, Spring, Summer. 1 to 6 credits. May re-enroll for a maximum of 12 credits. Advanced individual work on a field or laboratory research problem or a study of published literature on a selected topic.

404. Field Entomology Summer. 6 credits. One year of biological science or teaching major in general science or approval of department. Given at W. K. Kellogg Biological Station. Basic field survey in entomology. Emphasis on the biology, collection and identification of insects common to the Gull Lake Biological Station area.

410. Apiculture and Pollination Spring. 3(2-2) Biology of the honey bee and some of the wild bees. Relationships between bees and flowering plants. Value of bees in crop pollination. Introduction to management with visits to the University apiary.

411. Seminar Fall, Winter. 1(1-0) Majors or approval of department. Reports by students, faculty, and representatives of the profession, with emphasis on current problems not covered in regular college subjects.

418. Systematic Entomology Winter. 4(1-9) 301, 302. General taxonomic course to acquaint the student with the various groups of insects.

420. Aquatic Insects Fall. 4(3-2) 301, 369. Biology, ecology and systematics of aquatic insects.

421. Stream Ecology Summer. 3 credits. 420 or approval of department. Given at W. K. Kellogg Biological Station. An in-depth examination of stream ecosystems—physical, chemical and biological aspects. Field work will be centered on local streams. Laboratory exercises will involve manipulations necessary for the determination of population energy budgets, with special emphasis on aquatic insects.

430. Economic Entomology Fall. 3(3-0) 302. Recognition, life histories, behavior, ecology and integrated control of insects of economic importance.

438. Taxonomy of Immature Insects Spring of even-numbered years. 4(1-9) 418. Identification of immature insects with particular emphasis on the Holometabola.

440. External Morphology of Insects Fall. 4(3-0) 301, 302, or approval of department. Morphological concepts of external skeletal parts of insects. Emphasis on evolutionary development of structures from the Apterygota through the Pterygota.

441. Internal Morphology Winter. 4(2-0) 440 or approval of department. Morphology of the internal structure of insects. Emphasis on the evolutionary development of organs and organ systems of various representative insects.

450. Insect Physiology Spring. 4(4-0) 441; ESL 401; 1 year of chemistry or approval of department. Comparative physiology of insects with histological and functional aspects of organs and organ systems.

480. Medical Entomology Spring. 4(3-3) 301, 302, or approval of department. Distribution and biology of important arthropod vectors of diseases to man, disease symptoms, life cycle of the infectious agent, reservoirs, urticating arthropods, anaphylactic reactions, myiasis, and prophylactic measures.

470. Nematode Diseases of Economic Plants Winter of odd-numbered years. 4(2-4) Interdepartmental with the Department of Botany and Plant Pathology. Major nematode diseases of economically important plants, with emphasis on diagnostic symptoms, nematode biology and principles of control.

480. Insects in Relation to Plant Diseases (860) Winter of even-numbered years. 4(2-4) 302. Interdepartmental with the Department of Botany and Plant Pathology. Relationships of insects, mites and nematodes to important plant diseases incited by bacteria, fungi, viruses and toxins. Modes of transmission and means of control. Transmission techniques and important plant-pathogen-insect relationships.

490. Topics in Entomology Fall, Winter, Spring. 3 credits. Majors or approval of department. Advanced work in medical entomology, systematics, advanced forest entomology, soil arthropods, behavior and biological control.

808. Advanced Taxonomy Fall, Winter, 4(0-12) May re-enroll for a maximum of 34 credits. 415, 440. Classification in depth of a single order of insects, including comparative morphology of the group and survey of recent and classical literature.

811. Ecology of Aquatic Insects Summer of every third year; given in 1965. 3 credits. 420 or approval of department. Given at W. K. Kellogg Biological Station. Aquatic insects, their physiology, distribution, and density. Preparation of energy budgets for natural populations.

820. Insect Ecology Spring. 3(2-2) Approval of department. Detailed consideration of the dynamics of insect populations. Review of those factors in the insect ecosystem which can be manipulated for the purpose of pest management. Role and use of models in insect ecology.

821. Advanced Stream Ecology Summer. 1 credit. 431 or approval of instructor. Given at W. K. Kellogg Biological Station. Interdepartmental with Fisheries and Wildlife Department. Stream ecosystem energy budget models with emphasis on individual projects involving both laboratory and field experiments. Particular use will be made of artificial streams and locally abundant species of aquatic insects.

830. Insect Biochemistry Spring of even-numbered years. 4(4-0) 450; BCR 401. Energy metabolism, intermediary metabolism and the biochemistry of development in insects; stresses biochemical differences between insects and higher animals.
331. Insect Biochemistry Laboratory  
Spring of even-numbered years. 2(0-6)  
830 or concurrent enrollment in Laboratory to accompany 830. Experiments designed to elucidate the biochemical mechanisms of importance to insects.  

338. Principles of Taxonomy  
Spring of odd-numbered years. 3(3-0)  
Twentieth credits in zoology and/or entomology, or approval of department. Methods and principles of systematic zoology and entomology, including a historical survey of the principal systems and post-Linnaean systems of classification. International rules of zoological nomenclature and their emendations.  

480. Insect Toxicology  
Winter of odd-numbered years. 5(3-6)  
301, 303; organic chemistry. Chemical and physical properties of insecticides, relationship of chemical structure to mode of action, and physiological basis of toxicological action.  

481. Insect Physiology Laboratory  
Spring. 2(0-6)  
Selected physiological systems in insects.  

781. Biology of Nematodes  
Winter of even-numbered years. 4(2-4)  
Approval of department. Interdepartmental with the Department of Botany and Plant Pathology. Ontogeny, taxonomy, morphology, pathology and ecology of nematodes, with special reference to plant-parasitic and phytopathogenic species.  

781. Biology of the Arthropoda  
Winter, 5(3-6) ZOL 481 or approval of department. Interdepartmental with and administered by the Zoology Department. Ecology, life cycles, morphology, taxonomy, and distribution of arthropods other than insects.  

800. Problems  
Fall, Winter, Spring, Summer. 1 to 8 credits. May re-enroll for a maximum of 12 credits. Major or approval of department. Advanced individual work in: apiculture, aquatic insects, insect biochemistry, biometrics, economic insects, insect ecology, forest insects, morphology, nematology, insect physiologic, plant disease transmission, insect toxicology, arachnida, acarina, medical entomology, chemistry of insects, insect biology, extension entomology, systems.  

899. Research  
Fall, Winter, Spring, Summer. Variable credit. Approval of department.  

940. Analytical Techniques for Biological Compounds I  
Fall. 4(3-6) Organic chemistry, approval of department. Application, extraction, cleanup and purification techniques employed in analysis of biologically active compounds. Stresses use of radioisotopes and column, paper, thin-layer, and molecular sieve chromatography.  

941. Analytical Techniques for Biological Compounds II  
Winter. 4(2-6)  
Analytical techniques used for identification and quantification of biologically active compounds. Emphasis on spectrophotometry and gas-liquid chromatography.  

999. Research  
Fall, Winter, Spring, Summer. Variable credit. Approval of department.  

FAMILY AND CHILD SCIENCES  

College of Human Ecology†  

145. The Individual, Marriage and the Family  
Fall, Winter, Spring. 4(4-0) Students may not receive credit in both 145 and 5 W 238.  

146. The Individual, Marriage and the Family  
Fall, Winter, Spring. 4(4-0) Students may not receive credit in both 145 and 5 W 238.  

245. Children, Youth and the Family  
(261.) Fall, Winter, Spring. 3(3-0)  
Sophomore, SOC 241. Focuses on family system. Stages of family development studied include childrearing through launching. Interaction of parent, children and societal forces, particularly in middle childhood and adolescent stages emphasized.  

262A. Child Growth and Development: Conception Through Early Childhood  
(362A.) Fall, Winter, Spring. Summer of odd-numbered years. 3(3-0) A biological science or psychology course and SOC 241; ED 290 or PSY 160 or 170. Physical, cognitive, social, and emotional aspects of human growth and development from conception through early childhood.  

262B. Child Growth and Development Laboratory  
(362B.) Fall, Winter, Spring. Summer of odd-numbered years. 4(2-3) Concurrently or approval of department. Observation of human development in infants and young children.  

364. Interacting with Young Children in Child Development Centers  
Fall, Winter, Spring. 3(2-3) 262A and 262B or PSY 245. Application of principles of human growth and development to personal interaction with children ages three to six individually and in small groups in schools of early childhood.  

369A. Learning Activities for Early Childhood Programs  
Fall, Winter, Spring. 3(3-0) Majors: 362A and 364; others: ED 412. Planning learning activities and teaching strategies for children ages 3 to 6 in early childhood education programs.  

369B. Learning Activities for Early Childhood Programs — Laboratory  
Fall, Winter, Spring. 1(0-3) 369A concurrently and approval of department. Experience in planning and carrying out learning activities with young children in an early childhood program.  

400H. Honors Work  
Fall, Winter, Spring. Summer. Variable credit. May re-enroll for a maximum of 10 credits. Seniors; approval of department.  

401. Minority Families in America  
Winter. 3(3-0) S & S 223 or approval of department. Historical, structural, functional components of minority family systems in America. Centers on a particular minority family system each term. Life styles, pressures, adaptations, viability, and continuity of minority family subculture.  

(1) Name changed July 1, 1970. Formerly College of Home Economics.  

444. Interpersonal Relationships in the Family  
Fall, Winter. Summer of even-numbered years. 3(3-0) 145 or 245 or approval of department. Relationships between and among family members as they are affected by other systems, and by physical, cultural, social-psychological forces within the family eco-system. Contemporary family life issues.  

446. Approaches to the Study of the Family  
Fall, Winter. Summer of odd-numbered years. 4(4-0) 145 or 245, 444. The family is studied from several approaches. Case studies, films, literary materials, research studies and observations of living situations are included.  

461. Individual Child Study  
Fall, Winter. 3(2-3) Majors: 364; others: 262A and 262B, or ED 412, approval of department. A directed practicum in planning, implementing and evaluating the learning environment, in a class of young children during an entire term.  

464A. Practicum in a Child Development Center  

465. Human Sexuality and the Family  
(365.) Fall, Winter. 3(3-0) Juniors. Personal, interpersonal, societal meanings of human sexuality, utilizing ongoing small peer group interaction. Non-literate, value clarification approach, integrating reflection on research findings, family, peer and cultural influences.  

467. Administration of Child Development Centers  
Spring. 3(0-3) 464A and 464B concurrently. Analysis of the administrator’s role in child development centers. Application of philosophical approaches, communication techniques and management skills to operating early childhood education programs. Licensing and other regulations.  

468. Teacher-Parent Interaction  
Fall, Winter. 3 credits. Majors: 464A and 464B, or concurrently; others: 262A or ED 412, approval of department. Analysis of parent-teacher communication and interaction, parent involvement, and parent education related to early childhood education programs operated by schools, churches, or community agencies. Field experience when feasible.  

469. Physical and Physiological Growth of Children  
(463.) Winter, Spring. 4(3-3) BNF 102, three terms of Natural Science. Interdepartmental with Biology and Food Science. Physical and physiological growth patterns. Experimental evidence for nutritional requirements. Applications to feeding practices, and physical activity of children.