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

20. Aquatic Insects
Spring. 4(3-5) ENT 301, ENT 302.
Biology, ecology and systematics of aquatic insects. Insect collection required.

21. Stream Ecology
Fall, Summer-given at W. K. Kellogg Biological Station. Interdepartmental with the Department of Fisheries and Wildlife.
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. Field trips required.

22. Economic Entomology
Fall. 3(2-3) ENT 301, ENT 302.
Recognition, life histories, behavior, ecology and integrated control of insects of economic importance.

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

24. External Morphology of Insects
Fall. 4(2-0) ENT 301, ENT 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.

25. Internal Morphology
Winter. 4(2-0) ENT 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.

26. Insect Physiology
Spring. 5(3-4) ENT 441; 1 biochemistry or physiology course, 1 year of chemistry including 1 term of organic general and comparative physiology of insects, treating molecular, tissue and organ function. Laboratory exercises emphasizing mastery of sound experimental procedures.

27. Toxicology of Insecticides
Fall of even-numbered years. 4(4-0) 1 term organic chemistry.
Properties of insecticides. Mode of action, metabolism and movement in animals. Safety and potential hazards to man and wildlife. Fates of insecticides in the environment.

28. Medical Entomology
Spring. 4(3-3) ENT 301, ENT 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, vectorial arthropods, anaphylactic reactions, myiasis, and prophylactic measures.

40. Insects in Relation to Plant Diseases
Fall of even-numbered years. 3(2-2) ENT 302. Interdepartmental with the Department of Botany and Plant Pathology.
Relationships of insects, mites and nematodes to important plant diseases caused by bacteria, fungi, viruses and toxins. Mode of transmission and means of control. Transmission techniques and important plant-pathogen-insect relationships.

41. Topics in Entomology
Fall, Winter, Spring, Summer. Variable credit. Majors or approval of department.
Advanced work in medical entomology, acarology, advanced forest entomology, soil arthropods, behavior and biological control.

42. Advanced Taxonomy
Fall, Winter, Spring. 40-12. May reenroll for a maximum of 24 credits. ENT 418, ENT 440.
Classification in depth of a single order of insects, including comparative morphology of the group and survey of recent and classical literature.

43. Graduate Seminar Topics
Fall, Winter, Spring. 1(1-0). May reenroll if different topic is taken. Graduate students and approval of department.
Graduate level seminars on current research and philosophy. Student participation required.

44. Biological Control
Winter of even-numbered years. 3(2-3)
Approval of department.
Properties of entomophagous species; relationships to population ecology and systematics; application of ecological principles to pest management. Role and use of models in insect ecology.

45. Advanced Stream Ecology
Summer. 3 credits. ENT 421 or approval of instructor. Given at W. K. Kellogg Biological Station. Interdepartmental with the Department of Fisheries and Wildlife.
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.

46. Principles of Taxonomy
Spring of odd-numbered years. 3(3-0)
Twenty credits in zoology and/or entomology, or approval of department.
Methods and principles of systematic zoology and entomology, including a historical survey of the pre-Linnean and post-Linnean systems of classification. International rules of zoological nomenclature and their emendations.
840. Insect Toxicology
Winter of odd-numbered years. 5(3-6)
ENT 301, ENT 302: organic chemistry.
Chemical and physical properties of insecticides, relationship of chemical structure to mode of action, and physiological basis of toxicological action.

871. Biology of Nematodes
Spring. 4(2-6) ENT 470 or 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.

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

890. Problems
Fall, Winter, Spring, Summer. 1 to 6 credits. May reenroll for a maximum of 12 credits. Majors or approval of department.
Advanced individual work in: agriculture, aquatic insects, insect biochemistry, biosystematics, economic insects, insect ecology, forest insects, morphology, nematology, insect physiology, plant disease transmission, insect toxicology, araneida, acarina, medical entomology, chemistry of insecticides, 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(2-6) 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) ENT 940.
Analytical techniques used for identification and quantification of biologically active compounds. Emphasis on spectroscopy 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 FCS 145 and S W 228.

255. Family and Individual Development: Life Cycle
Winter, Spring. 3(3-0) Three terms of natural science; sophomores. Overview of family development. Predictable individual developmental changes over the life span. Cognitive, moral, physical, psychological and social aspects. Interface between individual and family development.

262A. Child Growth and Development: Conception through Early Childhood
Fall, Winter, Spring. Summer of odd-numbered years. 3(3-0) Sophomores. PSY 160 or PSY 170 or ED 200. FCS 262B concurrently.
Physical, cognitive, social, and emotional aspects of human growth and development from conception through early childhood.

262B. Child Growth and Development Laboratory
Fall, Winter, Spring. Summer of odd-numbered years. 10(3-0) FCS 262A concurrently or approval of department. Observation of human development in infants and young children.

263. Children, Youth and the Family
(245.) Fall, Winter, Spring. 3(3-0) Sophomores. SOC 241 or FCS 145 or FCS 262A; or approval of instructor.
A family systems perspective of middle childhood, adolescence, and youth development is presented, incorporating childhood through launching stages of family development. Interactions of parents, children and socio-cultural factors are analyzed.

364A. Interacting with Young Children in Child Development Centers
(364.) Fall, Winter, Spring. 3(3-0) FCS 262A, FCS 262B each with minimum grade of 2.0. FCS 361B concurrently.
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.

364B. Interacting with Young Children-Laboratory
Fall, Winter, Spring. 3(3-0) FCS 364A concurrently, or concurrently, FCS 362A, FCS 362B each with a minimum grade of 2.0. FCS 361B concurrently.
Experience in interaction with children ages two to six years, individually and in small groups in a child development center.

369A. Learning Activities for Early Childhood Programs
Fall, Winter, Spring. 3(3-0) Majors: FCS 262A and FCS 262B, FCS 364A and FCS 364B each with a minimum grade of 2.0. FCS 361B concurrently. Others: approval of department.
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. 3(3-0) FCS 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 reenroll for a maximum of 16 credits. Seniors, approval of department.

442. Minority Families in America
(401.) Winter. 3(3-0) Juniors.
Historical, structural, functional components of minority family systems in white America. Centers on particular minority family system each term. Life styles, pressure, adaptations, viability and continuity of minority family subculture.

444. Interpersonal Relationships in the Family
Fall. Spring. Summer of even-numbered years. 3(3-0) FCS 145 or FCS 263 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 and eco-system. Contemporary family life issues.

445. Human Sexuality in the Family
(365.) Fall, Winter. 3(3-0) Juniors. Credit may not be earned in both FCS 445 and PSY 290.
Personal, interpersonal, societal meanings of human sexuality, utilizing ongoing small peer group interaction. Nonlecture, value clarification approach. Integrating reflection on research findings, family, peer and cultural influences.

446. Approaches to the Study of the Family
Fall. Winter. Summer of odd-numbered years. 4(4-0) FCS 145 or FCS 263. FCS 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(2-0) Majors: FCS 364; others: FCS 262A, PSY 344 or ED 412.
An in-depth analysis of development and behavior utilizing regular observation of a young child. Applications of theories of child growth and behavior.

464A. Practicum in a Child Development Center
Fall, Winter, Spring. Summer of odd-numbered years. 3 to 7 credits. FCS 262A, FCS 262B, FCS 364A, FCS 364B, FCS 364C each with a minimum grade of 2.0 and approval of department.
A directed practicum in planning, implementing and evaluating the learning environment, in a class of young children during an entire term.

464B. Problems in Teaching in a Child Development Center
Fall, Winter, Spring. Summer of odd-numbered years. 2(2-0) FCS 454A concurrently, HEC 301.
Analysis of problems in teaching in an early childhood program. Application of child guidance techniques and principles.

467. Administration of Child Development Centers
Spring. 3(3-0) FCS 454A, FCS 454B or concurrently, or approval of department.
Administration's role in child development centers. Application of child care philosophy, management and communication skills to operation of early childhood education programs. Federal, state, and local regulations and support services.