983. *Seminar: American Literature*
Fall, Winter, Spring. 3(3-0)
Special problems in American literature, beginnings to 1900.

984. *Seminar: Twentieth Century Literature*
Fall, Winter, Spring. 3(3-0)
Special problems in English and American literature, 1900 to the present.

985. *Seminar: Special Studies in Literary Form and Theory*
Fall, Winter, Spring. 3(3-0)
Forms, genres, and movements.

986. *Seminar: American Literature and Culture*
Fall, Winter, Spring. 3(3-0)
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) Advanced graduates. Interdepartmental with the departments of Romance and Classical Languages and German and Russian and administered by the Department of Romance and Classical Languages.

998. *Advanced Writing for Doctoral Candidates*
Fall, Winter, Spring, Summer. 3(3-0) Admission to a doctoral program or approval of instructor.
Training for writing dissertations and publishing in the sciences, humanities, and other fields. Includes a detailed analysis of each student's style, methods of organizing, practice in editing, and individual conferences.

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

ENTOMOLOGY ENT

College of Agriculture and Natural Resources
College of Natural Science

250. *Pesticides, Their Alternatives 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. Approval of department.
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 zoological 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, Spring. 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*
Spring. 4(3-3) 301, 302.
Biology, ecology and systematics of aquatic insects. Insect collection required.

421. *Stream Ecology*
Fall. Summer-given at W. K. Kellogg Biological Station. 3(3-0) 420 or approval of department. 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.

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

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

440. *External Morphology of Insects*
Fall. 4(2-6) 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(2-6) 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; PSL 401; 1 year of chemistry or approval of department.
Comparative physiology of insects with histological and functional aspects of organs and organ systems.

460. *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. 4(3-3) B S 212 or BOT 205. Interdepartmental with the Department of Botanty 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*
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. Mode of transmission and means of control. Transmission techniques and important plant-pathogen-insect relationships.

490. *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.

808. *Advanced Taxonomy*
Fall, Winter. 4(0-12) May re-enroll for a maximum of 24 credits. 418, 440.
Classification in depth of a single order of insects, including comparative morphology of the group and survey of recent and classical literature.

815. *Biological Control*
Winter of even-numbered years. 3(2-3) Approval of department.
Properties of entomophagous species; relationships to population ecology and systematics; foreign exploration, colonization, manipulation, and evaluation; interactions with pesticides, analysis of successful programs, and future trends. Collection for taxonomic lab to be made the summer before.

820. Insect Ecology

Fall of even-numbered years. 3(2-3) 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. 3 credits. 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 acquatic insects.

838. 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-Linnaean and post-Linnaean systems of classification. International rules of zoological nomenclature and their emendations.

840. Insect Toxicology

Winter of odd-numbered years. 5(3-6) 301, 302; organic chemistry.

Chemical and physical properties of insecticides, relationship of chemical structure to mode of action, and physiological basis of toxicological action.

851. Insect Physiology Laboratory

Spring. 2(0-6) 450 or concurrently.

Selected physiological systems in insects.

871. Biology of Nematodes

Spring. 4(2-6) 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. 5(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 anthropods other than insects.

890. Problems

Fall, Winter, Spring, Summer. 1 to 6 credits. May re-enroll for a maximum of 12 credits. Majors or approval of department.

Advanced individual work in: apiculture, 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) 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 FCS

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 S W 228.

Individual as young adult. Alternative living patterns. Marriage as social institution. Courtship and marriage patterns. Adjustments in marriage. Attitudes and roles in family living. Crises situations. Family planning.

245. Children, Youth and the Family

Fall, Winter, Spring. 3(3-0) Sophomores, SOC 241.

Focuses on family system. Stages of family development studied include childbearing 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

Fall, Winter, Spring. Summer of odd-numbered years. 3(3-0) A biological science or physiology course and SOC 241; ED 200 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

Fall, Winter, Spring. Summer of odd-numbered years. 1(0-3) 262A concurrently or approval of department.

Observation of human development in infants and young children.

364A. Interacting With Young Children in Child Development Centers

(364.) Fall, Winter, Spring. 3(3-0) 262A, 262B.

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. 1(0-3) 262A, 262B; 364A or 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: 262A and B 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 16 credits. Seniors; approval of department.

401. Minority Families in America

Winter. 3(3-0) S S 213 or approval of department.

Historical, structural, functional components of minority family systems in white America. Centers on a particular minority family system each term. Life styles, pressures, adaptations, viability and continuity of minority family subculture.

444. Interpersonal Relationships in the Family

Fall, Spring. 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(2-2) Majors: 364; others: 262A, PSY 244 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. Majors: 364, 369A, 369B; 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.