110. 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.

115. Insect Behavior
Winter of even-numbered years. 3(3-0)
ENT 301, ENT 302; ZOL 313 recommended. Mechanisms and adaptive significance of communication, orientation, food and habitat selection and behavioral rhythm in insects.

118. Systematic Entomology
Winter. 4(3-9) ENT 301, ENT 302.
General taxonomic course to acquaint the student with the various groups of insects.

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

225. Agricultural Entomology
Winter. 4(3-2) One year of biological or agricultural sciences.
Natural processes of insect populations and associated techniques that are important to agriculture.

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

240. External Morphology of Insects
Fall. 4(2-6) ENT 301, ENT 302, or approval of department.
Morphological concepts of external skeletal parts of insects. Emphasis on evolutionary development of structures from the Aptyrygota through the Pterygota.

244. Insect Ecology
Fall of odd-numbered years. 3(3-0)
One course in introductory entomology. Unique characteristics and principles of insect ecology. Trophic relationships, population, climate, co-existence, competition, behavior, communities and distributions.

250. Insect Physiology
Fall of even-numbered years. 5(3-4)
ENT 301, ENT 302; 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.

255. Toxicology of Insecticides
Winter of odd-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 humans and wildlife. Fates of insecticides in the environment.

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

270. Nematode Diseases of Economic Plants
Spring of odd-numbered years. 4(3-3)
BOT 405. 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.

275. Stream Ecology
Fall. 3(3-0) ENT 420, ZOL 389 or BOT 450 or F W 902 or approval of department. Interdepartmental with the departments of Fisheries and Wildlife, and Zoology. Administration by the Department of Fisheries and Wildlife.
Biological, chemical, physical, and geological processes which determine the structure and function of stream ecosystems.

282. Graduate Seminar Topics
Fall, Winter. 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.

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

290. Applied Insect Ecology
Fall of odd-numbered years. 3(2-3)
Approval of department.
Ecological factors in an insect's ecosystem that can be manipulated for the purpose of pest management. Critical evaluation of current and classical literature presented by students in both oral and written reports.

297. Biology of Nematodes
Spring of even-numbered years. 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.

311. Biology of the Arthropoda
Winter. 5(3-6) ZOL 306 or approval of department and administered by the Department of Zoology.
Ecology, life cycles, morphology, taxonomy, and distribution of arthropoda other than insects.

890. Problems
Fall, Winter, Spring, Summer. 1 to 6 credits. May reenroll for a maximum of 12 credits. Major or approval of department.
Advanced individual work in: apiculture, aquatic insects, insect biochemistry, biostatistics, 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. Master's Thesis Research
Fall, Winter, Spring. Variable credit. Approval of department.

940. Analytical Techniques for Biological Compounds I
Winter of odd-numbered years. 4(2-6)
Organic chemistry, approval of department.
Application, extraction, cleanup and purification techniques employed in analysis of biologically active compounds. Stresses use of radioscopes, and column, paper, thin-layer, and molecular sieve chromatography.

941. Analytical Techniques for Biological Compounds II
Winter of even-numbered years. 4(2-6)
ENT 840.
Analytical techniques used for identification and quantification of biologically active compounds. Emphasis on spectroscopy and gas-liquid chromatography.

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

ENVIRONMENTAL ENGINEERING
See Civil and Environmental Engineering.

FAMILY AND CHILD ECOLOGY
FCE
College of Human Ecology

115. Family Resources
Fall. 3(2-2)
Skill development in identification, description and classification of human and non-human family resources on a historical and cross-cultural basis.

145. The Individual, Marriage and the Family
Fall, Winter, Spring. 4(4-0) Students may not receive credit in both FCE 145 and S W 258.

200. Ecological Approach to Family and Health
Fall, Winter. 2(2-0) Sophomores. Not open to IEC majors.
Use of the human ecosystem perspective to study people and their various environments with focus on family and health support systems.

221. Human Services in the Community
Fall, Spring. 4(3-3)
Analysis of human and community needs: roles of professionals and volunteers in providing community and human services. Participation in community agency required.

238. Personal Finance
Fall, Winter, Spring. 3(3-0)
Strategies, techniques and resources useful in the management of personal finance.
255. Family and Individual Development: Life Cycle
Winter, Spring, 3(3-0) Three terms of natural science; sophomore.
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; FCE 262B concurrently; one of the following: PST 160, PST 170, T 200A, T 200B, T 200C, T 200D.
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) FCE 262A concurrently or approval of department.
Observation of human development in infants and young children.

263. Children, Youth and the Family
Fall, Winter, 3(3-0) Sophomores; SOC 241 or FCE 145 or FCE 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.

331. Management and Decision Making in the Family
Fall, Winter, 3(3-0) HEC 201, Juniors.
Integrated nature of management in the family setting from an ecosystem perspective. Values and goals as reflected in decision making about family resources.

332. Application of Principles of Home Management
Fall, Spring, 2(0-5) FCE 331.
Principles of effective home management and their application in a living situation.

337. Energy Utilization in the Household
(437) Fall, Summer of even-numbered years. 3(3-0) FCE 331 or approval of department.
Human and fossil fuel energy use at the household level. Issues and policies regarding work accomplishment in the home.

340. Instruction in Human Ecology for Non-Formal Settings
Fall, Winter, 3(2-2) Juniors, HEC 301; Dietetic Majors: HNF 320 or concurrently.
Theory and practice of instruction in Human Ecology with specific application to non-formal environments. For majors in Dietetics and Community Services and other majors in human ecology.

364A. Interacting with Young Children in Child Development Centers
Fall, Winter, 3(3-0) FCE 262A, FCE 262B each with minimum grade of 2.0; FCE 364B 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, 10(3-0) FCE 364A or concurrently, FCE 262A, FCE 262B each with minimum grade of 2.0.
Experience in interaction with children ages two to six years, individually and in groups in a child development center.

369A. Learning Activities for Early Childhood Programs
Winter, Spring, 3(3-0) FCE 364A, FCE 364B each with a minimum grade of 2.0; FCE 386B concurrently.
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
Winter, Spring, 1(0-3) FCE 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. 1 to 16 credits. May reenroll for a maximum of 24 credits. Seniors; approval of department.

404. Home as a Learning Center
Fall, Winter, Spring. 3(3-0) Seniors or approval of department.
Learning processes and resource use in home settings. Exploration of linkages between the informal educational system and formal and non-formal systems.

405. Work and the Family
Winter, 3(3-0) Juniors.
Examines the kinds and interrelationships of decisions made by the family and the paid work force (business/ labor) as they relate to interactions between the family and the paid work sphere.

436. Consumer Economic Problems
Fall, Winter, Spring. 3(3-0) or 2(0-3) EC 201 or EC 202.
Nature of current consumer problems. Sources of information and methods of evaluating information in the search for solutions to problems and for improved consumer protection.

438. Family Financial Management
Fall, Spring, 3(3-0) FCE 238, EC 202.
Application of financial planning and budgeting strategies to families during various stages of the family life cycle. Current income support programs. Implications for the community of the family's financial decisions.

439. Families: Consumer Legislation and Participation
Fall, Winter, Spring of even-numbered years. 3(3-0) EC 201, FCE 438.
Public policies and laws affecting families and individuals as consumers. Regulation, protection, and legal resources. Influencing change through participation in consumer policy decisions.

440. Approaches to the Study of the Family
Fall, Summer of odd-numbered years. 3(3-0) FCE 145 or FCE 263.
The family is studied from several approaches. Case studies, films, literary materials and research studies of living situations are included.

442. Minority Families in America
Fall, Winter, Spring. 3(3-0) Juniors.
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, Winter, Spring. Summer of even-numbered years. 3(3-0) FCE 145 or FCE 263, Juniors.
Relationships between and among family members as they are affected by other systems, and by physical, cultural, social-psychological factors within the family eco-system. Contemporary family life issues.

445. Human Sexuality in the Family
Fall, Winter, Spring. 3(3-0) Juniors.
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.

450. Selected Topics in Family and Child Ecology
Fall, Winter, Spring. 3(3-0) or 4(4-0).
May reenroll for a maximum of 12 credits. Seniors.
Current subjects of concern to professionals working with families and children.

461. Individual Child Study
Fall, Winter, Spring. 3(2-2) Majors: FCE 364A, FCE 364B; Non-majors: FCE 262A or PST 244 or CEP 412.
An in-depth analysis of development and behavior utilizing regular observation of a young child. Applications of theories of child growth and behavior.

464. Problems in Teaching in a Child Development Center
Fall, Winter, Summer. 2(2-0) FCE 464A or FCE 464C or concurrently.
Analysis of problems in teaching in an early childhood program. Application of child guidance techniques and principles.

464A. Practicum in a Child Development Center
Fall, Winter, Summer. 7(0-21) FCE 369A, FCE 369B each with a minimum grade of 2.0; FCE 464 concurrently. Advance application required. Not to open to students with credit in FCE 464C.
A directed practical in planning, implementing and evaluating the learning environment in a class of young children during an entire term.

464C. Practicum in a Child Development Center
Fall, Winter, Spring. 4(0-12) FCE 369A, FCE 369B each with a minimum grade of 2.0; FCE 464 concurrently. Advance application required. Not to open to students with credit in FCE 464A.
A directed practicum in planning, implementing and evaluating the learning environment in a class of young children. For experienced teachers.

467. Administration of Child Development Centers
Fall, Winter, Spring. 3(3-0) FCE 464A, FCE 464 or concurrently; or approval of department.
Administrator'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.
802. Seminar in Child Development
   Fall, Winter, Spring. 3(3-0) May reenroll for a maximum of 12 credits. Approval of department.

804. Human Resource Development in Family
   Winter. Summer of odd-numbered years. 3(3-0) EC 201, EC 202; FCE 444,
   Role of family in human capital formation and development. Examination of effect of family
   environment on quality of human resources. Evaluation of public policy impacts on human
   resource development.

810. Workshop
   Summer. 2 to 10 credits. May reenroll for a maximum of 10 credits. Approval of department.
   Content varies depending on nature of workshop.

813. Special Studies in Family Life
   Fall, Winter, Spring. 1 to 4 credits. May reenroll for a maximum of 12 credits.
   Approval of department.

819. Theories of Child Development
   Fall. 3(3-0) FCE 262A or child psychology.
   Comparative study of conceptual frameworks utilized in child development.

820. Human Development in the Family: Physiological Development
   Fall. 4(4-0) Six credits in child development or approval of department.
   Selected aspects of family members' physiological potential, development, status explored.
   Family's contributions to members' physiological potential for growth and development and to
   realization of human potential are seen as fundamental.

821. Human Development in the Family: Personality
   Winter. 4(4-0) Six credits in child development or approval of department.
   Influence of child rearing practices and parent-child relationships on human personality.
   Application of research findings and theoretical approaches to psychological development
   in the family and family-related situations.

822. Human Development in the Family: Socialization
   Spring. 4(4-0) Basic course in sociology; 6 credits in child development or family life
   or approval of department.
   Influence of family structure and interaction upon socialization from infancy to adulthood.
   Relationship of family to processes in larger social environment, and influence of these on
   human social development.

823. Curriculum in Home Economics Education
   Summer of odd-numbered years. 3(3-0) Approval of department.
   Clarification of mission and goals of home economics as one basis for curriculum develop-
841. Early Childhood Education: Curricular Approaches
Spring of even-numbered years. 3(3-0)
A course in child growth and development; early childhood curriculum course or equivalent experience.
Theoretical background, content and evaluation of early childhood curricula and programs. Influence of research and public policy on program practices.

842. Assessment of Development of the Young Child
Fall. 3(3-0) A child growth and development course.
Survey of assessment instruments and procedures for children from birth to age seven. Techniques for practitioner or parent to use to assess physical, social, emotional and intellectual development.

843. Play and Human Development
Winter of odd-numbered years. 3(3-0)
One course in child development or human development.
Role of play in human development. Functions of play related to other aspects of development. Analysis of theory related to play behavior.

844. Child Development Across Cultures
Winter of odd-numbered years. 3(3-0)
Approval of department.
Development of children in cultures throughout the world. Biological, ecological, and social factors influencing behavior of children and their families. Impact of rapid social changes.

845. Approaches to Child Rearing
Spring. 3(2-0) One course in child development or family development or approval of department.
Child rearing and parental practices based on various theoretical models.

846. Parent Education: Programs and Processes
Winter of even-numbered years. 3(3-0)
FCE 845 or approval of department.
Materials and approaches to parent education. Application of teaching strategies and evaluation techniques will be made by designing an educational program for parents.

848. Principles of Program Development For Infants
Winter. 2(2-0) A child growth and development course.
Concepts of early childhood education applied to programming for the developmental needs of infants. Evaluation of research, learning materials, and activities for infants in home and day care settings.

849. Practicum in Infant Care Settings
Fall, Winter, Spring. 2(1-3) or 3(1-6)
May reenroll for a maximum of 6 credits. FCE 845 or concurrently; approval of department.
Directed experience with infants and their caregivers in home and day care settings.

850. Aging in the Family
Spring. 3(3-0) FCE 480 or approval of instructor.
Provides students with a knowledge and understanding of the literature in aging in the family and develops an appreciation of the interrelationships involved in this multidisciplinary area.

851. Death, Dying, and the Family
Spring. 3(3-0)
Theoretical frames of reference for viewing death within families and strategies designed to assist them.

852. Communication and Family Crisis
Winter. 3(3-0) Approval of department.
Dynamics of family communication and adjustment to crisis during the life cycle. Delineation of major types of family crises and their consequences. Strategies for positive communication and resolution.

853. Developing Family Competencies
Fall. 3(3-0) FCE 444 or approval of department.
Identification, clarification and application of concepts, principles, processes and interactive skill sets effective in developing and enhancing the quality of family relationships. Focus is on developing family strengths.

854. Theories of Family Process and Relationships
Winter. 3(3-0) FCE 440, basic research methods course or approval of department.
Comparison and analysis of major conceptual and theoretical perspectives in study of the family.

855. Topics in Family Relationships (MTC)
Fall. 2 to 4 credits. May reenroll for a maximum of 8 credits if different subtitle is taken. FCE 444 or FCE 445 or approval of department.
In-depth analysis of a topic related to the American family as an interactive system within the larger society.

856. Family Transitions: Separation, Divorce, Remarriage
Spring of even-numbered years. 3(3-0)
Approval of instructor.
Interpersonal dynamics and adjustments in family life transitions due to changes in marital status. Current research, laws, and programming to meet family needs and enhance effective interpersonal adjustment.

857. The Adolescent in the Family
Summer. 3(3-0) FCE 262A, FCE 263 or approval of department.
An ecosystem approach to selected developmental dimensions and issues of adolescence in relation to the significant contexts of adolescent life.

858. Community Development Field Study: Project Design
Winter. 4(3-2) R D 864 or approval of department. Interdepartmental with and administered by the Department of Resource Development.
Design of a community development project in a selected Michigan community. Focus on community issues using the action research model of community change (field trip required).

860. Community Development Field Study: Project Implementation
Spring. 4(3-4) R D 865 or approval of department. Interdepartmental with and administered by the Department of Resource Development.
Undertaking the project designed in R D 865 (field project required).

891. Research Methods
Fall, Spring. Summer of even-numbered years. 3(3-0) Approval of department.
Elements of the research process: problem formation, theoretical frameworks, operationalizing concepts, hypotheses formulation, research design, instrumentation, sampling, analysis, interpretation, and reporting of findings.

901. Internship
Fall, Winter, Spring, Summer. 1 to 5 credits. May reenroll for a maximum of 12 credits. Approval of department.
Supervised advanced graduate practicums, observation, internships, and externships in the various areas of emphasis.

903. Seminars in Family Ecology
Spring. 2 or 3 credits. May reenroll for a maximum of 9 credits. Approval of department.
Seminars in selected topics.

922. History and Philosophy of Human Ecology
Fall. 3(3-0)
History and development of human ecology as an interdisciplinary field of study. Values underlying the field. Current emphasis.

935. Family Ecology Theory Development
Fall of odd-numbered years. 3(3-0)
FCE 835, FCE 891 and one course in family or human development theory. Assumptions, concepts and propositions in family ecological theory. Application of selected strategies of theory building.

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