885 Plant Diseases in the Field
Summer of odd years. 2(1-3) P:NM: (BOT 810) R: Open only to graduate students. Diagnosis of plant diseases and disorders in a field setting. Field trips and independent study are required.

891 Current Topics in Ecology and Evolution
Summer. 1 credit. Given only at W.K. Kellogg Biological Station. A student may earn a maximum of 8 credits in all enrollments for this course. Interdepartmental with Zoology; Crop and Soil Sciences. Administered by Department of Zoology. Presentation and critical evaluation of theoretical and empirical developments by visiting scientists.

896 Population and Community Ecology

897 Ecosystem Ecology
Spring. 4(4-0) Interdepartmental with Zoology; Fisheries and Wildlife. Administered by Department of Zoology. Structure and function of natural ecosystems. Succession, food web analysis, energy flow, nutrient cycling, and effects of human activities on ecosystem systems. Global environmental change. Ecosystem management and restoration.

899 Masters Thesis Research
Fall, Spring, Summer. 1 to 12 credits. A student may earn a maximum of 24 credits in all enrollments for this course. R: Open only to graduate students. Research in anatomy, histology, cell biology, ecology, genetics, molecular biology, morphology, mycology, paleobotany, physiology, and systematics.

999 Doctoral Dissertation Research
Fall, Spring, Summer. 1 to 12 credits. A student may earn a maximum of 99 credits in all enrollments for this course. R: Open only to doctoral students. Research in anatomy, histology, cell biology, ecology, genetics, molecular biology, morphology, mycology, paleobotany, physiology, and systematics.

BUILDING CONSTRUCTION MANAGEMENT BCM

Department of Agricultural Engineering
College of Agriculture and Natural Resources
College of Engineering

101 Principles of Building Construction Management
Fall. 2(2-0)
Historical developments and current issues and trends in commercial and residential construction industries.

124 Residential Construction Materials and Methods
Spring. 3(3-0) P:NM: (BCM 101) SA: BCM 126 Properties of construction materials and their application in residential construction.

210 Commercial Construction Methods
Fall. 3(3-0) P: (BCM 101 and BCM 124) Commercial construction: principles, materials, assemblies and commercial blueprints.

211 Building Codes
Fall. 3(3-0) P: (BCM 210 or concurrently) SA: BCM 227 Construction code, structural, mechanical, electrical and plumbing. Building safety and accessibility.

222 Statics and Strengths of Materials

230 Utility Systems
Spring. 4(4-0) P: (BCM 210) R: Open only to sophomores or juniors or seniors in the Building Construction Management or Civil Engineering major. Heating, cooling, ventilating, electrical, gas, lighting, water, waste water, telecommunications, fire protection, safety security and sound control systems in residential and commercial construction. Applicable codes.

305 Site Construction and Measurement
Fall. 3(2-2) P: (BCM 230) Site construction methods, materials and equipment for buildings, soil, foundation, erosion and storm water. Layout, leveling, surveying and underground utilities.

315 Construction Quantity Surveying
Spring. 3(2-2) P: (BCM 305 or concurrently and CSE 101) R: Open only to students in the Building Construction Management or Civil Engineering major. SA: BCM 352 Measurement of quantities for construction projects. Work breakdown structure. Industry standards.

322 Structural Systems
Fall. 3(3-0) P: (BCM 211) and (BCM 222 or MSTM 205 or MSTM 211) Not open to students with credit in CE 406. Structural design using wood, steel and concrete. Beams, columns, footings, and foundation walls. Loading, soils.

324 Construction Estimation
Fall, Spring. 4(3-2) P: (BCM 230 or concurrently and BCM 322) R: Open only to juniors or seniors in the Building Construction Management or Civil Engineering major. C: BCM 311 concurrently. Estimating construction projects: labor, material, overhead, and profit in unit and detailed formats. Job cost accounting and control. Estimation software.

325 Real Estate Principles and Construction Finance
Fall. 4(4-0) P: (EC 201 or EC 202) and (MTH 124 or concurrently) R: Open only to juniors or seniors in the Building Construction Management major. Financial methods and instruments utilized in construction, rehabilitation, development, and purchase of real estate. Terms, contracts, valuation, brokerage, taxation, risk, and interest rate analysis.

328 Construction Presentation Graphics
Spring. 2(1-2) P: (CSE 101) R: Open only to juniors or seniors in the Building Construction Management major. Graphic communication methods used in construction organizations.

353 Land Development
Spring. 3(3-0) P: (BCM 211 and BCM 305 and BCM 325 or concurrently) R: Open only to juniors or seniors in the Building Construction Management or Civil Engineering or Landscape Architecture or Urban and Regional Planning major. SA: BCM 352, BCM 403 Methods and practices of land development. Market research. Financial feasibility. Land use regulations. Legal documentation. Site analysis and design. Case studies.

385 Construction Documents and Contracts
Spring. 3(3-0) P: (BCM 305 and CSE 101) R: Open only to juniors or seniors in the Building Construction Management or Civil Engineering major. Not open to students with credit in BCM 422. Construction contracts for commercial and residential projects. Contract procedures, bidding, changes, substitutions. Specifications. Insurance, bonding, claims, disputes, and payments. Responsibilities of owners and contractors.

401 Construction Safety Management
Spring. 3(3-0) P:NM: (BCM 385) R: Open only to seniors in the Building Construction Management or Civil Engineering major. Construction safety with OSHA emphasis. General safety and health provisions, records, and safety management programs. Personnel protection and life saving equipment. Economic impact of safety program.

403 Land Development
Fall. 3(3-0) P: (BCM 211 and BCM 305 and BCM 325 or concurrently) R: Open only to juniors or seniors in the Building Construction Management or Civil Engineering or Landscape Architecture or Urban and Regional Planning major. SA: BCM 352 Not open to students with credit in BCM 453. Methods and practices of land development. Market research. Financial feasibility. Land use regulations. Legal documentation. Site analysis and design. Case studies.

411 Construction Project Scheduling
Fall, Spring. 3(2-2) P: (STT 200 or STT 201) and (BCM 315 or concurrently and BCM 322) R: Open only to juniors or seniors in the Building Construction Management or Civil Engineering major. SA: BCM 311 C: BCM 415 concurrently. Basic construction project scheduling procedures. Work breakdown structure, critical path method and scheduling logic. Activity durations, status reports, resource allocation and control.
817 Construction Management Information Systems
Spring. 3(2-2) R: Approval of department; application required.
Information generation and utilization for the management of construction projects. Integration of construction management software, conceptual modeling and knowledge-based models.

822 Legal Issues in Construction
Spring. 3(3-0) P:NM: (BCM 422 or BCM 385) RB: A degree or experience in civil engineering, human environment and design, interior design, architecture, urban planning, landscape architecture or law.
Application of Michigan and Federal case law to construction and development claims and litigation.

823 Advanced Construction Project Management
Fall, Spring. 3(3-0) P:NM: (BCM 411 and BCM 415) R: Open only to graduate students in Building Construction Management.
Project management issues, services and documentation, Bidding, cost accounting, scheduling. Project planning and controlling.

890 Special Problems
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 College of Agriculture and Natural Resources. Approval of department; application required.
Individual study in land acquisition and development, design, construction, management, finance, marketing, and structural analysis.

891 Advanced Topics in Building Construction Management
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 8 credits in all enrollments for this course. R: Open only to graduate students in College of Agriculture and Natural Resources. Approval of department.
Advanced topics in building construction management.

892 Construction Management Research Seminar
Fall. 2(2-0) R: Open only to graduate students in the College of Agriculture and Natural Resources or College of Human Ecology.
Current areas and topics of research in construction management. Resources of research results, analysis of existing research and development of preliminary proposal.

896 Master's Research
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 master's students in the Building Construction Management major.
Masters degree Plan B research paper.

899 Master's Thesis Research
Fall, Spring, Summer. 1 to 10 credits. A student may earn a maximum of 99 credits in all enrollments for this course. R: Open only to graduate students in Building Construction Management.
Master's thesis research.

BIOLOGY

800 Cell and Molecular Biology Seminar
Fall. 1(1-0) A student may earn a maximum of 5 credits in all enrollments for this course. R: Open only to students in the Cell and Molecular Biology major.
Current literature in such areas of cell and molecular biology as gene expression, intracellular transport, cell signalling, regulation of cell growth and cell structure.

880 Laboratory Rotation
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 12 credits in all enrollments for this course. R: Open only to students in the Cell and Molecular Biology major.
Participation in research projects in laboratories of Cell and Molecular Biology faculty.

892 Research Forum
Fall. 1(1-0) A student may earn a maximum of 4 credits in all enrollments for this course. R: Open only to students in the Cell and Molecular Biology major.
Advanced graduate students present their laboratory research.

999 Doctoral Dissertation Research
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 60 credits in all enrollments for this course. R: Open only to students in the Cell and Molecular Biology major.
Doctoral dissertation research.