885. Plant Diseases in the Field
Summer of odd-numbered years. 2(1-3)
P: 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, and Crop and Soil Sciences. Administered by Zoology. Presentation and critical evaluation of theoretical and empirical developments by visiting scientists.

897. Community and Ecosystem Ecology
Spring. 4(4-0) Interdepartmental with Zoology, and Fisheries and Wildlife. Administered by Zoology.
R: Open only to students in Interdepartmental Graduate Specializations in Ecology and Evolutionary Biology. Structure and function of natural communities and ecosystems. Community analysis along environmental gradients. Succession, food web analysis, energy flow, nutrient cycling, and effects of human activities on ecosystems.

899. Doctoral Dissertation 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, bryology cell biology, ecology, genetics, molecular biology, morphology, mycology, parasitology, pathology, physiology and systematics.

999. Dissertation Research
Fall, Spring, Summer. 1 to 12 credits. A student may earn a maximum of 59 credits in all enrollments for this course.
R: Open only to doctoral students.
Research in anatomy, bryology cell biology, ecology, genetics, molecular biology, morphology, mycology, parasitology, pathology, physiology and systematics.

Building Construction Management

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

124. Construction Materials
Fall, Spring. 3(3-0)
Properties of construction materials and their application in residential and light commercial construction.
SA: BCM 120

125. Architectural Drafting
Fall, Spring. 3(3-0)
Architectural drafting including site plans, floor plans, foundation plans, elevations, sections, and details. Print reading including plan analysis of assemblies and details. Emphasizes residential construction.
SA: BCM 120

277. Commercial Building Construction Methods
Fall, Spring. 3(3-0)
P: BCM 124; R: Open only to Building Construction Management students.
Methods, codes, and plans for constructing commercial buildings. Construction system details: site preparation, foundations, floors, framing systems, and roof systems.

290. Utilities
Fall, Spring. 3(3-0)
P: BCM 227; R: Not open to freshmen. Open only to Building Construction Management students and Civil Engineering majors.
Heating, cooling, plumbing and electrical utilities in residence and light commercial construction utilizing applicable codes.

295. Construction Mechanics and Equipment Management
Fall. 3(2-3)
R: Open only to Building Construction Management or Agricultural Technology and Systems Management students.
Principles, applications, techniques, tools, materials and resources in building construction mechanics and light construction equipment management.

295. Current Issues in the Building and Housing Industries
Fall. 3(3-0)
Impacts of government policies and regulations on the building and housing industries. Land use, construction technology, energy, Economics, demographics, and lifestyle choices.

311. Quantitative Methods in Technology Management
Fall, Spring. 3(3-0)
P: MTH 116 or MTH 120; CPS 100 or CPS 130 or CPS 131; R: Not open to freshmen and sophomores.
Technology management methods including linear programming, scheduling, decision theory, queueing and simulation. Applications in building construction management, agriculture and associated industries.

322. Structural Design
Fall, Spring. 4(5-0)
P: BCM 227; PHY 251 or PHY 251B; R: Open only to Building Construction Management or Agricultural Technology and Systems Management majors.
Mechanics, material strengths and section properties developed and applied to structural design using wood, steel and concrete. Beams, columns, footings, and foundation walls.

324. Construction Estimation
Fall, Spring. 4(3-2)
P: BCM 330, BCM 322; R: Open only to Building Construction Management or Civil Engineering majors.

325. Construction and Real Estate Finance
Fall, Spring. 4(4-0)
P: BC 201 or BC 202; MTH 116 or MTH 120; R: Open only to Building Construction Management, Civil Engineering, and College of Business majors.
Financial methods and instruments utilized in construction, rehabilitation, development, and purchase of real estate. Terms, contracts, valuation, brokerage, taxation, risk, and interest rate analysis.

Building Construction Management

BCM
Residential Design Evaluation  
Fall, 3(3-0)  

Construction Renovation  
Spring, 3(3-0)  
P: BCM 227. R: Open only to Building Construction Management or Human Environment and Design majors or to juniors and seniors in Historic Preservation Specialization. Preservation, rehabilitation, remodeling, and restoration of existing buildings. Analysis of building adaptability and design. Economic feasibility and codes. Historical and social considerations.

Construction Contracts  
Fall, Spring, 3(3-0)  

Construction Project Management  
Fall, Spring, 3(3-0)  
P: BCM 311, BCM 324. R: Open only to seniors and graduate students in Building Construction Management and Civil Engineering. Construction management principles and practices. Site and project management.

Concepts of Fire Safety Construction  
Fall, 3(3-0)  

Commercial Utility Systems  
Spring, 3(3-0)  
P: BCM 230. R: Open only to Building Construction Management, Mechanical Engineering, Civil Engineering, and Human Environment and Design majors. Primary electrical, heating, ventilating, air conditioning, plumbing, elevator, and fire detection and suppression systems for commercial buildings.

Land Development  
Spring, 3(3-0)  

Independent Study  
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 Building Construction Management majors. Approval of department; application required. Special problems in acquisition and development of residential land, design, construction technology, building materials, finance, marketing, construction management, or land use codes and regulations.

Special Topics in Building Construction Management  
Fall, Spring, 1 to 4 credits. A student may earn a maximum of 8 credits in all enrollments for this course. R: BCM 227 or BCM 311. R: Open only to Building Construction Management majors. Approval of department. Topics such as computer methods in building construction management, construction technology, solar energy, special land use codes or new technology management.

Advanced Project Scheduling  
Fall of odd-numbered years, 3(2-0)  
Critical path analysis for effective and logical scheduling of construction projects. Identification of project activities and their relationships. Schedule development, analysis, and updating. Relationship of project costs and resources to the schedule. Effective communication and scheduling information.

Advanced Construction Project Management  
Spring of even-numbered years, 3(3-0)  
P: BCM 422, BCM 423; or CE 375, CE 471. R: Open only to graduate students in Building Construction Management or Civil Engineering. Project management issues, services, documentation, risk assessment. Bidding, cost accounting, scheduling. Dispute resolution and liability case studies.

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.

Advanced Topics in Building Construction Management  
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 5 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.

Construction Management Seminar  
Fall, 1(1-0)  
P: Open only to graduate students in College of Agriculture and Natural Resources or College of Engineering. Current topics and issues in construction management. Construction methods and materials and building design.

Master's Thesis Research  
Fall, Spring, Summer. 1 to 10 credits. A student may earn a maximum of 9 credits in all enrollments for this course. R: Open only to graduate students in Building Construction Management.

Fluid Flow and Heat Transfer  
Spring, 4(5-0)  
P: CHE 201 or concurrently, MTH 235 or concurrently. R: Open only to College of Engineering students. Not open to students with credit in ME 202 or MEM 351. Thermodynamics of fluid flow. Laminar and turbulent flow. Design of flow systems. Heat transfer in solids and flowing fluids. Turbulent heat transfer. Radiant heat transfer. Multiple effect evaporation. Design of heat exchange equipment.

Mass Transfer and Separations  
Fall, 4(5-0)  

Unit Operations Laboratory  
Spring, 3(3-6)  
P: CHE 311 or concurrently; CHE 322; CHE 351 or concurrently. R: Open only to Chemical Engineering and Food Engineering majors. Completion of Tier I writing requirement. Momentum, heat, and mass transfer. Separation processes: distillation, filtration, and drying. Reactor kinetics. Automatic process control. Laboratory problems requiring team effort.

Thermodynamics for Chemical Engineering  
Spring, 4(5-0)  

Chemical Engineering Materials  
Fall, 3(3-0)  
P: CHE 363; CSE 361 or concurrently. R: Open only to Chemical Engineering majors. Structure, properties, and performance of classes of materials emphasizing polymeric materials.

Transport Phenomena  
Spring, 3(3-0)  
P: CHE 311, CHE 312, or FE 485. R: Open only to Chemical Engineering and Food Engineering majors. Mathematical and physical analogies among mass, energy, and momentum transfer processes. Dimensional analysis and solutions to multivariable boundary value problems. Numerical solutions to nonlinear problems.