

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, bryology cell biology, ecology, genetics, molecular biology, morphology, mycology, paleobotany, pathology, 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: (BCM 101)

Properties of construction materials and their application in residential construction.
SA: BCM 126

**210. Commercial Construction
Methods**

Fall. 3(3-0) P: (BCM 124)

Commercial construction: principles, materials, assemblies and commercial blueprints.

211. Building Codes

Fall. 3(3-0) P: (BCM 210 or concurrently)

Construction codes: structural, mechanical, electrical and plumbing. Building safety and accessibility.
SA: BCM 227

222. Statics and Strengths of Materials
Spring. 3(3-0) P: (MTH 124 and PHY 321 and BCM 210) Not open to students with credit in MSM 205 or MSM 211.

Equilibrium of forces. Free body diagrams. Force components. Bending moments. Stress and strain. Mechanical properties of materials. Beams and trusses. Computer applications. Indeterminate structures.

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.

311. Construction Project Scheduling

Fall, Spring. 3(2-2) P: BCM 230 or concurrently; BCM 322 R: Open only to juniors or seniors in the Building Construction Management or Civil Engineering major. C: BCM 324 concurrently.

Basic construction project scheduling procedures. Work breakdown structure, critical path method and scheduling logic. Activity durations, status reports, resource allocation and control.
Approved through Summer semester 2001

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.

Measurement of quantities for construction projects. Work breakdown structure. Industry standards.

SA: BCM 324

322. Structural Systems

Fall. 3(3-0) P: (BCM 211) and (BCM 222 or MSM 205 or MSM 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 or concurrently) 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.

Approved through Fall semester 2000

**325. Real Estate Principles and
Construction Finance**

Fall. 4(4-0) P: (EC 201 or EC 202) and (MTH 124) 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.

**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: (BCM 385) R: Open only to juniors or 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 or UP 334) R: Open only to seniors in the Building Construction Management or Civil Engineering or Landscape Architecture or Urban and Regional Planning major. 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.

SA: BCM 352

411. Construction Project Scheduling

Spring. 3(2-2) P: (STT 200 or STT 201) and (BCM 315 and BCM 322) R: Open only to juniors or seniors in the Building Construction Management or Civil Engineering major. 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. PERT.

SA: BCM 311

415. Cost Estimating and Analysis

Fall. 3(2-2) P: (BCM 315) and (BCM 385 or concurrently) C: BCM 411 concurrently.

Estimation of construction project costs: direct and indirect, labor, material, and equipment. Overhead and profit. Bidding. Computer-based estimating.

SA: BCM 324

422. Construction Contracts

Fall, Spring. 3(3-0) P: BCM 227, BCM 311, BCM 324. R: Open only to seniors and graduate students in Building Construction Management and Civil Engineering.

Construction contracts for commercial and residential projects. Contract procedures, bidding, changes, substitutions. Insurance, bonding, claims, disputes, and payments. Specifications. Responsibilities of owner and contractors.

Approved through Spring semester 2001

423. Construction Project Management

Fall. 3(3-0) P: (BCM 411 or concurrently and BCM 415 or concurrently) R: Open only to seniors in the Building Construction Management or Civil Engineering major.

Construction management principles and practices. Project planning and controls.

Descriptions—Building Construction Management of Courses

435. Residential Building Projects (W)
Spring. 3(1-4) P: (ACC 230 and BCM 423 and BCM 328 and BCM 403) and completion of Tier I writing requirement. R: Open only to seniors in the Building Construction Management major.
Development of a residential project and business plan.

436. Commercial Building Projects (W)
Spring. 3(1-4) P: (ACC 230 and BCM 423 and BCM 328 and BCM 403) and completion of Tier I writing requirement. R: Open only to seniors in the Building Construction Management major.
Evaluation, procurement and management of commercial building projects.

453. Land Development
Spring. 3(3-0) P: BCM 227 and BCM 325. R: Open only to Building Construction Management, Civil Engineering, History of Art, Landscape Architecture, and Urban Planning majors.
Methods and practices of land development for residential and commercial uses. Market research. Land use regulations. Legal documentation. Site analysis and design. Case studies.
SA: BCM 352
Approved through Spring semester 2001

490. 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.

491. 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. P: 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.

811. Advanced Project Scheduling
Fall of odd years. 3(2-2)
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 of schedule information.

817. Computer-Integrated Construction Management
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.

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 Engineering, 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.

898. 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.

CELL AND MOLECULAR BIOLOGY CMB

College of Natural Science

800. Cell and Molecular Biology Seminar
Fall, Spring. 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.

CHEMICAL ENGINEERING CHE

Department of Chemical Engineering College of Engineering

201. Material and Energy Balances
Fall, Spring. 3(4-0) P: (MTH 133) and (CEM 142 or CEM 143 or CEM 152) and (CSE 101 or concurrently or CSE 131 or concurrently)
Chemical engineering calculations. Synthesis of chemical process systems. Analysis of chemical processes using material and energy balances. Enthalpy calculations for changes in temperature, phase transitions, and chemical reactions.

301. Chemical Engineering as a Profession
Fall. 1(2-0) P: (CHE 201 or concurrently) RB: Junior standing in chemical engineering R: Open only to students in the Chemical Engineering major.
Professional aspects of chemical engineering. Communication skills, professionalism and ethics, teamwork skills, contemporary engineering issues, career planning, project management, industrial processes.

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

312. Mass Transfer and Separations
Spring. 4(5-0) P: (CHE 201 and MTH 235 or concurrently) R: Open only to students in the College of Engineering.
Diffusion. Mass transfer coefficients. Design of countercurrent separation systems, both stage-wise and continuous. Distillation, absorption, extraction. Multicomponent separations. Batch processes. Computer-aided design methods.