

890 Independent Study
 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 Computer Science or Electrical Engineering majors. Approval of department. SA: CPS 890

Independent study of some topic, system, or language not covered in a regular course.

891 Selected Topics
 Fall, Spring. 1 to 3 credits. A student may earn a maximum of 9 credits in all enrollments for this course. R: Open only to Computer Science or Electrical Engineering majors. SA: CPS 891

Selected topics in computer science of current interest and importance but not covered in a regular course.

898 Master's Project
 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 Computer Science majors. Approval of department. SA: CPS 898

Master's degree Plan B individual student project: original research, research replication, or survey and reporting on a topic such as system design and development, or system conversion or installation.

899 Master's Thesis Research
 Fall, Spring, Summer. 1 to 8 credits. A student may earn a maximum of 24 credits in all enrollments for this course. R: Open only to Computer Science majors. Approval of department. SA: CPS 899

Master's thesis research.

902 Selected Topics in Recognition by Machine
 Spring. 3(3-0) A student may earn a maximum of 9 credits in all enrollments for this course. RB: (CSE 802 and CSE 803) R: Open only to Computer Science or Electrical Engineering majors. SA: CPS 902

Advanced topics in pattern recognition and computer vision such as Markov random fields, modeling and recognition of three dimensional objects, and integration of visual modules.

910 Selected Topics in Computer Networks and Distributed Systems
 Spring of even years. 3(3-0) A student may earn a maximum of 9 credits in all enrollments for this course. RB: (CSE 422 and CSE 812) R: Open only to Computer Science or Electrical Engineering majors. SA: CPS 910

Advanced topics and developments in high-bandwidth computer networks, protocol engineering, and distributed computer systems.

914 Formal Methods in Software Development
 Fall. 3(3-0) P:M: (CSE 814) RB: Undergraduate courses in software engineering and in logic. R: Open only to students in the Department of Computer Science and Engineering. SA: CPS 914

Current research in selected areas of software engineering such as: approaches for the incorporation of formal methods in software development; current projects using formal methods in software engineering; object-oriented analysis and development techniques; and approaches for the incorporation of user-interface analysis and design in software development.

920 Selected Topics in High Performance Computer Systems
 Spring of odd years. 3(3-0) A student may earn a maximum of 9 credits in all enrollments for this course. P:M: (CSE 822) R: Open only to Computer Science and Engineering majors or approval of Department. SA: CPS 920

Design of high performance computer systems. Seminar format.

921 Advanced Topics in Digital Circuits and Systems
 Fall, Spring. 3(3-0) A student may earn a maximum of 6 credits in all enrollments for this course. Interdepartmental with Electrical and Computer Engineering. Administered by Department of Electrical and Computer Engineering. SA: EE 921

Topics vary each semester.

921A Testable and Fault-tolerant Digital Systems
 Fall of odd years. Spring of odd years. 3(3-0) Interdepartmental with Electrical and Computer Engineering. Administered by Department of Electrical and Computer Engineering. RB: (ECE 809 and ECE 813) SA: EE 921A

Reliability evaluation. Fault models and test pattern generation. Design for testability. Fault-tolerant design techniques, self-checking circuits and systems, system diagnosis and reconfiguration.

921B Embedded Architectures
 Fall of odd years. Spring of odd years. 3(3-0) Interdepartmental with Electrical and Computer Engineering. Administered by Department of Electrical and Computer Engineering. RB: (ECE 809 and ECE 813) SA: EE 921B

Embedded computers and architectures for real-time computation and/or robust control. ASICs. Bit-slice architectures. Systolic arrays. Neural networks. Genetic algorithms. Implementation technologies and design issues.

921C Electronic Systems Packaging
 Fall of odd years. Spring of odd years. 3(3-0) Interdepartmental with Electrical and Computer Engineering. Administered by Department of Electrical and Computer Engineering. RB: A basic background in electronics and electromagnetics.

VLSI packaging technology, thermal management, electrical design, switching noise, multi-chip packaging, materials, device assembly, RF device packaging, and electrical testing.

941 Selected Topics in Artificial Intelligence
 Fall. 3(3-0) A student may earn a maximum of 9 credits in all enrollments for this course. RB: (CSE 841) R: Open only to Computer Science or Electrical Engineering majors. SA: CPS 941

Topic such as second generation expert systems, human factors, natural language processing, speech understanding, neural networks, genetic algorithms and opportunistic planning.

960 Selected Topics in Algorithms and Complexity
 Spring of odd years. 3(3-0) A student may earn a maximum of 9 credits in all enrollments for this course. RB: (CSE 830 and CSE 860) R: Open only to graduate students in the Department of Computer Science and Engineering. Approval of department. SA: CPS 960

Current research in the general theory of algorithms and computational complexity.

980 Selected Topics in Database Systems
 Spring. 3(3-0) A student may earn a maximum of 9 credits in all enrollments for this course. RB: (CSE 880) R: Open only to Computer Science or Electrical Engineering majors. SA: CPS 980

Recent developments in areas such as distributed and parallel database systems, object oriented database systems, knowledgebase and expert database systems.

999 Doctoral Dissertation Research
 Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 99 credits in all enrollments for this course. R: Open only to Computer Science majors. Approval of department. SA: CPS 999

Doctoral dissertation research.

CONSTRUCTION CMP MANAGEMENT PROGRAM

School of Planning, Design and Construction College of Agriculture and Natural Resources

101 Principles of Building Construction Management
 Fall, Summer. 2(2-0) R: Not open to seniors. SA: BCM 101

Historical developments, current issues and trends in commercial and residential construction industries.

124 Residential Construction Materials and Methods
 Spring, Summer. 3(3-0) RB: (CMP 101) SA: BCM 124

Properties of construction materials and their application in residential construction.

210 Commercial Construction Methods
 Fall. 3(3-0) P:M: (CMP 101 or concurrently and CMP 124) SA: BCM 210 C: CMP 211 concurrently.

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

211 Building Codes
 Fall. 3(3-0) P:M: (CMP 101 or concurrently and CMP 124) SA: BCM 211 C: CMP 210 concurrently.

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

Construction Management Program—CMP

- 222 Statics and Strengths of Materials**
Spring. 3(3-0) P:M: (CMP 210 and CMP 211) and (MTH 124 or MTH 132 or LBS 118) and (PHY 183 or PHY 231 or PHY 231B or PHY 231C) SA: BCM 222 Not open to students with credit in ME 221 or ME 222.
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:M: (CMP 210 and CMP 211) SA: BCM 230
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:M: (CMP 230) R: Open only to juniors or seniors in the Construction Management major. SA: BCM 305
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:M: (CMP 305) and (CSE 101 or CSE 131 or CSE 231 or CSS 110 or LBS 126) R: Open only to juniors and seniors in the Construction Management or Civil Engineering major. SA: BCM 315
Measurement of quantities for construction projects. Work breakdown structure. Industry standards.
- 322 Structural Systems**
Fall. 3(3-0) P:M: (CMP 222) or (ME 221 or ME 222) R: Open only to juniors or seniors in the Construction Management or Civil Engineering majors. SA: BCM 322 Not open to students with credit in CE 406.
Structural design using wood, steel and concrete. Beams, columns, footings, and foundation walls. Loading, soils.
- 325 Real Estate Principles and Construction Finance**
Fall. 4(4-0) P:M: (EC 201 or EC 202 or EC 251H or EC 252H) and (MTH 124 or MTH 132 or LBS 118) R: Open only to juniors or seniors in the Construction Management major or approval of department. SA: BCM 325
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**
Fall, Spring. 2(1-2) P:M: (CMP 230) and (CSE 101 or CSE 131 or CSE 231 or CSS 110 or LBS 126) R: Open only to juniors or seniors in the Construction Management major. SA: BCM 328
Graphic communication methods used in construction organizations.
- 353 Land Development**
Spring. 3(3-0) P:M: (CMP 211 and CMP 305) and (CMP 325 or UP 458) R: Open only to juniors or seniors in the Construction Management or Civil Engineering or Landscape Architecture or Urban and Regional Planning major. SA: BCM 353
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 (W)**
Spring. 3(3-0) P:M: (CMP 305) Completion of Tier I writing requirement. R: Open only to juniors and seniors in the Construction Management or Civil Engineering or Landscape Architecture major. SA: BCM 385
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:M: (CMP 305) RB: (CMP 385 or CMP 423 or concurrently) R: Open only to juniors or seniors in the Construction Management or Civil Engineering major. SA: BCM 401
Construction safety with Occupational Safety and Health Administration (OSHA) emphasis. General safety and health provisions, records, and safety management programs. Personnel protection and life saving equipment. Economic impact of safety program.
- 411 Construction Project Scheduling**
Fall. 3(2-2) P:M: (STT 200 or STT 201 or STT 315 or STT 421) and (CMP 315 and CMP 322) R: Open only to juniors or seniors in the Construction Management or Civil Engineering major. SA: BCM 411
Basic construction project scheduling procedures. Work breakdown structure, critical path method, and scheduling logic. Activity durations, status reports, resource allocation, and control.
- 415 Cost Estimating and Analysis**
Fall. 3(2-2) P:M: (CMP 315 and CMP 385) SA: BCM 415
Estimation of construction project costs: direct and indirect, labor, material, and equipment. Overhead and profit. Bidding. Computer-based estimating.
- 423 Construction Project Management**
Fall, Spring. 3(3-0) P:M: (CMP 385 and CMP 411 or concurrently and CMP 415 or concurrently) R: Open only to seniors in the Construction Management or Civil Engineering major. SA: BCM 423
Construction management principles and practices. Project planning and controls.
- 435 Residential Building Projects (W)**
Spring. 3(1-4) P:M: (ACC 201 and ACC 202) or (ACC 230) and (CMP 328 and CMP 353 and CMP 423 or concurrently) and completion of Tier I writing requirement. R: Open only to seniors in the Construction Management major. SA: BCM 435
Development of a residential project and business plan.
- 436 Commercial Building Projects (W)**
Spring. 3(1-4) P:M: (ACC 201 and ACC 202) or (ACC 230) and (CMP 328 and CMP 353 and CMP 423 or concurrently) and completion of Tier I writing requirement. R: Open only to seniors in the Construction Management major. SA: BCM 436
Evaluation, procurement, and management of commercial building projects.
- 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 Construction Management majors. Approval of department; application required. SA: BCM 490
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:M: (CMP 210) R: Open only to Construction Management majors. Approval of department. SA: BCM 491
Topics such as computer methods in building construction management, construction technology, solar energy, special land use codes, or new technology management.
- 493 Professional Internship in Building Construction Management.**
Fall, Spring, Summer. 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Open only to juniors or seniors in the Construction Management major. Approval of department; application required. A student may earn a maximum of 6 credits in all enrollments for any or all of these courses: ABM 493, AEE 493, ANR 493, ANS 493, CMP 493, CSS 493, EEP 493, FIM 493, FSC 493, FW 493, HRT 493, PKG 493, PLP 493, PRR 493, and RD 493. SA: BCM 493
Supervised professional experiences in agencies and businesses related to a student's major field of study.

COUNSELING, CEP EDUCATIONAL PSYCHOLOGY AND SPECIAL EDUCATION

Department of Counseling, Educational Psychology and Special Education College of Education

- 150 Reflections on Learning**
Fall, Spring, Summer. 3(3-0) Interdepartmental with Teacher Education. Administered by Department of Teacher Education.
Students' experiences as learners in comparison to psychological, sociological, and anthropological theories and assumptions about learning and teaching in and out of school.