

# CONSTRUCTION ENGINEERING (CON E)

Courses primarily for undergraduates:

## CON E 112: Orientation to Learning and Productive Team Membership

(Cross-listed with AER E, FS HN, HORT, NREM). (2-0) Cr. 2. F.

Introduction to developing intentional learners and worthy team members. Learning as the foundation of human enterprise; intellectual curiosity; ethics as a personal responsibility; everyday leadership; effective team and community interactions including team learning and the effects on individuals; and growth through understanding self, demonstrating ownership of own learning, and internalizing commitment to helping others. Intentional mental processing as a means of enhancing learning. Interconnectedness of the individual, the community, and the world.

## CON E 114: Developing Responsible Learners and Effective Leaders

(Cross-listed with FS HN, HORT, NREM). (2-0) Cr. 2. S.

*Prereq: Hort 112 or NREM 112*

Focus on team and community. Application of fundamentals of human learning; evidence of development as a responsible learner; intentional mental processing as a habit of mind; planning and facilitating learning opportunities for others; responsibility of the individual to the community and the world; leading from within; holding self and others accountable for growth and development as learners and leaders.

## CON E 121: Cornerstone Learning Community: Orientation to Academic Life

(0-2) Cr. 1. F.

Integration of first-year and transfer students into the engineering profession and the Construction Engineering program. Assignments and activities completed both individually and in learning teams involving teamwork, academic preparation, and study skills. Introduction to construction industry professionals. Teamwork topics include interdisciplinary teamwork, skills for academic success, diversity issues and leadership. Introduction to organization of program, department, college, and university. Overview of faculty, staff, policies, procedures and resources.

## CON E 122: Cornerstone Learning Community: Orientation to Professional Life

(0-2) Cr. 1. S.

Continuation of Con E 121. Integration of first-year and transfer students into the engineering profession. Career preparation, professional ethics, construction research, leadership. Introduction to construction industry professionals including how they interact with engineers in other disciplines. Continued introduction to program, department, college, and university organization. Overview of faculty, staff, policies, procedures and resources.

## CON E 222: Contractor Organization and Management of Construction

(2-2) Cr. 3. F.S.

*Prereq: Completion of basic program*

Entry level course for construction engineering: integration of significant engineering and management issues related to construction company operations. Company organization and operations; construction and project administration; construction contracts; delivery systems; construction safety; contract documents.

## CON E 241: Construction Materials and Methods

(2-3) Cr. 3. F.S.

*Prereq: CON E 222*

Introduction to materials and methods of building construction and to construction drawings. Foundation, structural framing, floor, roof, and wall systems. Blueprint reading and quantity takeoff techniques.

## CON E 251: Mechanical/Electrical Materials and Methods

(0-3) Cr. 1. F.S.

*Prereq: Credit or enrollment in CON E 241*

Introduction to the materials and methods for mechanical and electrical construction systems and drawings. HVAC, water and waste water, power distribution, lighting, and fire protection. Blueprint reading and quantity takeoff.

## CON E 298: Cooperative Education

Cr. R. F.S.SS.

*Prereq: Permission of department and Engineering Career Services*

First professional work period in the cooperative education program.

Students must register for this course before commencing work.

## CON E 322: Construction Equipment and Heavy Construction Methods

(2-2) Cr. 3. F.S.

*Prereq: CON E 241 or C E 306*

Selection and acquisition of construction equipment. Application of engineering fundamentals and economics to performance characteristics and production of equipment. Heavy construction methods and economic applications.

## CON E 340: Concrete and Steel Construction

(2-2) Cr. 3. F.S.

*Prereq: E M 324, credit or enrollment in CON E 322*

Planning and field engineering for concrete and steel construction. Design and applications of concrete formwork to construction. Erection of structural steel. Emerging industry themes.

## CON E 352: Mechanical Systems in Buildings

(2-2) Cr. 3. F.S.

*Prereq: CON E 251, PHYS 222*

Comprehensive coverage of mechanical systems, plumbing, fire protection. Analysis techniques and design principles for each system. Required comprehensive design project for a major building project.

## CON E 353: Electrical Systems in Buildings

(2-2) Cr. 3. F.S.

*Prereq: PHYS 222 and credit or enrollment in CON E 352*

Comprehensive coverage of building electrical systems including power, lighting, fire alarm, security and communications. Analysis techniques and design principles for each system. Required comprehensive design project for a major building project.

## CON E 354: Building Energy Performance

(3-0) Cr. arr. F.

*Prereq: Junior Classification*

Energy performance of buildings, building shells, HVAC, electrical and other building systems. Analysis and evaluation of building performance, energy efficiency, environmental quality, first costs, and operating costs. Strategies to exceed energy code requirements through the ASHRAE Standard 90.1.

**CON E 380: Engineering Law**

(3-0) Cr. 3. F.S.

*Prereq: Junior classification*

Introduction to law and judicial procedure as they relate to the practicing engineer. Contracts, professional liability, professional ethics, licensing, bidding procedures, intellectual property, products liability, risk analysis. Emphasis on development of critical thinking process, abstract problem analysis and evaluation.

**CON E 381: Bidding Construction Projects I**

(0-3) Cr. 1. F.

*Prereq: Permission from the instructor*

Team development of construction process designs and cost estimates for transportation construction projects under closely simulated conditions. Examine project sites, consult with construction industry mentors, obtain subcontractor and supplier quotations, and submit bids. Offered in the following specialties:

**CON E 381A: Bidding Construction Projects I: Heavy and Highway**

(0-3) Cr. 1. F.

*Prereq: Permission from the instructor*

Team development of construction process designs and cost estimates for transportation construction projects under closely simulated conditions. Examine project sites, consult with construction industry mentors, obtain subcontractor and supplier quotations, and submit bids. Offered in the following specialties:

**CON E 381B: Bidding Construction Projects I: Building**

(0-3) Cr. 1. F.

*Prereq: Permission from the instructor*

Team development of construction process designs and cost estimates for transportation construction projects under closely simulated conditions. Examine project sites, consult with construction industry mentors, obtain subcontractor and supplier quotations, and submit bids. Offered in the following specialties:

**CON E 381C: Bidding Construction Projects I: Mechanical**

(0-3) Cr. 1. F.

*Prereq: Permission from the instructor*

Team development of construction process designs and cost estimates for transportation construction projects under closely simulated conditions. Examine project sites, consult with construction industry mentors, obtain subcontractor and supplier quotations, and submit bids. Offered in the following specialties:

**CON E 381D: Bidding Construction Projects I: Electrical**

(0-3) Cr. 1. F.

*Prereq: Permission from the instructor*

Team development of construction process designs and cost estimates for transportation construction projects under closely simulated conditions. Examine project sites, consult with construction industry mentors, obtain subcontractor and supplier quotations, and submit bids. Offered in the following specialties:

**CON E 381E: Bidding Construction Projects I: Mechanical and Electrical**

(0-3) Cr. 1. F.

*Prereq: Permission from the instructor*

Team development of construction process designs and cost estimates for transportation construction projects under closely simulated conditions. Examine project sites, consult with construction industry mentors, obtain subcontractor and supplier quotations, and submit bids. Offered in the following specialties:

**CON E 381F: Bidding Construction Projects I: Miscellaneous**

(0-3) Cr. 1. F.

*Prereq: Permission from the instructor*

Team development of construction process designs and cost estimates for transportation construction projects under closely simulated conditions. Examine project sites, consult with construction industry mentors, obtain subcontractor and supplier quotations, and submit bids. Offered in the following specialties:

**CON E 396: Summer Internship**

Cr. R. Repeatable. SS.

*Prereq: Permission of department and Engineering Career Services*

Summer professional work period. Students must register for this course before commencing work.

**CON E 397: Engineering Internship**

Cr. R. Repeatable. F.S.

*Prereq: Permission of department and Engineering Career Services*

Professional work period, one semester maximum per academic year. Students must register for this course before commencing work.

**CON E 398: Cooperative Education**

Cr. R. F.S.SS.

*Prereq: CON E 298, permission of department and Engineering Career Services*

Second professional work period in the cooperative education program. Students must register for this course before commencing work.

**CON E 422: Construction Cost Estimating and Cost Engineering**

(2-2) Cr. 3. F.S.

*Prereq: CON E 241 and 251*

Conceptual and detailed cost estimating. Theory and practice of estimating construction costs of materials, labor, equipment, contingency, overhead and markup. Estimating competencies and bid ethics. Electronic quantity take off and pricing methods. Assemblies costs, unit costs, production rates. Analysis of project profitability, cost analysis and cost control methods. Value engineering. Life cycle cost analysis.

**CON E 441: Construction Planning, Scheduling, and Control**

(2-2) Cr. 3. F.S.

*Prereq: Credit or enrollment in CON E 421*

Integration of previous construction coursework into the planning, scheduling, and management of time, costs, and other resources. Emphasis on preparation and analysis of network schedules. Comprehensive planning and scheduling project. Computer project management applications.

**CON E 481: Bidding Construction Projects II**

(0-3) Cr. 1. F.

*Prereq: Permission from the instructor*

Similar to Con E 381, except students with previous experience attempt projects with larger scope or lead students with less experience.

**CON E 481A: Bidding Construction Projects II: Heavy and Highway**

(0-3) Cr. 1. F.

*Prereq: Permission from the instructor*

Similar to Con E 381, except students with previous experience attempt projects with larger scope or lead students with less experience.

**CON E 481B: Bidding Construction Projects II: Building**

(0-3) Cr. 1. F.

*Prereq: Permission from the instructor*

Similar to Con E 381, except students with previous experience attempt projects with larger scope or lead students with less experience.

**CON E 481C: Bidding Construction Projects II: Mechanical**

(0-3) Cr. 1. F.

*Prereq: Permission from the instructor*

Similar to Con E 381, except students with previous experience attempt projects with larger scope or lead students with less experience.

**CON E 481D: Bidding Construction Projects II: Electrical**

(0-3) Cr. 1. F.

*Prereq: Permission from the instructor*

Similar to Con E 381, except students with previous experience attempt projects with larger scope or lead students with less experience.

**CON E 481E: Bidding Construction Projects II: Mechanical and Electrical**

(0-3) Cr. 1. F.

*Prereq: Permission from the instructor*

Similar to Con E 381, except students with previous experience attempt projects with larger scope or lead students with less experience.

**CON E 481F: Bidding Construction Projects II: Miscellaneous**

(0-3) Cr. 1. F.

*Prereq: Permission from the instructor*

Similar to Con E 381, except students with previous experience attempt projects with larger scope or lead students with less experience.

**CON E 487: Construction Engineering Design I**

(2-2) Cr. 3. F.S.

*Prereq: CON E 380 or ACCT 215, CON E 340 (B, H), CON E 352 (B, E, M), CON E 353 (B, E, M), CON E 421, CON E 441. Student must be within two semesters of graduation*

The integrated delivery of project services as a team, including preliminary engineering design process, constructability review, interaction with the client, identification of engineering problems, developments of a proposal, identification of design criteria, cost estimating, planning and scheduling, application of codes and standards, development of feasible alternatives, selection of best alternative, and delivery of oral presentations.

**CON E 488: Construction Engineering Design II**

(1-5) Cr. 3. F.S.

*Prereq: CON E 380 or ACCT 215. Coreq: CON E 487*

Application of team design concepts to a construction engineering project. Project planning. Advanced construction and project management.

**CON E 490: Independent Study**

Cr. 1-5. Repeatable. F.S.SS.

*Prereq: Permission of instructor*

Individual study in any phase of construction engineering. Pre-enrollment contract required.

**CON E 498: Cooperative Education**

Cr. R. Repeatable. F.S.SS.

*Prereq: CON E 398, permission of department and Engineering Career Services*

Third and subsequent professional work periods in the cooperative education program. Students must register for this course before commencing work.