Civil Engineering (CIVE)

Civil Engineering (CIVE) Courses

CIVE 2004 [0.5 credit]
GIS, Surveying, CAD and BIM
Prerequisite(s): ECOR 1010.
Lectures three hours a week, problem analysis and laboratories three hours a week.

CIVE 2005 [0.5 credit]
Architectural Technology 2
Technical issues involved in architectural design of buildings from ancient times to the present. Technological innovation and materials related to structural developments, and the organization and design of structures. Basic concepts of calculus, equilibrium, and mechanics of materials. Not eligible for use for Bachelor of Engineering degree requirements.
Prerequisite(s): ARCC 2202.
Lectures three hours a week, laboratory three hours a week.

CIVE 2101 [0.5 credit]
Mechanics II
Prerequisite(s): ECOR 1101 and MATH 1004 and MATH 1104.
Lectures three hours a week, problem analysis three hours a week.

CIVE 2200 [0.5 credit]
Mechanics of Solids I
Prerequisite(s): ECOR 1101 for B.Eng. students or CIVE 2005 for B.A.S. with Concentration in Conservation and Sustainability.
Lectures three hours a week, problem analysis and laboratory three hours a week.

CIVE 2700 [0.5 credit]
Civil Engineering Materials
Prerequisite(s): second year status for students in an Engineering program or second year standing in a B.A.S. major in Conservation and Sustainability.
Lectures three hours a week, problem analysis and laboratory three hours a week.

CIVE 3202 [0.5 credit]
Mechanics of Solids II
Precludes additional credit for MAAE 3202.
Prerequisite(s): CIVE 2200.
Lectures three hours a week, laboratory/problem analysis three hours alternate weeks.

CIVE 3203 [0.5 credit]
Introduction to Structural Analysis
Prerequisite(s): CIVE 2200 and MATH 1004.
Lectures three hours a week, problem analysis three hours alternate weeks.

CIVE 3204 [0.5 credit]
Introduction to Structural Design
Prerequisite(s): CIVE 2200.
Lectures three hours a week, problem analysis three hours alternate weeks.
CIVE 3205 [0.5 credit]  
**Design of Structural Steel Components**  
Introduction to CAN/CSA - S16, design and behaviour concepts; shear lag, block shear, local plate buckling, lateral torsional buckling, instantaneous centre, inelastic strength and stability. Design of tension members, axially loaded columns, beams, beam-columns, simple bolted and welded connections.  
Prerequisite(s): CIVE 2200 and CIVE 2700.  
Recommended prerequisite: CIVE 3204.  
Lectures three hours a week, problem analysis three hours alternate weeks.

CIVE 3206 [0.5 credit]  
**Design of Reinforced Concrete Components**  
Introduction to CAN/CSA - A23.3; design and behaviour concepts; flexural analysis at service loads; shear, bond, Whitney stress block, under, over reinforced behaviour, ultimate strength. Flexural design of singly reinforced, doubly reinforced T-beams, one-way slabs. Shear design for beams. One-way, two-way slab systems, columns.  
Prerequisite(s): CIVE 2200 and CIVE 2700.  
Recommended prerequisite: CIVE 3204.  
Lectures three hours a week, problem analysis three hours alternate weeks.

CIVE 3207 [0.5 credit]  
**Historic Site Recording and Assessment**  
Methods of heritage documentation including hand recording, photography, rectified photography, total station, gps, photogrammetry, and laser scanning. Non-destructive testing techniques; environmental assessment tools for determining air quality and energy efficiency.  
Multidisciplinary teams for all project work.  
Also listed as ARCN 4100.  
Prerequisite(s): third-year status in B.Eng. in Architectural Conservation and Sustainability Engineering or third-year standing in B.A.S. Concentration in Conservation and Sustainability.  
Lectures three hours a week, lab or field work two hours a week.

CIVE 3208 [0.5 credit]  
**Geotechnical Mechanics**  
Also listed as ERTH 4107.  
Prerequisite(s): third-year status in Engineering, or permission of the department. Additional recommended background: ERTH 2404 or equivalent.  
Lectures three hours a week, laboratory three hours alternate weeks.

CIVE 3209 [0.5 credit]  
**Building Science**  
Building envelope design and analysis; applied heat transfer and moisture transport; solar radiation; hygrothermal modelling; control of rain, air, vapour, and heat; materials for wall, window, curtain wall, roof, and foundation systems; building envelope retrofit case studies; building code; envelope construction.  
Prerequisite(s): MAAE2400 and third-year status in B.Eng. Architectural Conservation and Sustainability Engineering or in Civil Engineering.  
Lectures three hours a week, problem analysis three hours alternate weeks.

CIVE 3304 [0.5 credit]  
**Transportation Engineering and Planning**  
Transportation and the socio-economic environment; modal and intermodal systems and components; vehicle motion, human factors, system and facility design; traffic flow; capacity analysis; planning methodology; environmental impacts; evaluation methods.  
Also listed as GEOG 4304.  
Prerequisite(s): third-year status in Engineering, or permission of the Department.  
Lectures three hours a week, problem analysis three hours alternate weeks.

CIVE 3999 [0.0 credit]  
**Co-operative Work Term**

CIVE 4200 [0.5 credit]  
**Matrix Analysis of Framed Structures**  
Introduction to the finite element method.  
Prerequisite(s): CIVE 3203.  
Lectures three hours a week, problem analysis three hours alternate weeks.

CIVE 4201 [0.5 credit]  
**Finite Element Methods in Civil Engineering**  
Introduction to the theory and application of finite element methods. The relationship with virtual work, Rayleigh-Ritz, system of linear equations, polynomial interpolation, numerical integration, and theory of elasticity is explored. Isoparametric formulations of structural and plane elements are examined. Geotechnical and nonlinear problems are introduced.  
Prerequisite(s): CIVE 2200 and fourth year status in engineering.  
Lectures three hours a week, problem analysis three hours alternate weeks.
CIVE 4202 [0.5 credit]
Wood Engineering
Also listed as ARCC 4202.
Prerequisite(s): CIVE 2200, CIVE 3204.
Lectures three hours a week, problem analysis three hours alternate weeks.

CIVE 4208 [0.5 credit]
Geotechnical Engineering
Prerequisite(s): CIVE 3208.
Lectures three hours a week, problem analysis three hours alternate weeks.

CIVE 4209 [0.5 credit]
Highway Engineering
Highway planning; highway location and geometric design; traffic engineering; highway capacity; soil classifications; subgrade and base materials; highway drainage; frost action; structural design of rigid and flexible pavements; highway economics and finance; maintenance and rehabilitation.
Prerequisite(s): Fourth year status in engineering.
Recommended prerequisites: CIVE 2004, CIVE 3304 and CIVE 3208.
Lectures three hours a week, problem analysis three hours alternate weeks.

CIVE 4301 [0.5 credit]
Foundation Engineering
A critical study of the theories in soil mechanics and their application to the solution of geotechnical engineering problems. Field investigations, laboratory and field testing, shallow foundations, special footings, mat foundations, pile foundations and excavations. Discussion of new methods and current research.
Prerequisite(s): CIVE 4208.
Lectures three hours a week, laboratory three hours alternate weeks.

CIVE 4302 [0.5 credit]
Reinforced and Prestressed Concrete Design
Reinforced concrete shear and torsion design. Two-way slab design by Direct Design and Equivalent Frame Method. Behaviour and design of slender reinforced concrete columns. Prestressed concrete concepts; flexural analysis and design; shear design; anchorage zone design; deflection and prestress loss determination.
Prerequisite(s): CIVE 3202, CIVE 3203 and CIVE 3206.
Lectures three hours a week, problem analysis three hours alternate weeks.

CIVE 4303 [0.5 credit]
Urban Planning
A systematic approach to urban planning; urban sprawl; data collection; forecasting; standards; space requirements; land use; zoning; transportation; land development; site selection; land capability; layout; evaluation; housing; urban renewal and new towns.
Also listed as GEOG 4303.
Prerequisite(s): fourth-year status in Engineering, or permission of the Department.
Lectures three hours a week, problem analysis three hours alternate weeks.

CIVE 4307 [0.5 credit]
Municipal Hydraulics
Prerequisite(s): MAAE 2300.
Lectures three hours a week, problem analysis 1.

CIVE 4308 [0.5 credit]
Behaviour and Design of Steel Structures
Behaviour and design of open web steel joists, steel and composite decks, composite beams and columns, stud girders, and plate girders. Design of moment connections, base plates and anchor bolts, and bracing connections. Stability of rigid and braced frames. Design for lateral load effects.
Prerequisite(s): CIVE 3205 and fourth-year status in Engineering.
Lectures three hours a week, problem analysis three hours alternate weeks.

CIVE 4400 [0.5 credit]
Construction/Project Management
Systems approach to project planning and control. Analysis of alternative network planning methods: CPM, precedence and PERT; planning procedure; computer techniques and estimating; physical, economic and financial feasibility; implementation feedback and control; case studies.
Prerequisite(s): fourth-year status in Engineering.
Lectures three hours a week, problem analysis three hours alternate weeks.
**CIVE 4403 [0.5 credit]**  
**Masonry Design**  
Introduction to structural design in masonry. Properties of masonry materials and assemblages. Behaviour and design of beams, walls and columns. Selected topics including veneer wall systems, differential movement, workmanship, specifications, inspection, maintenance and repair. Lowrise and highrise building design.  
Prerequisite(s): CIVE 3204, CIVE 3206 and fourth-year status in Engineering or permission of the Department.  
Also offered at the graduate level, with different requirements, as CIVE 5200, for which additional credit is precluded. Lectures three hours a week, problem analysis three hours alternate weeks.

**CIVE 4407 [0.5 credit]**  
**Municipal Engineering**  
Prerequisite(s): fourth-year status in Engineering. Lectures three hours a week, problem analysis 1.

**CIVE 4500 [0.5 credit]**  
**Computer Methods in Civil Engineering**  
Advanced software development for Civil Engineering applications. Examples may be chosen from surveying, transportation, geotechnical and/or structural engineering. Software technologies include object-oriented programming, data base management, Internet-based applications and graphical user interfaces.  
Prerequisite(s): ECOR 2606 and fourth-year status in Engineering.  
Also offered at the graduate level, with different requirements, as CIVE 5602, for which additional credit is precluded. Lectures three hours a week, problem analysis one.

**CIVE 4601 [0.5 credit]**  
**Building Pathology and Rehabilitation**  
Deterioration mechanisms for concrete, timber, steel and masonry structures. Identification of design deficiencies; criteria for selection and design of rehabilitation systems. Design techniques to reduce deterioration in new construction and historical structures. fourth-year standing in B.A.S. concentration in Conservation and Sustainability.  
Also listed as ARCN 4200.  
Prerequisite(s): fourth-year status in B.Eng. in Architectural Conservation and Sustainability Engineering or fourth-year standing in B.A.S. concentration in Conservation and Sustainability.  
Lectures three hours a week, lab/field work two hours a week.

**CIVE 4614 [0.5 credit]**  
**Building Fire Safety**  
Understanding fire-structure interaction and the concepts of fire severity and resistance; behaviour of steel, concrete, and timber buildings exposed to fires; compartment fire dynamics; correlations and computer models to predict fire dynamics; fire retardants; laboratory-scale fire experiments; performance-based approach for building fire safety design.  
Prerequisite(s): fourth-year status in Engineering, or permission of the Department. Lectures three hours a week, problem analysis and laboratories one and one-half hours per week.

**CIVE 4907 [1.0 credit]**  
**Engineering Project**  
A major project in engineering analysis, design, development or research carried out by individual students or small teams, for an opportunity to develop initiative, self-reliance, creative ability and engineering judgment and is intended for students with high CGPAs and an interest in graduate studies.  
Precludes additional credit for CIVE 4917. Prerequisite(s): fourth-year status in Engineering and permission of the department.

**CIVE 4917 [0.5 credit]**  
**Undergraduate Directed Study**  
Student carries out a study, analysis, and solution of an engineering problem which results in a written final report. Carried out under close supervision of a faculty member. Intended for students interested in pursuing graduate studies. Requires supervising faculty member and proposal from student.  
Precludes additional credit for CIVE 4907. Prerequisite(s): permission of the Department and completion of, or concurrent registration in, CIVE 4918. Self study.

**CIVE 4918 [1.0 credit]**  
**Design Project**  
Teams of students develop professional level experience through a design project that incorporates fundamentals acquired in previous mathematics, science, engineering, and complementary studies courses. A final report and oral presentations are required.  
Prerequisite(s): ECOR 3800 and fourth-year status in Engineering. Certain projects may have additional requirements.  
Lectures two hours alternate weeks, problem analysis three hours a week.

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**Summer session**: some of the courses listed in this Calendar are offered during the summer. Hours and scheduling for summer session courses will differ significantly from those reported in the fall/winter Calendar. To determine the scheduling and hours for summer session classes, consult the class schedule at central.carleton.ca

Not all courses listed are offered in a given year. For an up-to-date statement of course offerings for the current
session and to determine the term of offering, consult the class schedule at central.carleton.ca