

# Architectural Conservation and Sustainability Engineering (ACSE)

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## Arch. Conservation and Sustainability Eng. (ACSE) Courses

### ACSE 2001 [0.5 credit]

#### Architecture and the Environment

Impacts of the environment on architecture; deterioration, freeze/thaw, solar heat, air pollution, moisture; Impacts of architecture on the environment; ecologic footprint, energy consumption, air quality, waste generation; designing with the environment; renewable energy, effective siting and landscape, passive solar energy, natural lighting, energy efficiency.

Also listed as ENVE 1001.

Lectures three hours a week, problem analysis one and a half hours a week.

### ACSE 3105 [0.5 credit]

#### Green Building Design

Concepts, calculations, modeling; design of green buildings and their components; sustainable sites and landscaping; passive design; building envelope; building materials; daylighting; heating, cooling, and ventilation; building-integrated renewable energy systems; indoor environmental quality; overview of building standards and codes.

Also listed as ENVE 4105.

Prerequisite(s): Third-year status in B.Eng. in Architectural Conservation and Sustainability Engineering, Civil Engineering, or Environmental Engineering or fourth-year standing in B.A.S. concentration in Conservation and Sustainability.

Lectures three hours a week, problem analysis one and a half hours per week.

### ACSE 3201 [0.5 credit]

#### Introduction to Building Performance Simulation

Modelling and simulation to support design, retrofit, rehabilitation of new and existing buildings on performance - energy, comfort, emissions; from basics of numerical modelling to parametric design techniques.

Includes: Experiential Learning Activity

Prerequisite(s): Third-year status in B.Eng. Architectural Conservation and Sustainability Engineering, Environmental Engineering or Civil Engineering, or fourth-year standing in B.A.S. concentration in Conservation and Sustainability.

Lecture 3 hours per week, computer lab/problem analysis 3 hours every other week

### ACSE 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.

Includes: Experiential Learning Activity

Also listed as ARCH 3881, CIVE 3207.

Precludes additional credit for ARCN 4100.

Prerequisite(s): third-year status in B.Eng. in Architectural Conservation and Sustainability Engineering.

Lectures three hours a week, lab or field work two hours a week.

### ACSE 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.

Includes: Experiential Learning Activity

Also listed as CIVE 3209.

Prerequisite(s): MAAE 2400 and third-year status in B.Eng. Architectural Conservation and Sustainability Engineering.

Lectures three hours a week, lab/problem analysis three hours alternate weeks.

### ACSE 3999 [0.0 credit]

#### Co-operative Work Term

Co-operative work term.

Includes: Experiential Learning Activity

Precludes additional credit for CIVE 3999.

Prerequisite(s): N/A.

No formal lectures.

### ACSE 4101 [0.5 credit]

#### Introduction to Structural Assessment of Historic Masonry Buildings

History of conservation and restoration; types of historic buildings and structural components; mechanical properties and mechanics of masonry constructions; thrust line analysis; masonry buildings, structural walls, seismic damage, basic concepts, and design of masonry structures.

Includes: Experiential Learning Activity

Prerequisite(s): CIVE 2200, CIVE 2700.

Lecture 3 hours per week, lab/problem analysis 3 hours every other week

**ACSE 4106 [0.5 credit]****Indoor Environmental Quality**

Indoor environmental quality (air quality, thermal, visual, and acoustic comfort); physical and chemical parameters for characterization. Types and sources of indoor air pollution and discomfort; measurement techniques. Heating, ventilation, air conditioning, lighting practices and issues. Modelling of and design for indoor environmental quality.

Also listed as ENVE 4106.

Prerequisite(s): fourth year status in B.Eng. Architectural Conservation and Sustainability Engineering or B.Eng. Environmental Engineering or fourth year standing in B.A.S. concentration in Conservation and Sustainability.

Also offered at the graduate level, with different requirements, as BLDG 5104, for which additional credit is precluded.

Lectures three hours a week, laboratory three hours alternate weeks.

**ACSE 4107 [0.5 credit]****Building Services Engineering**

This course provides details on how buildings are designed and operated. The materials provide foundational knowledge to understand building services: mechanical, electrical, plumbing systems with associated controls.

Also listed as ENVE 4107.

Prerequisite(s): CIVE 3209 and ENVE 4105.

Also offered at the graduate level, with different requirements, as BLDG 5302, for which additional credit is precluded.

Lecture three hours per week, problem analysis three hours every other week.

**ACSE 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.

Includes: Experiential Learning Activity

Also listed as ARCN 4200, CIVE 4601.

Prerequisite(s): ACSE 3207 and fourth-year status in B.Eng. in Architectural Conservation and Sustainability Engineering.

Lectures three hours a week, lab/field work two hours a week.

**ACSE 4907 [1.0 credit]****Engineering Research Project**

A research project in engineering analysis, design or development carried out by individual students or small teams, for an opportunity to develop initiative, self-reliance, creative ability and engineering judgment and is normally intended for students with high CGPAs and an interest in graduate studies.

Includes: Experiential Learning Activity

Precludes additional credit for CIVE 4907, CIVE 4917 and ACSE 4917.

Prerequisite(s): fourth-year status in Engineering and permission of the department.

No formal lectures

**ACSE 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.

Includes: Experiential Learning Activity

Precludes additional credit for CIVE 4907, CIVE 4917 and ACSE 4907.

Prerequisite(s): permission of the Department and completion of, or concurrent registration in, ACSE 4918.

No formal lectures. Self-study.

**ACSE 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.

Includes: Experiential Learning Activity

Precludes additional credit for CIVE 4918, ENVE 4918.

Prerequisite(s): ECOR 3800 and fourth-year status in Architectural Conservation and Sustainability Engineering. Certain projects may have additional requirements.

Lectures two hours alternate weeks, problem analysis three hours a week.