

# Civil Engineering - Joint (CIVJ)

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## Civil Engineering - Joint (CIVJ) Courses

### CIVJ 5105 [0.5 credit] (CVG 5175)

#### Numerical Methods for Geotechnical Engineering

### CIVJ 5106 [0.5 credit] (CVG 5161)

#### Mechanics of Unsaturated Soils

### CIVJ 5109 [0.5 credit] (CVG 5314)

#### Geotechnical Hazards

### CIVJ 5110 [0.5 credit] (CVG 5187)

#### Rock Mechanics

Rock exploration, laboratory and in-situ testing, rock mass classification, deformation and strength, failure criteria, stresses in rock, foundations on rock.

### CIVJ 5182 [0.5 credit] (CVG 5182)

#### Water Resources Management

Global water supply and demand, integrated water resources management, modeling and optimization of water resources systems, reservoir management, uncertainty modeling, climate change and water, decision under uncertainty.

Also listed as ENVJ 5182.

### CIVJ 5184 [0.5 credit] (CVG 5184)

#### Construction Cost Estimating

General overview of construction cost estimating. Techniques and construction cost estimating process; elements of project cost; conceptual and detailed cost estimation methods; risk assessment and range estimating; work breakdown structure applied in building projects. Computer applications in building construction cost estimating and infrastructure projects.

### CIVJ 5185 [0.5 credit] (CVG 5185)

#### Construction Life Cycle Analysis

General overview of analyzing the economics of construction projects by applying the concept of time value of money. Financing strategies for construction projects and profitability analysis; correlation between value engineering, life cycle cost analysis and assessment for construction projects. Breakeven, sensitivity and risk analysis.

### CIVJ 5186 [0.5 credit] (CVG 5186)

#### Project Information Management

Topics in contractual relationships between construction project teams. Different type of construction contracts and their application. Preparation of project documents. Evaluation of different types of project organization structure and associated project delivery systems. Bidding strategies. Network analysis using deterministic and stochastic methods for construction-time.

### CIVJ 5188 [0.5 credit] (CVG 5188)

#### Loads on structures

Overview of loads on buildings according to Canadian codes and standards. Dead and live loads, snow loads, wind loads, earthquake loads, loads on non-structural components; vibrations. Selected topics in the practical design of building structures.

### CIVJ 5189 [0.5 credit] (CVG5189)

#### Blast Engineering

Overview of explosives and blast loads on structural and non-structural infrastructure components; dynamic analysis of elements under blast-induced shock waves and dynamic pressures; elastic and inelastic response; incremental equation of motion and nonlinear analysis; development of resistance functions; pressure-impulse (P-I) diagrams; blast-resistant building design.

### CIVJ 5190 [0.5 credit] (CVG 5190)

#### Rehabilitation of Concrete Structures

Durability of concrete bridges and building structures in Canada; assessment and evaluation of damaged concrete structures; repair, rehabilitation and strengthening techniques; applicable design codes and guidelines; monitoring technologies for structures; implications for infrastructure management.

Lecture three hours a week

### CIVJ 5191 [0.5 credit] (CVG 5191)

#### Diagnosis and Prognosis of Concrete Infrastructure

Condition assessment of concrete infrastructure using experimental (i.e. visual, nondestructive, microscopic and mechanical) and analytical approaches; overview of repair and maintenance techniques according to damage type and extent; Serviceability performance and appraisal guides for aging infrastructure; design for durability through performance based design approaches.

Lecture three hours a week

### CIVJ 5192 [0.5 credit] (CVG 5192)

#### Characterization Methods for Materials

Modern materials characterization techniques especially with respect to civil engineering materials. Choosing the right characterization methods in order to determine the properties of materials such as chemical composition, atomic structure, and surface properties used in their research. Interpreting the results of each method.

### CIVJ 5193 [0.5 credit] (CVG 5193)

#### Instrumentation and Experimental Design for Civil Engineering

Introduction to instrumentation in civil engineering applications. Instrument types and performance, strain gauges, transducers, measurement of position, velocity, acceleration, force, pressure, temperature and flow. Data collection and data acquisition systems; diagnostics and calibration, closed versus open-loop control; servomotor types and servo-valves.

### CIVJ 5201 [0.5 credit] (CVG 5142)

#### Advanced Structural Dynamics

**CIVJ 5202 [0.5 credit] (CVG 5143)**  
**Advanced Structural Steel Design**

**CIVJ 5203 [0.5 credit] (CVG 5145)**  
**Theory of Elasticity**

**CIVJ 5204 [0.5 credit] (CVG 5147)**  
**Theory of Plates and Shells**

**CIVJ 5206 [0.5 credit] (CVG 5150)**  
**Advanced Concrete Technology**

**CIVJ 5207 [0.5 credit] (CVG 5216)**  
**Sustainable and Resilient Infrastructure in Changing Climate**  
Development of infrastructure with long-term sustainability and resiliency under various extreme events; climate change drivers, climate modelling and climate change impact studies. The concepts of sustainability, resiliency, and reliability. Climatic and flooding hazards. Uncertainty and non-stationarity processes.

**CIVJ 5209 [0.5 credit] (CVG 5153)**  
**Wind Engineering**

**CIVJ 5300 [0.5 credit] (CVG 5144)**  
**Advanced Reinforced Concrete Design**

**CIVJ 5301 [0.5 credit] (CVG 5156)**  
**Finite Element Methods I**

**CIVJ 5302 [0.5 credit] (CVG 5146)**  
**Numerical Methods of Structural Analysis**

**CIVJ 5303 [0.5 credit] (CVG 5157)**  
**Finite Element Methods II**

**CIVJ 5304 [0.5 credit] (CVG 5149)**  
**Structural Stability**

**CIVJ 5305 [0.5 credit] (CVG 5148)**  
**Prestressed Concrete Design**

**CIVJ 5306 [0.5 credit] (CVG 5155)**  
**Earthquake Engineering**

**CIVJ 5307 [0.5 credit] (CVG 5158)**  
**Elements of Bridge Engineering**

**CIVJ 5308 [0.5 credit] (CVG 5154)**  
**Random Vibrations**

**CIVJ 5309 [0.5 credit] (CVG 5159)**  
**Long Span Structures**  
Includes: Experiential Learning Activity

**CIVJ 5310 [0.5 credit] (CVG 5311)**  
**Bridge Design**

**CIVJ 5311 [0.5 credit] (CVG 5312)**  
**Durability of Concrete Structures**

**CIVJ 5312 [0.5 credit] (CVG 5313)**  
**Seismic Analysis and Design of Concrete Structures**  
Includes: Experiential Learning Activity

**CIVJ 5501 [0.5 credit] (CVG 5111)**  
**Hydraulic Structures**

**CIVJ 5502 [0.5 credit] (CVG 5112)**  
**Computational Hydrodynamics**

**CIVJ 5503 [0.5 credit] (CVG 5160)**  
**Sediment Transport**

**CIVJ 5504 [0.5 credit] (CVG 5162)**  
**River Hydraulics**

**CIVJ 5605 [0.5 credit] (CVG 5124)**  
**Coastal Engineering**

**CIVJ 5906 [0.5 credit]**  
**Solid Waste Disposal**

**CIVJ 6000 [0.5 credit] (CVG 6300)**  
**Special Topics in Civil Engineering**

**CIVJ 6001 [0.5 credit] (CVG 6301)**  
**Special Topics in Civil Engineering**

**CIVJ 6002 [0.5 credit] (CVG 6302)**  
**Special Topics in Civil Engineering**

**CIVJ 6003 [0.5 credit] (CVG 6303)**  
**Special Topics in Civil Engineering**

**CIVJ 6004 [0.5 credit] (CVG 6304)**  
**Special Topics in Civil Engineering**

**CIVJ 6005 [0.5 credit] (CVG 6305)**  
**Special Topics in Civil Engineering**

**CIVJ 6006 [0.5 credit] (CVG 6306)**  
**Special Topics in Civil Engineering**

**CIVJ 6007 [0.5 credit] (CVG 6307)**  
**Special Topics in Civil Engineering**

**CIVJ 6008 [0.5 credit] (CVG 6308)**  
**Special Topics in Civil Engineering**

**CIVJ 6009 [0.5 credit] (CVG 6309)**  
**Special Topics in Civil Engineering**

**CIVJ 6010 [0.5 credit] (CVG 6310)**  
**Special Topics in Civil Engineering**

**CIVJ 6011 [0.5 credit] (CVG 6311)**  
**Special Topics in Civil Engineering**

**CIVJ 6012 [0.5 credit] (CVG 6312)**  
**Special Topics in Civil Engineering**

**CIVJ 6013 [0.5 credit] (CVG 6313)**  
**Special Topics in Civil Engineering**

**CIVJ 6014 [0.5 credit] (CVG 6314)  
Special Topics in Civil Engineering**

**CIVJ 6015 [0.5 credit] (CVG 6315)  
Special Topics in Civil Engineering**

**CIVJ 6016 [0.5 credit] (CVG 6316)  
Special Topics in Civil Engineering**

**CIVJ 6017 [0.5 credit] (CVG 6317)  
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**CIVJ 6018 [0.5 credit] (CVG 6318)  
Special Topics in Civil Engineering**

**CIVJ 6019 [0.5 credit] (CVG 6019)  
Special Topics in Civil Engineering**

**CIVJ 6020 [0.5 credit] (CVG 6320)  
Special Topics in Civil Engineering**