

Infrastructure Protection and International Security

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About the Program

MIPIS is designed to offer students a cross-disciplinary understanding of critical infrastructure protection (CIP) challenges. Students with an engineering background, in addition to specializing in infrastructure engineering design, mitigation, and management, will take courses in national security policy, CIP risk management, intelligence and terrorism. Students with a policy background will reinforce their national security policy, intelligence, and terrorism expertise with an understanding of infrastructure engineering design and mitigation.

Academic Regulations

See the General Regulations section of this Calendar.

Admission Requirements

The minimum requirement for admission into the Master's program is a B.A. (Honours) degree in a discipline related to International Affairs or a Bachelor's degree in Engineering. Students will normally be expected to have high honours standing to be considered for admission into the program.

In conformity with the Faculty of Graduate and Postdoctoral Affairs, applicants whose first language or language of instruction for their first degree is not English must be tested for proficiency in English as specified in the General Regulations section of this Calendar.

Students who have not successfully completed introductory microeconomics or engineering economics (ECOR 3800) at the time of their application will be required to either successfully complete either one (or an equivalent) prior to registration or as part of their first year of study. Students who have not successfully completed MATH 1004 or equivalent at the time of their application will be required to successfully complete MATH 1004 or an approved equivalent prior to registration or in their first term of study in the program. If students elect to complete the economics or mathematics course requirements in the first year of their program, they will be listed as additional program requirements and will not count towards the five credits required to complete the program. Students are strongly urged to complete these courses prior to entering the program, as completing them in the first term of the program may delay the completion of the degree.

Program Requirements

Students in the M.I.P.I.S. program are required to successfully complete a total of 5.0 credits. Additional

requirements may be stipulated, depending on the background of the individual student.

Students have the choice of several program options:

- 5.0 credits of course work only
- 4.0 credits of course work and a 1.0 credit research project
- 4.0 credits of course work and a 1.0 credit research essay.

Unless otherwise specified with a [1.0] following the course number, courses carry a value of 0.5 credit. All masters students are required to complete five credits:

M. Infrastructure Protection and International Security (5.0 credits)

1. 2.0 credits in:		2.0
IPIS 5101 [0.5]	Critical Infrastructure Protection: Issues and Strategies	
IPIS 5102 [0.5]	Introduction to Infrastructure Management	
IPIS 5103 [0.5]	Infrastructure Engineering Principles	
IPIS 5104 [0.5]	Terrorism and International Security	
2. 1.0 credit from:		1.0
IPIS 5301 [0.5]	Disarmament, Arms Control and Nonproliferation	
IPIS 5302 [0.5]	International Security after the Cold War	
IPIS 5303 [0.5]	Intelligence Statecraft and International Affairs	
IPIS 5304 [0.5]	Intelligence and National Security: Policies and Operations	
IPIS 5305 [0.5]	National Security Policy and Law	
IPIS 5320 [0.5]	Topics in Infrastructure Security	
3. 1.0 credit from:		1.0
IPIS 5501 [0.5]	Transportation and Aviation Security	
IPIS 5502 [0.5]	Infrastructure Assets Management	
IPIS 5503 [0.5]	People in Fires	
IPIS 5504 [0.5]	Fundamentals of Fire Safety	
IPIS 5505 [0.5]	Geohazards	
IPIS 5506 [0.5]	Public Health Safety	
IPIS 5507 [0.5]	Blast-load Effects on Structures	
IPIS 5520 [0.5]	Selected Topics in Engineering of Critical Infrastructure	
4. 1.0 credit remaining may be selected as follows:		1.0
Coursework Program Option:		
1.0 credit from (a) graduate courses listed above, or courses offered by the Faculty of Engineering or the Faculty of Public Affairs that have been selected in consultation with, and approved by, the MIPIS Director and Associate Director		
Research Project Option:		
1.0 credit in:		
IPIS 5907 [1.0]	Infrastructure Engineering Project	
Research Essay Option:		
1.0 credit in:		
IPIS 5908 [1.0]	Research Essay	
Total Credits		5.0

Co-op Option

Full-time M.A. students who have completed 2.5 credits, including IPIS 5101 and IPIS 5103 and all Mathematics or Economic requirements, may select a co-op option. The co-op program provides opportunities to integrate the theoretical and practical aspects of international affairs.

The 0.0 credit co-op is in addition to the 5.0 credits required for the M.A. Two (2) co-op terms must be successfully completed before the student is eligible to receive a co-op designation on their academic transcript. Students will be registered in the co-op course IPIS 5913 once they are successful in their co-op job search, and are restricted from taking more than 0.5 credit at the same time. If a student opts to undertake 0.5 credit while on a co-op work term, the credit must be taken outside of regular working hours.

Work terms are four months in duration, and typically students are employed at the junior officer level in government departments or other organizations. Information and procedures can be obtained from the Carleton University Co-op Office.

Infrastructure Protection and International Security (IPIS) Courses

IPIS 5101 [0.5 credit]

Critical Infrastructure Protection: Issues and Strategies

Examines critical infrastructure, its interdependencies, vulnerabilities, and security requirements; intentional and natural risks; policy responses to threat and vulnerability assessments; risk management approaches, prevention and protective security, emergency management and damage mitigation measures; continuity of critical operations and resilience planning.

IPIS 5102 [0.5 credit]

Introduction to Infrastructure Management

Infrastructure management and its relationship to facility and asset management; challenges facing infrastructure managers; tools for effective IM; concept of total quality management; economic analysis of maintenance, rehabilitation and reconstruction; use of life cycle cost analysis in decision making, development and use of IM systems.

Also listed as CIVE 5404.

Precludes additional credit for CIVE 5809 (2005-2007).

IPIS 5103 [0.5 credit]

Infrastructure Engineering Principles

Introduction to infrastructure engineering: civil, municipal/environmental, energy, communications, and military infrastructure systems; engineering principles; design, analysis and construction techniques; lifecycle performance, maintenance and retrofit strategies; optimization, asset-management; decision-making and decision support tools.

IPIS 5104 [0.5 credit]

Terrorism and International Security

Contemporary international terrorism in comparative perspective; religious and ideological parameters motivating terrorism; sociology of recruitment and participation; evolving structure and dynamics of terror networks; terrorism finance, operations and related activities; impact of counter-terrorism measures; examples are drawn from international and domestic terrorism. Also listed as INAF 5244.

IPIS 5301 [0.5 credit]

Disarmament, Arms Control and Nonproliferation

Origins, theory and practice, with a focus on so-called weapons of mass destruction and current controversies. Emphasis on treaty negotiation and implementation, including monitoring, verification, facilitation and enforcement of compliance. Also listed as INAF 5201.

IPIS 5302 [0.5 credit]

International Security after the Cold War

The evolving strategic and security environment since the end of the Cold War, encompassing both traditional and non-traditional concepts. Topics include hegemonism; the rise of new powers; terrorism; multilateralism; human security; and new security threats, including climate change. Also listed as INAF 5202.

IPIS 5303 [0.5 credit]

Intelligence Statecraft and International Affairs

The role of intelligence in foreign and security policy after the Cold War. Evolution of intelligence as regards strategic and policy requirements, the capabilities of selected services, interactions within government and civil society. Emphasis on the structure and functions of Canada's intelligence community. Also listed as INAF 5204.

IPIS 5304 [0.5 credit]

Intelligence and National Security: Policies and Operations

The roles and activities of intelligence services of selected countries. Their performance will be assessed in the light of historical experience, and in the context of the policy, legal and ethical constraints. Also listed as INAF 5224.

IPIS 5305 [0.5 credit]

National Security Policy and Law

The international legal and policy implications of identifying and responding to national security threats. Topics include: intelligence gathering; verification regimes; military and counter-terrorism operations; criminal prosecution; and, balancing human rights and security concerns. Also listed as INAF 5234.

IPIS 5320 [0.5 credit]**Topics in Infrastructure Security**

Courses in special topics related to infrastructure security, not covered by other graduate courses; course topics will be available prior to registration.

IPIS 5501 [0.5 credit]**Transportation and Aviation Security**

Canadian Public Security Strategy and Transportation System security environment; Civil Aviation security and operations: trends, impacts, and implications of evolving policies, operations, and technologies; security vulnerabilities in the transportation system; transportation of hazardous materials; secure movements on roads, highways and railways.

IPIS 5502 [0.5 credit]**Infrastructure Assets Management**

Municipal infrastructure systems: portable water systems, waste and storm water collection and treatment, roads, sidewalks, bridges and overpasses; decision-making in municipal environment; elements of asset management systems: inventory, diagnostic and condition assessment, performance and prediction, valuation, planning and lifecycle analysis; prioritization of interventions.

Precludes additional credit for CIVE5706 (2005-2007).

IPIS 5503 [0.5 credit]**People in Fires**

Review of the work presented by the founders in the field of human behaviour in fire. Introduction to the basic notions of perception, cognition, information processing, decision-making and problem solving. Behavioural concepts such as panic, commitment, affiliation, familiarity and role are discussed.

Precludes additional credit for CIVE 5708 (2001-2003), CIVE 5611.

IPIS 5504 [0.5 credit]**Fundamentals of Fire Safety**

The fire safety system; social, economic and environmental issues; description of the fire safety regulatory system and the governing building codes and standards. This includes the global fire safety system in a facility and active fire protection systems; detection, suppression, smoke management.

Precludes additional credit for CIVE 5707 (2001-2003), CIVE 5609.

IPIS 5505 [0.5 credit]**Geohazards**

Earthquakes and ground motion, tsunamis, landslides, liquefaction; soil properties for ground response analysis: laboratory tests, in-situ tests; dams and embankments, slope stability, seismic effects on slope stability, retaining structures.

IPIS 5506 [0.5 credit]**Public Health Safety**

Public health protection: environmental, political, and societal issues; microbes in water, food, and air; toxic chemicals and heavy metals; detection, and fate of chemicals and pathogens in the environment; epidemiology; toxicology; risk assessment; water supply and treatment.

IPIS 5507 [0.5 credit]**Blast-load Effects on Structures**

Threats, risk analysis, vulnerability assessment; explosives: types and mechanisms; load determination; response of structural elements under blast loads, analysis and design for blast loads; blast mitigation, retrofit of structures; post-event assessment.

Also listed as CIVE 5507.

Precludes additional credit for CIVE 5707 (2007-2008).

IPIS 5520 [0.5 credit]**Selected Topics in Engineering of Critical Infrastructure**

Courses in special topics related to infrastructure security, not covered by other graduate courses; course topics will be available prior to registration.

IPIS 5907 [1.0 credit]**Infrastructure Engineering Project**

Students enrolled in the project option will conduct a study, analysis, or design project that relates to the protection and security of infrastructure under the general supervision of a member of the department.

IPIS 5908 [1.0 credit]**Research Essay**

Under the general guidance of a research supervisor, students enrolled in the research essay option will conduct independent research on a relevant topic that integrates the infrastructure, engineering and security elements of their program of study.

IPIS 5913 [0.0 credit]**Co-operative Work Term**

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