Infrastructure Protection and International Security

This section presents the requirements for programs in:

- **M.Eng. Infrastructure Protection and International Security**
- **M.Eng. Infrastructure Protection and International Security with Collaborative Specialization in Cybersecurity**
- **M. Infrastructure Protection and International Security**
- **M. Infrastructure Protection and International Security with Collaborative Specialization in Cybersecurity**
- **Graduate Diploma in Infrastructure Protection and International Security**

Program Requirements

M.Eng. Infrastructure Protection and International Security (5.0 credits)

Requirements - Research project pathway:

1. 1.5 credits in:		1.5
IPIS 5101 [0.5]	Critical Infrastructure Protection: Issues and Strategies	
IPIS 5105 [0.5]	Critical Infrastructure Risk Assessment	
IPIS 5106 [0.5]	Management of Critical Infrastructure	
2. 1.0 credit from:		1.0
IPIS 5104 [0.5]	Terrorism and International Security	
IPIS 5301 [0.5]	Disarmament, Arms Control and Nonproliferation	
IPIS 5302 [0.5]	Contemporary International Security	
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 5306 [0.5]	Emergency and Business Continuity Management	
IPIS 5320 [0.5]	Topics in Infrastructure Security Policy	
Or 5000-level courses from the Intelligence and International Affairs (IIA) and Security Defence Policy (SDP) designated fields offered by the Norman Paterson School of International Affairs.		
3. 1.5 credit from:		1.5
IPIS 5501 [0.5]	Transportation and Aviation Security	
IPIS 5504 [0.5]	Fundamentals of Fire Safety	
IPIS 5505 [0.5]	Natural Hazards in Canada: Risk and Impact	
IPIS 5507 [0.5]	Blast Load Effects on Structures	
IPIS 5508 [0.5]	Introduction to Explosives and Explosion Effects as they relate to Infrastructure and its Components	
IPIS 5509 [0.5]	Introduction to Cybersecurity	
IPIS 5520 [0.5]	Selected Topics in Engineering of Critical Infrastructure	
or an engineering course approved by the IPIS Director or Associate Director.		
4. 1.0 credit in:		**1.0**
IPIS 5907 [1.0]	Research Project (in the area of the specialization)	
Total Credits		**5.0**

Requirements - Coursework pathway:

1. 1.5 credits in:		1.5
IPIS 5101 [0.5]	Critical Infrastructure Protection: Issues and Strategies	
IPIS 5105 [0.5]	Critical Infrastructure Risk Assessment	
IPIS 5106 [0.5]	Management of Critical Infrastructure	
2. 1.0 credit from:		1.0
IPIS 5104 [0.5]	Terrorism and International Security	
IPIS 5301 [0.5]	Disarmament, Arms Control and Nonproliferation	
IPIS 5302 [0.5]	Contemporary International Security	
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 5306 [0.5]	Emergency and Business Continuity Management	
IPIS 5320 [0.5]	Topics in Infrastructure Security Policy	
Or 5000-level courses from the Intelligence and International Affairs (IIA) and Security Defence Policy (SDP) designated fields offered by the Norman Paterson School of International Affairs.		
3. 1.5 credit from:		1.5
IPIS 5501 [0.5]	Transportation and Aviation Security	
IPIS 5504 [0.5]	Fundamentals of Fire Safety	
IPIS 5505 [0.5]	Natural Hazards in Canada: Risk and Impact	
IPIS 5507 [0.5]	Blast Load Effects on Structures	
IPIS 5508 [0.5]	Introduction to Explosives and Explosion Effects as they relate to Infrastructure and its Components	
IPIS 5509 [0.5]	Introduction to Cybersecurity	
IPIS 5520 [0.5]	Selected Topics in Engineering of Critical Infrastructure	
or an engineering course approved by the IPIS Director or Associate Director.		
4. 1.0 credit from graduate courses from the Faculty of Engineering and Design that have been selected in consultation with, and approved by, the MIPIS Director and Associate Director.		1.0
Total Credits		**5.0**

M.Eng. Infrastructure Protection and International Security with Collaborative Specialization in Cybersecurity (5.0 credits)

Requirements - Research project pathway:

1. 1.0 credit in:		1.0
CYBR 5000 [1.0]	Science and Social Science of Cybersecurity	
2. 1.5 credits in:		1.5
IPIS 5101 [0.5]	Critical Infrastructure Protection: Issues and Strategies	
IPIS 5105 [0.5]	Critical Infrastructure Risk Assessment	
IPIS 5106 [0.5]	Management of Critical Infrastructure	
3. 0.5 credit from:		0.5
IPIS 5104 [0.5]	Terrorism and International Security	
IPIS 5301 [0.5]	Disarmament, Arms Control and Nonproliferation	
IPIS 5302 [0.5]	Contemporary International Security	
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 5306 [0.5]	Emergency and Business Continuity Management	
IPIS 5320 [0.5]	Topics in Infrastructure Security Policy	
Or 5000-level courses from the Intelligence and International Affairs (IIA) and Security Defence Policy (SDP) designated fields offered by the Norman Paterson School of International Affairs.		
4. 1.0 credit from:		1.0
IPIS 5501 [0.5]	Transportation and Aviation Security	
IPIS 5504 [0.5]	Fundamentals of Fire Safety	
IPIS 5505 [0.5]	Natural Hazards in Canada: Risk and Impact	
IPIS 5507 [0.5]	Blast Load Effects on Structures	
IPIS 5508 [0.5]	Introduction to Explosives and Explosion Effects as they relate to Infrastructure and its Components	
IPIS 5509 [0.5]	Introduction to Cybersecurity	
IPIS 5520 [0.5]	Selected Topics in Engineering of Critical Infrastructure	
or an engineering course approved by the IPIS Director or Associate Director.		
5. 1.0 credit in:		**1.0**
IPIS 5907 [1.0]	Research Project (in the area of the specialization)	
Total Credits		**5.0**

Requirements - Coursework pathway:

1. 1.0 credit in:		1.0
CYBR 5000 [1.0]	Science and Social Science of Cybersecurity	
2. 1.5 credits in:		1.5
IPIS 5101 [0.5]	Critical Infrastructure Protection: Issues and Strategies	
IPIS 5105 [0.5]	Critical Infrastructure Risk Assessment	
IPIS 5106 [0.5]	Management of Critical Infrastructure	
3. 1.0 credit from:		1.0
IPIS 5104 [0.5]	Terrorism and International Security	
IPIS 5301 [0.5]	Disarmament, Arms Control and Nonproliferation	
IPIS 5302 [0.5]	Contemporary International Security	
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 5306 [0.5]	Emergency and Business Continuity Management	
IPIS 5320 [0.5]	Topics in Infrastructure Security Policy	
Or 5000-level courses from the Intelligence and International Affairs (IIA) and Security Defence Policy (SDP) designated fields offered by the Norman Paterson School of International Affairs.		
4. 1.0 credit from:		1.0
IPIS 5501 [0.5]	Transportation and Aviation Security	
IPIS 5504 [0.5]	Fundamentals of Fire Safety	
IPIS 5505 [0.5]	Natural Hazards in Canada: Risk and Impact	
IPIS 5507 [0.5]	Blast Load Effects on Structures	
IPIS 5508 [0.5]	Introduction to Explosives and Explosion Effects as they relate to Infrastructure and its Components	
IPIS 5509 [0.5]	Introduction to Cybersecurity	
IPIS 5520 [0.5]	Selected Topics in Engineering of Critical Infrastructure	
or an engineering course approved by the IPIS Director or Associate Director.		
5. 0.5 credit in approved electives in the area of the specialization		
6. 0.5 credit from graduate courses from the Faculty of Engineering and Design that have been selected in consultation with, and approved by, the MIPIS Director and Associate Director.		0.5
Total Credits		**5.0**

M. Infrastructure Protection and International Security (5.0 credits)

Requirements:

1. 2.0 credits in:		2.0
IPIS 5101 [0.5]	Critical Infrastructure Protection: Issues and Strategies	
IPIS 5103 [0.5]	Infrastructure Engineering Principles	
IPIS 5105 [0.5]	Critical Infrastructure Risk Assessment	
IPIS 5106 [0.5]	Management of Critical Infrastructure	
2. 1.0 credit from:		1.0

IPIS 5104 [0.5]	Terrorism and International Security	
IPIS 5301 [0.5]	Disarmament, Arms Control and Nonproliferation	
IPIS 5302 [0.5]	Contemporary International Security	
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 5306 [0.5]	Emergency and Business Continuity Management	
IPIS 5320 [0.5]	Topics in Infrastructure Security Policy	
Or 5000-level courses from the IIA or SDP designated fields offered by the Norman Paterson School of International Affairs.		
3. 1.0 credit from:		1.0
IPIS 5501 [0.5]	Transportation and Aviation Security	
IPIS 5504 [0.5]	Fundamentals of Fire Safety	
IPIS 5505 [0.5]	Natural Hazards in Canada: Risk and Impact	
IPIS 5507 [0.5]	Blast Load Effects on Structures	
IPIS 5508 [0.5]	Introduction to Explosives and Explosion Effects as they relate to Infrastructure and its Components	
IPIS 5509 [0.5]	Introduction to Cybersecurity	
IPIS 5520 [0.5]	Selected Topics in Engineering of Critical Infrastructure	
4. 1.0 credit normally comprised of courses with CIVE, INAF or IPIS course designations, but may also be chosen from related programs that have been selected in consultation with, and approved by, the MIPIS Director and Associate Director and associated faculty when necessary.		1.0
Total Credits		**5.0**

M. Infrastructure Protection and International Security with Collaborative Specialization in Cybersecurity (5.0 credits)

Requirements:

1. 1.0 credit in:		1.0
CYBR 5000 [1.0]	Science and Social Science of Cybersecurity	
2. 2.0 credits in:		2.0
IPIS 5101 [0.5]	Critical Infrastructure Protection: Issues and Strategies	
IPIS 5103 [0.5]	Infrastructure Engineering Principles	
IPIS 5105 [0.5]	Critical Infrastructure Risk Assessment	
IPIS 5106 [0.5]	Management of Critical Infrastructure	
3. 1.0 credit from:		1.0
IPIS 5104 [0.5]	Terrorism and International Security	
IPIS 5301 [0.5]	Disarmament, Arms Control and Nonproliferation	
IPIS 5302 [0.5]	Contemporary International Security	
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 5306 [0.5]	Emergency and Business Continuity Management	
IPIS 5320 [0.5]	Topics in Infrastructure Security Policy	
Or 5000-level courses from the IIA or SDP designated fields offered by the Norman Paterson School of International Affairs.		
4. 0.5 credit from:		0.5
IPIS 5501 [0.5]	Transportation and Aviation Security	
IPIS 5504 [0.5]	Fundamentals of Fire Safety	
IPIS 5505 [0.5]	Natural Hazards in Canada: Risk and Impact	
IPIS 5507 [0.5]	Blast Load Effects on Structures	
IPIS 5508 [0.5]	Introduction to Explosives and Explosion Effects as they relate to Infrastructure and its Components	
IPIS 5509 [0.5]	Introduction to Cybersecurity	
IPIS 5520 [0.5]	Selected Topics in Engineering of Critical Infrastructure	
5. 0.5 credit in elective in the area of the specialization, selected in consultation with, and approved by, the MIPIS Director and Associate Director and associated faculty when necessary.		0.5
Total Credits		**5.0**

Graduate Diploma in Infrastructure Protection and International Security (3.0 credits)

Type 2 (Concurrent), Type 3 (Direct Entry)

Requirements:

1. 1.5 credits in:		1.5
IPIS 5101 [0.5]	Critical Infrastructure Protection: Issues and Strategies	
IPIS 5105 [0.5]	Critical Infrastructure Risk Assessment	
IPIS 5106 [0.5]	Management of Critical Infrastructure	
2. 1.0 credit from electives:		1.0
IPIS 5104 [0.5]	Terrorism and International Security	
IPIS 5301 [0.5]	Disarmament, Arms Control and Nonproliferation	
IPIS 5302 [0.5]	Contemporary International Security	
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 Policy	
IPIS 5501 [0.5]	Transportation and Aviation Security	
IPIS 5504 [0.5]	Fundamentals of Fire Safety	
IPIS 5505 [0.5]	Natural Hazards in Canada: Risk and Impact	

IPIS 5507 [0.5]	Blast Load Effects on Structures	
IPIS 5508 [0.5]	Introduction to Explosives and Explosion Effects as they relate to Infrastructure and its Components	
IPIS 5520 [0.5]	Selected Topics in Engineering of Critical Infrastructure	
3. 0.5 credit in:		0.5
a) for students without a B.Eng. in Civil Engineering (or equivalent):		
IPIS 5103 [0.5]	Infrastructure Engineering Principles	
b) for students with a B.Eng. in Civil Engineering (or equivalent):		
0.5 additional credit from electives in Item 2 above		
Total Credits		**3.0**

Co-operative Education

For information about how to apply for the Co-op program and how the Co-op program works, visit the Co-op website.

All graduate students participating in the Co-op program are governed by this Graduate Co-operative Education Policy.

Application Requirements

Graduate students are encouraged to apply to the Co-op Program during their first term of studies. Alternatively, students may delay their participation until later on, provided that they have mandatory credits remaining for degree completion.

Participation Requirements

Graduate students:

- must be registered as full-time before they begin their co-op job search and their co-op work term.
- will be registered in a Co-op Work Term course while at work. This course does not carry academic course credit, but is noted on academic transcripts.
- may register in a 0.5 credit during a work term, provided the course is offered during the evening or is offered asynchronously online.
- are not permitted to hold a Teaching Assistantship while on a co-op work term. Where eligible, Teaching Assistantships will be deferred to a later term.
- in receipt of internal or external scholarships should contact the Faculty of Graduate and Post-Doctoral Affairs to discuss the possible funding implications of being on a co-op work term
- must have mandatory courses left to complete following their final co-op work term. In cases where the graduate student has just a 0.5 credit left, he or she may request permission of the Co-op Office to complete this course during the work term.

Co-op Participation Agreement

All graduate students must adhere to the policies found within the Co-op Participation Agreement.

Communication with the Co-op Office

Graduate students must maintain regular contact with the Co-op Office during their job search and while on a work term. All email communication will be conducted via the student's Carleton email account.

Graduation with the Co-op Designation

In order to graduate with the Co-op Designation, graduate students must satisfy all requirements of the degree program in addition to the successful completion of two work terms. Students found in violation of the Co-op Participation Agreement may have the Co-op Designation withheld.

Employment

Although every effort is made to ensure a sufficient number of job postings for all Co-op students, no guarantee of employment can be made. The Co-op job search process is competitive, and success is dependent upon factors such as current market conditions, academic performance, skills, motivation, and level of commitment to the job search. It is the student's responsibility to apply for positions via the Co-op job board in addition to actively conducting a self-directed job search. Students who do not obtain a co-op work term are expected to continue with their academic studies. It should be noted that hiring priority for positions within the Federal Government of Canada is given to Canadian citizens.

Work Term Assessment and Evaluation

Work Term Evaluation

Employers are responsible for submitting to Carleton University final performance evaluations for their Co-op students at the end of their work terms.

Work Term Assessment

In order to successfully complete the co-op work term, graduate students must receive a Satisfactory (SAT) grade on their Co-op Work Term Report, which they must submit at the completion of each four-month work term.

Voluntary Withdrawal from the Co-op Option

Students who are currently on a co-op work term or who have already committed to a co-op work term either verbally or in writing may not leave the position and/or withdraw from the co-op option until they have completed the requirements of the work term.

Involuntary or Required Withdrawal from the Co-op Option

Graduate students may be removed from the Co-op Program for any of the following reasons:

1. Failure to attend all interviews for positions to which the student has applied;
2. Declining more than one job offer during the job search;
3. Reneging on a co-op position that the student has accepted either verbally or in writing;
4. Continuing a job search after accepting a co-op position;
5. Dismissal from a work term by the co-op employer;

6. Leaving a work term without approval from the Co-op Management Team;
7. Receipt of an unsatisfactory work term evaluation;
8. Receiving a grade of UNS on the work term report;

International Students

All Graduate International Students are required to possess a Co-op Work Permit issued by Immigration, Refugees and Citizenship Canada before they can begin working. The Co-operative Education Office will provide students with a letter of support to accompany their Co-op Work Permit application. Students are advised to discuss the application process and application requirements with the International Student Services Office.

Co-op Fees

All participating Co-op students are required to pay Co-op fees. For full details, please see the Co-op website.

Infrastructure Protection and International Security MIPIS Co-operative Education Option

Students are encouraged to apply for admission to the Co-operative Education Program by the end of their first term of academic study.

To be eligible for admission to Co-op, students must:

1. be enrolled in the Master of Infrastructure Protection and International Security or the Master of Engineering Infrastructure Protection and International Security;
2. have successfully completed, by the end of their first term of academic study, at least 1.5 credits toward the M.IPIS or the M.Eng IPIS;
3. have successfully completed, by the start-date of the first work term, a total of 3.0 credits toward the M.IPIS or the M.Eng IPIS, 1.5 of which must be core compulsory credits and IPIS 5002 or IPIS 5003, as required;
4. be registered as a full-time student in each academic term prior to a work term;
5. be eligible to work in Canada (for off-campus work terms)

For more information, please refer to the Co-operative Education Policy.

Admission Requirements

Proficiency in English is necessary to pursue graduate studies at Carleton University. All applicants whose first language is not English must satisfy this requirement as per the General Regulations.

M. Infrastructure Protection and International Security

The minimum requirement for admission into the M. I.P.I.S. is a B.A. Honours degree in a discipline related to International Affairs or a Bachelor's degree in Science or Engineering. Students will normally be expected to have a B+ average (or higher) to be considered for admission.

Students without a background in engineering or science will be required to complete IPIS 5003 [0.0] Mathematics and Engineering Primer for non-Engineers, which will be in addition to the regular degree requirements and is to be completed in the first fall term in which the student is registered. IPIS 5003 is a prerequisite for the required course in Infrastructure Engineering Principles, and for other engineering electives.

M. Eng. Infrastructure Protection and International Security

The minimum requirement for admission into the M.Eng. I.P.I.S. is a B.Eng. degree or equivalent. Students will normally be expected to have a B+ average (or higher) to be considered for admission.

Students without a background in the social sciences or policy work in the Canadian context will be required to complete IPIS 5002 [0.0] Policy Primer, which will be in addition to the regular degree requirements and is to be completed in the first fall term in which the student is registered.

Accelerated Pathway

The accelerated pathway to the Master of Infrastructure Protection and International Security and the Master of Engineering in Infrastructure Protection and International Security is a flexible and individualized plan of graduate study for students in their final year of a Carleton undergraduate degree in a related discipline.

Students in their third year of study in their undergraduate program who are interested in the accelerated pathway should consult with the Director and Associate Director in the I.P.I.S. Program to determine if the accelerated pathway is appropriate for them and to confirm their selection of courses and Honours project/thesis supervisor for their final year of undergraduate studies.

Accelerated Pathway Requirements

1. IPIS courses at the 5000-level with a grade of B+ or higher
2. Minimum overall CGPA of A-

Students may receive advanced standing with transfer of credit of up to 1.0 credit which can reduce their time to completion.

Infrastructure Protection and International Security (IPIS) Courses

IPIS 5002 [0.0 credit]
Policy Primer
Designed to provide MIPIS, MENG IPIS and Graduate Diploma in IPIS students with analytical, writing, and argument formulating strategies to apply in other courses during their studies. Includes review of policy making, government departments, writing for government, and proper citation strategies.

IPIS 5003 [0.0 credit]
Mathematics and Engineering Primer for non-Engineers
Review and application of basic mathematics, physics and engineering principles required to prepare non-engineers and other students without a previous background in mathematics for the required course in Infrastructure Engineering Principles and other engineering 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.
Prerequisite(s): Registration in the G.Dip (IPIS), M.IPIS or M.Eng (IPIS) degrees or permission of the Infrastructure Protection and International Security Program.

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.
Prerequisite(s): Registration in the G.Dip (IPIS), M.IPIS or M.Eng (IPIS) degrees or permission of the Infrastructure Protection and International Security Program.

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 5105 [0.5 credit]
Critical Infrastructure Risk Assessment
Risk-assessment techniques and methodologies relevant for the identification of threats. Assessment of vulnerabilities and evaluating the impact on infrastructures or systems considering the probability of such threats being realized.
Prerequisite(s): Registration in the G.Dip (IPIS), M.IPIS or M.Eng (IPIS) degrees or permission of the Infrastructure Protection and International Security Program.

IPIS 5106 [0.5 credit]
Management of Critical Infrastructure
Management of critical infrastructure (CI) and its relationship to facility and asset management; asset maintenance, rehabilitation, and restoration; tools, systems and approaches to effective CI management, integration and linkages across CI and consequent challenges to managers of critical infrastructure systems.
Prerequisite(s): Registration in the G.Dip (IPIS), M.IPIS or M.Eng (IPIS) degrees or permission of the Infrastructure Protection and International Security Program.

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]
Contemporary International Security
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 5306 [0.5 credit]
Emergency and Business Continuity Management
The disciplines of emergency management and business continuity, their interaction, and how they provide complementary contributions to critical infrastructure protection and resilience. A focus on Canada and Canadian Standards is supplemented by consideration of broader international approaches and contexts.
Precludes additional credit for IPIS 5320 taken before Winter 2021.
Prerequisite(s): Registration in the M.IPIS or M.Eng(IPIS) degrees or permission of the Infrastructure Protection and International Security Program.

IPIS 5320 [0.5 credit]
Topics in Infrastructure Security Policy
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 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 5609.

IPIS 5505 [0.5 credit]
Natural Hazards in Canada: Risk and Impact
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.
Also listed as ERTH 5215.

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.
Prerequisite(s): those enrolled in the M.IPIS program must have prior knowledge of structural steel and reinforced concrete design, typically obtained through the completion of an undergraduate engineering degree.

IPIS 5508 [0.5 credit]
Introduction to Explosives and Explosion Effects as they relate to Infrastructure and its Components
Properties and effects of explosives, propellants and pyrotechnics, detonation, deflagration and consequence of confinement, commercial and military applications including areas of terrorism and entertainment, sensitivities and hazards in transport, storage and use, specialized charges, explosion effects and indicators, and bombings and accident investigations.
Precludes additional credit for IPIS 5520.

IPIS 5509 [0.5 credit]
Introduction to Cybersecurity
Introductory cyber security principles with an emphasis on critical infrastructure protection. Basic concepts in computer networking, including: local and remote access, cloud computing, vulnerability identification and threat assessment, attack methodologies and exposed access points, access control and authentication.
Precludes additional credit for IPIS 5520 taken before January 2021.
Prerequisite(s): Registration in the M.IPIS or M.Eng(IPIS) degrees or permission of the Infrastructure Protection and International Security Program.

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 5901 [0.5 credit]
Tutorials in Infrastructure Protection and International Security
To be selected in consultation with Director and/or Associate Director.

IPIS 5907 [1.0 credit]
Research Project
Students may be given permission to undertake an approved research project that will conduct a study, analysis or design project that relates to the protection and security of infrastructure under the general supervision of an engineer approved by the MIPIS Director or Graduate Supervisor.
Includes: Experiential Learning Activity
Prerequisite(s): permission of the MIPIS Program Director or Graduate Supervisor.

IPIS 5908 [1.0 credit]
Research Paper
Students may be given permission to conduct independent research under the general guidance of a research supervisor, examining an approved policy-relevant topic that integrates the infrastructure, engineering and security elements of their program of study.
Includes: Experiential Learning Activity
Prerequisite(s): permission of the MIPIS Program Director or Graduate Supervisor.

IPIS 5913 [0.0 credit]
Co-operative Work Term
Includes: Experiential Learning Activity
Prerequisite(s): Full-time M. IPIS or M. Eng IPIS students who have completed a minimum of three classes (1.5 credits) in each of their first two terms, including 1.5 credits in core compulsory courses, and IPIS 5002 or IPIS 5003 as required are eligible for registration in their third term. Eligibility for registration in subsequent co-op terms requires the successful completion of all core program requirements.