Cybersecurity (Collaborative Specialization)

This section presents the requirements for programs in:

- **M.C.S. Computer Science with Collaborative Specialization in Cybersecurity**
- **M.A.Sc. Electrical and Computer Engineering with Collaborative Specialization in Cybersecurity**
- **M.Eng. Electrical and Computer Engineering with Collaborative Specialization in Cybersecurity**
- **M.Eng. Infrastructure Protection and International Security with Collaborative Specialization in Cybersecurity**
- **M.A.Sc. Digital Media with Collaborative Specialization in Cybersecurity**
- **Master of Networking Technology with Collaborative Specialization in Cybersecurity**
- **M. Infrastructure Protection and International Security with Collaborative Specialization in Cybersecurity**
- **M.A. International Affairs with Collaborative Specialization in Cybersecurity**

Program Requirements

M.C.S. Computer Science with Collaborative Specialization in Cybersecurity (5.0 credits)

Requirements - Thesis pathway (5.0 credits)

1. 1.0 credit in:		1.0
CYBR 5000 [1.0]	Science and Social Science of Cybersecurity	
2. 1.5 credits in course work. Course work must include a minimum of 1.5 credits of OCICS courses in three different research areas (see OCICS course listing by research areas).		1.5
3. 2.5 credits in graduate thesis (Each candidate submitting a thesis will be required to undertake an oral defence of the thesis).		2.5
COMP 5905 [2.5]	M.C.S. Thesis (in the area of the specialization)	
Total Credits		**5.0**

Requirements - Non-Thesis pathway (5.0 credits)

1. 1.0 credit in:		1.0
CYBR 5000 [1.0]	Science and Social Science of Cybersecurity	
2. 3.0 credits in course work. Course work must include a minimum of 1.5 credits of OCICS courses in three different research areas (see OCICS course listing by research areas).		3.0
3. 1.0 credit in Graduate project OR additional OCICS courses.		1.0
COMP 5903 [1.0]	Graduate Project (M.C.S.) (in the area of the specialization)	
OR		
1.0 credits of additional OCICS courses		
Total Credits		**5.0**

M.A.Sc. Electrical and Computer Engineering 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	
3. 1.5 credits in courses		1.5
4. 2.5 credits in:		2.5
SYSC 5909 [2.5]	M.A.Sc. Thesis (in the area of cybersecurity)	
Total Credits		**5.0**

M.Eng. Electrical and Computer Engineering with Collaborative Specialization in Cybersecurity (4.5 credits)

Requirements - project pathway (4.5 credits)

1. 0.5 credit in:		0.5
SYSC 5902 [0.5]	Research Methods for Engineers	
2. 1.0 credit in:		1.0
CYBR 5000 [1.0]	Science and Social Science of Cybersecurity	
4. 2.5 credits in courses		2.5
5. 0.5 credit in:		0.5
SYSC 5900 [0.5]	Systems Engineering Project (in the area of cybersecurity)	
Total Credits		**4.5**

Requirements - coursework pathway (4.5 credits)

1. 0.5 credit in:		0.5
SYSC 5902 [0.5]	Research Methods for Engineers	
1. 1.0 credit in:		1.0
CYBR 5000 [1.0]	Science and Social Science of Cybersecurity	
4. 3.0 credits in courses, including 0.5 credit in approved elective in the area of the specialization		3.0
Total Credits		**4.5**

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.A.Sc. Digital Media 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. 0.0 credit in:		
ITEC 5001 [0.0]	Information Technology Seminars	
3. 1.5 credit from core courses:		1.5
ITEC 5002 [0.5]	Fundamentals of Information Technology Research	
ITEC 5200 [0.5]	Entertainment Technologies	
ITEC 5201 [0.5]	Computer Animation Technologies	
ITEC 5202 [0.5]	Visual Effects Technologies	
ITEC 5203 [0.5]	Game Design and Development Technologies	
ITEC 5204 [0.5]	Emerging Interaction Techniques	
ITEC 5205 [0.5]	Design and Development of Data-Intensive Applications	
ITEC 5206 [0.5]	Data Protection and Rights Management	
ITEC 5207 [0.5]	Data Interaction Techniques	
ITEC 5208 [0.5]	Virtual Reality and 3D User Interfaces	
ITEC 5209 [0.5]	Empirical Research Methods in HCI	
ITEC 5920 [0.5]	Special Topics in Digital Media	
5. 2.5 credits in:		2.5
ITEC 5909 [2.5]	Master's Thesis (in the specialization)	
Total Credits		**5.0**

Master of Networking Technology 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. 0.0 credit in:		
ITEC 5001 [0.0]	Information Technology Seminars	
3. 2.0 credits from core courses:		2.0
ITEC 5100 [0.5]	Planning and Design of Computer Networks	
ITEC 5101 [0.5]	Cross Layer Design for Wireless Multimedia Networks	
ITEC 5102 [0.5]	Designing Secure Networking and Computer Systems	
ITEC 5103 [0.5]	Cloud and Datacentre Networking	
ITEC 5205 [0.5]	Design and Development of Data-Intensive Applications	
ITEC 5910 [0.5]	Special Topics in Network Technologies	
4. 0.5 credit in the area of the specialization, approved by the graduate supervisor or the Associate Director of Graduate Studies in the School.		0.5
5. 1.5 credits in electives at the 5000-level, chosen in consultation with your graduate advisor/supervisor or the Associate Director of Graduate Studies in the School.		1.5
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**

M.A. International Affairs with Collaborative Specialization in Cybersecurity (5.0 credits)

Requirements - Thesis 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
INAF 5015 [0.5]	Research Design and Methods for International Affairs	
INAF 5016 [0.5]	Statistical Analysis for International Affairs	
INAF 5017 [0.25]	International Policymaking in Canada: Structure and Process	
INAF 5018 [0.25]	Law and International Affairs	
3. 0.5 credit in economics, successfully completed by the end of the second term, from (See Note 1, below):		0.5
INAF 5009 [0.5]	International Aspects of Economic Development	
INAF 5205 [0.5]	Economics of Conflict	
INAF 5214 [0.5]	Economics for Defence and Security	
INAF 5221 [0.5]	Economics of Security and Intelligence	
INAF 5308 [0.5]	International Trade: Theory and Policy	
INAF 5309 [0.5]	International Finance: Theory and Policy	
INAF 5600 [0.5]	The Economics of Human Development	
INAF 5703 [0.5]	International Public Economics	
4. 2.0 credits in:		2.0
INAF 5909 [2.0]	M.A. Thesis (in the specialization)	
5. Successful completion of second language proficiency examination (See Note 3, below)		
Total Credits		**5.0**

Requirements - Research essay pathway:

1. 1.0 credit in:		1.0
CYBR 5000 [1.0]	Science and Social Science of Cybersecurity	
2. 1.5 credit in:		1.5
INAF 5015 [0.5]	Research Design and Methods for International Affairs	
INAF 5016 [0.5]	Statistical Analysis for International Affairs	
INAF 5017 [0.25]	International Policymaking in Canada: Structure and Process	
INAF 5018 [0.25]	Law and International Affairs	
3. 0.5 credit in economics, successfully completed by the end of the second term, from: (See Note 1, below)		0.5
INAF 5009 [0.5]	International Aspects of Economic Development	
INAF 5205 [0.5]	Economics of Conflict	
INAF 5214 [0.5]	Economics for Defence and Security	
INAF 5221 [0.5]	Economics of Security and Intelligence	
INAF 5308 [0.5]	International Trade: Theory and Policy	
INAF 5309 [0.5]	International Finance: Theory and Policy	
INAF 5600 [0.5]	The Economics of Human Development	
INAF 5703 [0.5]	International Public Economics	
4. 1.0 credit in:		1.0
INAF 5908 [1.0]	Research Essay (in the specialization)	
5. 1.0 credits in Field and Elective courses (See Note 2, below)		1.0
6. Successful completion of second language proficiency examination (see Note 3, below)		
Total Credits		**5.0**

Requirements - Coursework pathway (5.0 credits)

1. 1.0 credit in:		1.0
CYBR 5000 [1.0]	Science and Social Science of Cybersecurity	
2. 1.0 credit in:		1.0
INAF 5016 [0.5]	Statistical Analysis for International Affairs	
INAF 5017 [0.25]	International Policymaking in Canada: Structure and Process	
INAF 5018 [0.25]	Law and International Affairs	
3. 0.5 credit in economics, successfully completed by the end of the second term, from: (See Note 1, below)		0.5
INAF 5009 [0.5]	International Aspects of Economic Development	
INAF 5205 [0.5]	Economics of Conflict	
INAF 5214 [0.5]	Economics for Defence and Security	
INAF 5221 [0.5]	Economics of Security and Intelligence	
INAF 5308 [0.5]	International Trade: Theory and Policy	
INAF 5309 [0.5]	International Finance: Theory and Policy	
INAF 5600 [0.5]	The Economics of Human Development	
INAF 5703 [0.5]	International Public Economics	
4. 0.5 credit in courses in the area of the specialization and approved by the NPSIA M.A. Program Supervisor or Associate Director as being relevant to the student's program of study.		0.5
5. 2.0 credits in Field and Elective courses (See Note 2, below)		2.0
6. Successful completion of second language proficiency examination (see Note 3, below)		
Total Credits		**5.0**

1. All students must complete the 0.5 credit economics course for their designated field, or an approved alternate economics course. For students in the IEP field both INAF 5308 and INAF 5309 , or approved equivalent, must be completed.
2. For elective courses, 1.5 credits of the total required 5.0 credits may be selected from courses offered in other departments, with a maximum of 1.0 credit from a single department and a maximum of 1.0 credit selected from fourth year undergraduate courses. Any course not identified as an INAF 5000-level course must be approved by the M.A. Program Supervisor.
3. Students must successfully complete an examination in second language proficiency administered by Carleton University's School of Linguistics and Language Studies, or meet the equivalent standard as determined by the School of Linguistics and Language Studies. Details of the language requirement are provided on the School website.

Regulations

See the General Regulations section of this Calendar and the regulations of the participating unit.

Admission Requirements

Admission to the collaborative master’s program in Cybersecurity is available to master’s students who are admitted in one of the participating master’s programs. To apply to one of the participating master’s programs, please visit the Graduate Studies Admissions page.

Cybersecurity (CYBR) Courses

CYBR 5000 [1.0 credit]
Science and Social Science of Cybersecurity
Overview of legal, governance, and strategic considerations of cybersecurity from a Canadian and international perspective, and the computer science and engineering concepts critical to effective cybersecurity operations.