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 - Research Project pathway (5.0 credits)

4	1.0 orodit in:		1 (
Re	equirements - Thes	is pathway (5.0 credits)	
To	otal Credits		5.0
	COMP 5903 [1.0]	Graduate Project (M.C.S.) (in the area of the specialization)	
4.	1.0 credit in gradua	ate project.	1.0
mi re	nimum of 1.5 credits	se work. Course work must include a of OCICS courses in three different CICS course listing by research	3.0
	CYBR 5000 [1.0]	Science and Social Science of Cybersecurity	
1.	1.0 credit in:		1.0

1. 1.0 0	realt III.		1.0	
CYBI	R 5000 [1.0]	Science and Social Science of		
Cybersecurity				
2 150	redits in cour	se work. Course work must include a	1.5	

- minimum of 1.5 credits of OCICS courses in three different research areas (see OCICS course listing by research
- 3. 2.5 credits in graduate thesis (Each candidate submitting a thesis will be required to undertake an ordal defence of the thesis).

COMP 5905 [2.5]	M.C.S. Thesis (in the area of the
	specialization)

Total Credits

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 cour	ses	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 cour	ses	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
	sework pathway (4.5 credits)	4.5
	sework pathway (4.5 credits)	4.5 0.5
Requirements - cour	sework pathway (4.5 credits) Research Methods for Engineers	
Requirements - cour 1. 0.5 credit in:	, ,,	
Requirements - cour 1. 0.5 credit in: SYSC 5902 [0.5]	, ,,	

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

elective in the area of the specialization

Total Credits

2.5

Requirements - Research project pathway:

N	equirements - Rese	arcii project patriway.	
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	

4.5

IPIS 5303 [0.5]	Intelligence Statecraft and International Affairs			s from the Intelligence and IA) and Security Defence Policy	
IPIS 5304 [0.5]	Intelligence and National Security: Policies and Operations		(SDP) designated fiel School of International	ds offered by the Norman Paterson al Affairs.	
IPIS 5305 [0.5]	National Security Policy and Law		4. 1.0 credit from:		1.0
IPIS 5306 [0.5]	Emergency and Business Continuity Management		IPIS 5501 [0.5]	Transportation and Aviation Security	
IPIS 5320 [0.5]	Topics in Infrastructure Security		IPIS 5504 [0.5]	Fundamentals of Fire Safety	
	Policy s from the Intelligence and		IPIS 5505 [0.5]	Natural Hazards in Canada: Risk and Impact	
International Affairs (IIA) and Security Defence Policy		IPIS 5507 [0.5]	Blast Load Effects on Structures	
(SDP) designated fiel School of International	lds offered by the Norman Paterson		IPIS 5508 [0.5]	Introduction to Explosives and	
4. 1.0 credit from:	ai Alialis.	1.0		Explosion Effects as they relate to Infrastructure and its Components	
IPIS 5501 [0.5]	Transportation and Aviation	1.0	IPIS 5509 [0.5]	Introduction to Cybersecurity	
	Security		IPIS 5520 [0.5]	Selected Topics in Engineering of	
IPIS 5504 [0.5]	Fundamentals of Fire Safety		or an anginopring ou	Critical Infrastructure	
IPIS 5505 [0.5]	Natural Hazards in Canada: Risk and Impact		Associate Director.	urse approved by the IPIS Director or	
IPIS 5507 [0.5]	Blast Load Effects on Structures		5. 0.5 credit in appro	oved electives in the area of the	
IPIS 5508 [0.5]	Introduction to Explosives and Explosion Effects as they relate to Infrastructure and its Components		6. 0.5 credit from gr	aduate courses from the Faculty esign that have been selected in	0.5
IPIS 5509 [0.5]	Introduction to Cybersecurity			approved by, the MIPIS Director and	
IPIS 5520 [0.5]	Selected Topics in Engineering of Critical Infrastructure		Associate Director. Total Credits		5.0
or an engineering cou Associate Director.	urse approved by the IPIS Director or		M.A.Sc. Digital N		
5. 1.0 credit in:		1.0		ve Specialization in	
IPIS 5907 [1.0]	Research Project (in the area of the		Cybersecurity (5	o.o credits)	
	specialization)		Requirements:		1.0
Total Credits		5.0	1. 1.0 credit in: CYBR 5000 [1.0]	Science and Social Science of	1.0
Requirements - Cou	rsework pathway:		0121(0000[1.0]	Cybersecurity	
1. 1.0 credit in:		1.0	2. 0.5 credit in:		0.5
CYBR 5000 [1.0]	Science and Social Science of Cybersecurity		ITEC 5002 [0.5]	Fundamentals of Information Technology Research	
2. 1.5 credits in:		1.5	3. 0.0 credit in:		
IPIS 5101 [0.5]	Critical Infrastructure Protection: Issues and Strategies		ITEC 5001 [0.0]	Information Technology Seminars	
IPIS 5105 [0.5]	Critical Infrastructure Risk		4. 1.0 credit from co		1.0
11 10 0100 [0.0]	Assessment		ITEC 5200 [0.5]	Entertainment Technologies	
IPIS 5106 [0.5]	Management of Critical		ITEC 5201 [0.5]	Computer Animation Technologies	
	Infrastructure		ITEC 5202 [0.5]	Visual Effects Technologies Game Design and Development	
3. 1.0 credit from:		1.0	ITEC 5203 [0.5]	Technologies	
IPIS 5104 [0.5]	Terrorism and International Security		ITEC 5204 [0.5]	Emerging Interaction Techniques	
IPIS 5301 [0.5]	Disarmament, Arms Control and Nonproliferation		ITEC 5205 [0.5]	Design and Development of Data- Intensive Applications	
IPIS 5302 [0.5]	Contemporary International Security		ITEC 5206 [0.5]	Data Protection and Rights Management	
IPIS 5303 [0.5]	Intelligence Statecraft and International Affairs		ITEC 5207 [0.5]	Data Interaction Techniques	
IPIS 5304 [0.5]	Intelligence and National Security: Policies and Operations		ITEC 5208 [0.5]	Virtual Reality and 3D User Interfaces	
IPIS 5305 [0.5]	National Security Policy and Law		ITEC 5920 [0.5]	Special Topics in Digital Media	
IPIS 5306 [0.5]	Emergency and Business		5. 2.5 credits in:		2.5
IPIS 5320 [0.5]	Continuity Management Topics in Infrastructure Security		ITEC 5909 [2.5]	Master's Thesis (in the specialization)	
	Policy		Total Credits		5.0

Master of Networking Technology
with Collaborative Specialization in
Cybersecurity (5.0 credits)

			ıts:

K	equirements:		
1.	1.0 credit in:		1.0
	CYBR 5000 [1.0]	Science and Social Science of Cybersecurity	
2.	0.5 credit in:		0.5
	ITEC 5002 [0.5]	Fundamentals of Information Technology Research	
3.	0.0 credit in:		
	ITEC 5001 [0.0]	Information Technology Seminars	
4.	2.0 credits from co	ore 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	
by		ea of the specialization, approved visor or the Associate Director of e School.	0.5
CC	nsultation with your	ves at the 5000-level, chosen in graduate advisor/supervisor or the Graduate Studies in the School.	1.0

M. Infrastructure Protection and International Security

5.0

with Collaborative Specialization in Cybersecurity (5.0 credits)

Requirements:

Total Credits

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	
	s from the IIA or SDP designated lorman Paterson School of	
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	
selected in consultation	ve in the area of the specialization, on with, and approved by, the MIPIS e Director and associated faculty	0.5
Total Credits		5.0
M.A. Internationa	al Affaire	
	ve Specialization in	
Requirements - Thes	•	
	ois patriway	4.0
1 10 credit in:		1 ()
1. 1.0 credit in: CYBR 5000 [1.0]	Science and Social Science of Cybersecurity	1.0
		1.0
CYBR 5000 [1.0]		
CYBR 5000 [1.0] 2. 1.5 credits in:	Cybersecurity Research Design and Methods for	
CYBR 5000 [1.0] 2. 1.5 credits in: INAF 5015 [0.5]	Cybersecurity Research Design and Methods for International Affairs Statistical Analysis for International	
CYBR 5000 [1.0] 2. 1.5 credits in: INAF 5015 [0.5] INAF 5016 [0.5]	Cybersecurity Research Design and Methods for International Affairs Statistical Analysis for International Affairs International Policymaking in	
CYBR 5000 [1.0] 2. 1.5 credits in: INAF 5015 [0.5] INAF 5016 [0.5] INAF 5017 [0.25] INAF 5018 [0.25] 3. 0.5 credit in econdend of the second tend	Research Design and Methods for International Affairs Statistical Analysis for International Affairs International Policymaking in Canada: Structure and Process	
CYBR 5000 [1.0] 2. 1.5 credits in: INAF 5015 [0.5] INAF 5016 [0.5] INAF 5017 [0.25] INAF 5018 [0.25] 3. 0.5 credit in econo	Research Design and Methods for International Affairs Statistical Analysis for International Affairs International Policymaking in Canada: Structure and Process Law and International Affairs omics, successfully completed by the	1.5
CYBR 5000 [1.0] 2. 1.5 credits in: INAF 5015 [0.5] INAF 5016 [0.5] INAF 5017 [0.25] INAF 5018 [0.25] 3. 0.5 credit in econdend of the second tender INAF 5009 [0.5] INAF 5205 [0.5]	Research Design and Methods for International Affairs Statistical Analysis for International Affairs International Policymaking in Canada: Structure and Process Law and International Affairs omics, successfully completed by the m, from (See Note 1, below): International Aspects of Economic Development Economics of Conflict	1.5
CYBR 5000 [1.0] 2. 1.5 credits in: INAF 5015 [0.5] INAF 5016 [0.5] INAF 5017 [0.25] INAF 5018 [0.25] 3. 0.5 credit in econd end of the second tend in the second tend in the second tend of the second tend in the second ten	Research Design and Methods for International Affairs Statistical Analysis for International Affairs International Policymaking in Canada: Structure and Process Law and International Affairs omics, successfully completed by the m, from (See Note 1, below): International Aspects of Economic Development Economics of Conflict Economics for Defence and Security	1.5
CYBR 5000 [1.0] 2. 1.5 credits in: INAF 5015 [0.5] INAF 5016 [0.5] INAF 5017 [0.25] INAF 5018 [0.25] 3. 0.5 credit in econd end of the second tend in the second tend in the second tend of the second tend in the second ten	Research Design and Methods for International Affairs Statistical Analysis for International Affairs International Policymaking in Canada: Structure and Process Law and International Affairs omics, successfully completed by the m, from (See Note 1, below): International Aspects of Economic Development Economics of Conflict Economics for Defence and Security Economics of Security and Intelligence	1.5
CYBR 5000 [1.0] 2. 1.5 credits in: INAF 5015 [0.5] INAF 5016 [0.5] INAF 5017 [0.25] INAF 5018 [0.25] 3. 0.5 credit in econd end of the second tend INAF 5009 [0.5] INAF 5205 [0.5] INAF 5214 [0.5]	Research Design and Methods for International Affairs Statistical Analysis for International Affairs International Policymaking in Canada: Structure and Process Law and International Affairs omics, successfully completed by the m, from (See Note 1, below): International Aspects of Economic Development Economics of Conflict Economics for Defence and Security Economics of Security and	1.5
CYBR 5000 [1.0] 2. 1.5 credits in: INAF 5015 [0.5] INAF 5016 [0.5] INAF 5017 [0.25] INAF 5018 [0.25] 3. 0.5 credit in econd end of the second tend in the second tend in the second tend of the second tend in the second ten	Research Design and Methods for International Affairs Statistical Analysis for International Affairs International Policymaking in Canada: Structure and Process Law and International Affairs omics, successfully completed by the m, from (See Note 1, below): International Aspects of Economic Development Economics of Conflict Economics for Defence and Security Economics of Security and Intelligence International Trade: Theory and	1.5
CYBR 5000 [1.0] 2. 1.5 credits in: INAF 5015 [0.5] INAF 5016 [0.5] INAF 5017 [0.25] INAF 5018 [0.25] 3. 0.5 credit in econd end of the second tent INAF 5009 [0.5] INAF 5205 [0.5] INAF 5214 [0.5] INAF 5221 [0.5] INAF 5308 [0.5]	Research Design and Methods for International Affairs Statistical Analysis for International Affairs International Policymaking in Canada: Structure and Process Law and International Affairs omics, successfully completed by the m, from (See Note 1, below): International Aspects of Economic Development Economics of Conflict Economics for Defence and Security Economics of Security and Intelligence International Trade: Theory and Policy International Finance: Theory and	1.5
CYBR 5000 [1.0] 2. 1.5 credits in: INAF 5015 [0.5] INAF 5016 [0.5] INAF 5017 [0.25] INAF 5018 [0.25] 3. 0.5 credit in econd end of the second tend in the second tend in the second tend in the second tend in the second in the second in the second in the second tend in the second	Research Design and Methods for International Affairs Statistical Analysis for International Affairs International Policymaking in Canada: Structure and Process Law and International Affairs omics, successfully completed by the m, from (See Note 1, below): International Aspects of Economic Development Economics of Conflict Economics for Defence and Security Economics of Security and Intelligence International Trade: Theory and Policy International Finance: Theory and Policy The Economics of Human	0.5
CYBR 5000 [1.0] 2. 1.5 credits in: INAF 5015 [0.5] INAF 5016 [0.5] INAF 5017 [0.25] INAF 5018 [0.25] 3. 0.5 credit in econd end of the second tend INAF 5009 [0.5] INAF 5205 [0.5] INAF 5214 [0.5] INAF 5221 [0.5] INAF 5308 [0.5] INAF 5309 [0.5] INAF 5309 [0.5]	Research Design and Methods for International Affairs Statistical Analysis for International Affairs International Policymaking in Canada: Structure and Process Law and International Affairs omics, successfully completed by the m, from (See Note 1, below): International Aspects of Economic Development Economics of Conflict Economics for Defence and Security Economics of Security and Intelligence International Trade: Theory and Policy International Finance: Theory and Policy The Economics of Human Development	1.5

5. Successful completion of second language proficiency examination (See Note 3, below)			
Total Credits		5.0	
•	earch essay pathway:	1.0	
1. 1.0 credit in: CYBR 5000 [1.0]	Science and Social Science of	1.0	
O1BR 3000 [1.0]	Cybersecurity		
2. 1.5 credit in:		1.5	
INAF 5015 [0.5]	Research Design and Methods for		
INAF 5016 [0.5]	International Affairs Statistical Analysis for International		
11VAI 30 10 [0.3]	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)			
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:	D 15 ""	1.0	
INAF 5908 [1.0]	Research Essay (in the specialization)	1.0	
below)	5. 1.0 credits in Field and Elective courses (See Note 2, below)		
6. Successful complet examination (see Note	ion of second language proficiency e 3, below)		
Total Credits		5.0	
Requirements - Cour	sework 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	^ -	
	omics, successfully completed by the n, 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		

Total Credits			5.0	
6. Successful completion of second language proficiency examination (see Note 3, below)				
5. 2.0 credits in Field and Elective courses (See Note 2, below)			2.0	
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.				
	INAF 5703 [0.5]	International Public Economics		
	INAF 5600 [0.5]	The Economics of Human Development		
	INAF 5309 [0.5]	International Finance: Theory and Policy		
	INAF 5308 [0.5]	International Trade: Theory and Policy		

- 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 Faculty of Graduate and Postdoctoral Affairs 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.