

SOFTWARE SYSTEMS AND CYBERSECURITY, MSE

Penn Engineering continues to broaden its graduate portfolio with the launch of the Master of Science in Engineering in Software Systems and Cybersecurity (MSE-SSC), offered in both online and residential formats. Building on Penn's recognized strengths in computer science, systems, and cybersecurity, this program reflects our ongoing commitment to expanding access to premier engineering education around the world.

The MSE-SSC program is designed for students with a background in computer science or related fields who want to deepen their expertise in systems architecture and cybersecurity. The curriculum blends rigorous foundations in software infrastructure with advanced training in cybersecurity, complemented by a wide range of technical electives in high-demand areas such as big data systems, blockchain, and cloud technologies.

The degree and major requirements displayed are intended as a guide for students entering in the Fall of 2026 and later. Students should consult with their academic program regarding final certifications and requirements for graduation.

Curriculum

The MSE-SSC degree consists of 10 course units (CUs) and is designed to give students a solid foundation in systems and security, while offering flexibility to explore a range of technical electives.

Code	Title	Course Units
<i>Foundation (1 CU, if needed, and if so, counts towards open elective)</i>		
CIT 5950	Computer Systems Programming	
<i>Core: Software Systems (3 CUs)</i>		3
CIS 5050	Software Systems	
CIS 5480	Operating Systems Design and Implementation	
CIS 5530	Networked Systems	
CIS 5550	Internet and Web Systems	
<i>Core: Cybersecurity (3 CUs)</i>		3
CIS 5510	Computer and Network Security	
CIS 5560	Cryptography	
CIS 5580	Secure Software Engineering and Management	
<i>Technical Electives (2 CUs)</i>		2
CIS 5410	Embedded Software for Life-Critical Applications	
CIS 5450	Big Data Analytics	
CIS 5470	Software Analysis	
CIS 5490	Wireless Communications for Mobile Networks and Internet of Things	
CIS 5500	Database and Information Systems	

CIS XXXX: Applied Cyber TBD (.5 CU- industry practitioner courses) - To Be Developed	
CIS XXXX: Applied Cyber TBD (.5 CU- industry practitioner courses) - To Be Developed	
CIS XXXX: S3 Capstone TBD (1.0)	
<i>Open Electives (2 CUs)</i>	2
Any CIS, ESE, or EAS courses	
Total Course Units	10

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<i>Technical Electives (2 CUs)</i>		2
CIS 5450	Big Data Analytics	
CIS 5470	Software Analysis	
CIS 5490	Wireless Communications for Mobile Networks and Internet of Things	
CIS 5500	Database and Information Systems	
DATS 5750	Cloud Technologies Practicum	
EAS 5830	Blockchains	
CIS XXXX: Applied Cyber TBD (.5 CU- industry practitioner courses) - To Be Developed		
CIS XXXX: Applied Cyber TBD (.5 CU- industry practitioner courses) - To Be Developed		
CIS XXXX: S3 Capstone TBD (1.0)		
<i>Open Electives (2 CUs)</i>		2
Any CIS, ESE, or EAS courses		
Total Course Units		10

On Campus Program Plan of Study

First Year		Course Units
Fall		
CIS 5480	Operating Systems Design and Implementation	1
CIS 5510	Computer and Network Security	1

CIS 5450	Big Data Analytics	1
Course Units		3.00
Spring		
CIS 5580	Secure Software Engineering and Management	1
CIS 5550	Internet and Web Systems	1
CIS 5470	Software Analysis	1
Course Units		3.00
Second Year		
Fall		
CIS 5050	Software Systems	1
CIS 5560	Cryptograph	1
CIS 5500	Database and Information Systems	1
Course Units		3.00
Spring		
CIS XXXX: S3 Capstone TBD		1
Course Units		1.00
Total Course Units		10.00

Spring		
CIS 5510	Computer and Network Security	1
Course Units		1.00
Summer		
CIS XXXX: Applied Cyber TBD (.5 CU- industry practitioner courses)		.5
Course Units		0.50
Third Year		
Fall		
CIS 5560	Cryptography	1
CIS 5580	Secure Software Engineering and Managemen	1
Course Units		2.00
Spring		
CIS 5470	Software Analysis	1
CIS XXXX: S3 Capstone TBD		1
Course Units		2.00
Summer		
CIS XXXX: Applied Cyber TBD (.5 CU- industry practitioner courses)		.5
Course Units		0.50
Total Course Units		10.00

Online Program Plan of Study

First Year		
Fall		
CIT 5950	Computer Systems Programming	1
Course Units		1.00
Spring		
CIS 5530	Networked Systems	1
Course Units		1.00
Summer		
CIS 5050	Software Systems	1
Course Units		1.00
Second Year		
Fall		
CIS 5550	Internet and Web Systems	1
Course Units		1.00