

INFORMATION SYSTEMS ENGINEERING, MASTER OF SCIENCE

A track must be chosen for this program.

Admission Requirements

Applicants (degree seeking and special student) must meet the general requirements for admission (<http://e-catalog.jhu.edu/engineering/engineering-professionals/admission-requirements/>) to graduate study. The applicant's prior education must include the following prerequisites:

1. One year of college math (2 semesters or 3 quarters) This must include Discrete Mathematics or Calculus;
2. One semester/term of Java (C++ will be accepted but the student must be knowledgeable in Java);
3. One semester/term of Data Structures is conditionally required for those students seeking to take selected courses from Computer Science and Cybersecurity that require Data Structures.

Applicants whose prior education does not include the prerequisites listed above may still enroll under provisional status, followed by full admission status once they have completed the missing prerequisites. Missing prerequisites may be completed with Johns Hopkins Engineering (all prerequisites are available) or at another regionally accredited institution. Applicants typically have earned a grade point average of at least 3.0 on a 4.0 scale (B or above) in the latter half of their undergraduate studies. Applicants may submit a detailed résumé if they would like their academic and professional background to be considered.

Program Requirements

Ten courses must be completed within five years. Students are required to choose a track to follow. The curriculum consists of three foundation courses and five courses from the Information Systems Engineering (635.xxx) program, which includes selected courses from the Computer Science (EN.605.xxx), Cybersecurity (EN.695.xxx), Systems Engineering (EN.645.xxx), and Engineering Management (EN.595.xxx) programs as listed throughout the Courses section. At least three courses must be from the same track, at least three courses must be at the 700-level, and at least one 700-level course must be in the chosen track. Up to two electives may be selected from other programs. Courses **not** listed in the Courses section are considered electives for Information Systems Engineering and require prior advisor approval. Transfer courses will be considered electives. Transfer courses must meet all general EP requirements for transfer, must be directly applicable to Information Systems Engineering, and will be considered on a case-by-case basis. Only **one** C-range grade (C+, C, or C-) can count toward the master's degree. All course selections are subject to advisor approval.

Graduate students who are not pursuing a master's degree in Information Systems Engineering should consult with their advisor to determine which courses must be successfully completed before 600- or 700-level courses may be taken.

Courses

Code	Title	Credits
Prerequisites ¹		
EN.605.101	Introduction to Python	
EN.605.201	Intro to Programming Using Java	3
EN.605.202	Data Structures	3
EN.605.203	Discrete Mathematics	3
EN.605.206	Introduction to Programming Using Python	3

Foundation Courses

Students working toward a master's degree in Information Systems Engineering are required to take the following three foundation courses before taking any other courses:²

EN.605.601	Foundations of Software Engineering	3
EN.635.601	Foundations of Information Systems Engineering	3
EN.695.601	Foundations of Information Assurance	3

Tracks

Select one of the following Tracks:

Cybersecurity (p. 1)
Data Engineering (p. 2)
Enterprise and Web Computing (p. 2)
Human-Computer Interaction (p. 2)
Information Management (p. 2)
Network Engineering (p. 2)
Software Engineering (p. 2)
Systems Engineering (p. 2)
Independent Study and Special Topics (p. 2)

¹ Applicants whose prior education does not include the prerequisites listed under Admission Requirements may still be admitted under provisional status, followed by full admission once they have completed the missing prerequisites. All prerequisite courses beyond calculus are available at Johns Hopkins Engineering. These courses do not count toward the degree or certificate requirements.

² One or more foundation courses can be waived by the student's advisor if a student has received an A or B in equivalent graduate courses. In this case, the student may replace the waived foundation courses with the same number of other graduate courses and may take these courses after all remaining foundation course requirements have been satisfied.

Courses by Track

The tracks offered represent related groups of courses that are relevant for students with interests in the selected areas. Students are required to choose a track to follow and to take at least three courses from the selected track, including at least one 700-level course. The tracks are presented as an aid to students in planning their course selections and are only applicable to students seeking a master's degree. They do not appear as official designations on a student's transcript or diploma.

Cybersecurity

This track requires Data Structures.

Code	Title	Credits
EN.635.671	Data Recovery & Continuing Operations	3
EN.635.672	Privacy Engineering	3
EN.635.673	Critical Infrastructure	3
EN.635.676	Cybersecurity in Information Systems	3

EN.635.775	Cyber Operations, Risk, and Compliance	3
EN.635.776	Building Information Governance	3
EN.695.601	Foundations of Information Assurance	3
EN.695.611	Embedded Computer Systems-Vulnerabilities, Intrusions, and Protection Mechanisms	3
EN.695.614	Security Engineering	3

Data Engineering

This track requires Data Structures.

Code	Title	Credits
EN.635.631	Foundations of Data Analytics	3
EN.635.632	Foundations of Data Engineering	3
EN.605.635	Cloud Computing	3
EN.605.662	Data Visualization	3
EN.605.741	Large-Scale Database Systems	3
EN.605.744	Information Retrieval	3
EN.605.788	Big Data Processing Using Hadoop	3

Enterprise and Web Computing

This track requires Data Structures.

Code	Title	Credits
EN.635.682	Website Development	3
EN.635.683	E-Business: Models, Architecture, Technologies, and Infrastructure	3
EN.605.681	Principles of Enterprise Web Development	3
EN.605.684	Agile Development with Ruby on Rails	3
EN.605.784	Enterprise Computing with Java	3
EN.605.785	Web Services with SOAP and REST: Frameworks, Processes, and Applications	3
EN.605.786	Enterprise System Design and Implementation	3
EN.605.788	Big Data Processing Using Hadoop	3

Human-Computer Interaction

Code	Title	Credits
EN.635.661	Principles of Human Computer Interaction	3
EN.605.662	Data Visualization	3
EN.645.650	Foundations of Human Systems Engineering	3
EN.645.651	Integrating Humans and Technology	3

Information Management

This track requires Data Structures.

Code	Title	Credits
EN.635.621	Principles of Decision Support Systems	3
EN.605.641	Principles of Database Systems	3
EN.605.643	Linked Data and the Semantic Web	3
EN.605.644	XML Design Paradigms	3
EN.605.741	Large-Scale Database Systems	3
EN.605.744	Information Retrieval	3

Network Engineering

Code	Title	Credits
EN.635.611	Principles of Network Engineering	3
EN.635.711	Advanced Topics in Network Engineering	3
EN.605.772	Network Security Management	3

For students with appropriate backgrounds, the following courses may be taken toward the network engineering track. Advisor approval and permission of the instructor is required.

EN.605.677	Internetworking with TCP/IP I	3
EN.605.678	Next Generation Mobile Networks with 5G	3
EN.605.771	Wired and Wireless Local and Metropolitan Area Networks	3
EN.605.776	Fourth Generation Wireless Communications: WiMAX and LTE	3
EN.605.777	Internetworking with TCP/IP II	3
EN.605.778	Voice Over IP	3

Software Engineering

Code	Title	Credits
EN.605.601	Foundations of Software Engineering	3
EN.605.602	Software Analysis and Design	3
EN.605.604	Object-Oriented Programming with C++	3
EN.605.607	Agile Software Development Methods	3
EN.605.608	Software Project Management	3
EN.605.609	DevOps Software Development	3
EN.605.701	Software Systems Engineering	3
EN.605.704	Object-Oriented Analysis and Design	3
EN.605.705	Software Safety	3
EN.605.708	Tools and Techniques of Software Project Management	3

Systems Engineering

Code	Title	Credits
EN.635.601	Foundations of Information Systems Engineering	3
EN.635.792	Management of Innovation	3
EN.645.650	Foundations of Human Systems Engineering	3
EN.645.662	Introduction to Systems Engineering	3
EN.645.667	Management of Systems Projects	3
EN.645.742	Management of Complex Systems	3
EN.645.753	Enterprise Systems Engineering	3
EN.645.754	Social and Organizational Factors in Human Systems Engineering	3
EN.645.757	Foundations of Modeling and Simulation in Systems Engineering	3
EN.645.761	Systems Architecting	3
EN.645.767	System Conceptual Design	3
EN.595.660	Planning and Managing Projects	3

Independent Study and Special Topics

Code	Title	Credits
EN.635.795	Information Systems Engineering Capstone Project	3
EN.635.801	Independent Study in Information Systems Engineering I	3
EN.635.802	Independent Study in Information Systems and Technology II	3

Please refer to the course schedule (ep.jhu.edu/schedule (<https://apps.ep.jhu.edu/schedule/search/>)) published each term for exact dates, times, locations, fees, and instructors.