

Information Systems Engineering

EXPECTED COURSE OFFERINGS

The schedule below is based on historical patterns and expected scheduling. The semester and location in which a course may be offered is **subject to change** due to instructor availability, student demand, and the need to provide an appropriate balance of subjects and course levels in all semesters. Courses may be offered at the Applied Physics Laboratory (A), Online (O), Virtual Live (VL), or as an Independent Study (IS), as indicated. Courses may also be offered in odd years (odd yrs) or even years (even yrs).

Course Number	Course Name	Summer	Fall	Spring
Provisional Courses				
625.108 & 625.109 or 605.156	Calculus I	O	O	O
	Calculus II	O	O	O
	Calculus for Engineers		O	O
605.201 or 605.206	Introduction to Programming Using Java	O	O/VL	O/VL
	Introduction to Programming Using Python	O	O	O
605.203	Discrete Mathematics		O/VL	O/VL

Core Courses

635.601	Foundations of Information Systems Engineering		O	O
635.627	Intelligent Decision Support Systems		O	O
635.631	Foundations of Data Analytics	O	O	O

Students who successfully complete all three (3) core courses are eligible to enroll in any courses within the designated focus areas. Any required prerequisites are listed next to each course on this planning schedule. Completion of the core sequence and the listed prerequisites is considered sufficient preparation for advanced study across all focus areas.

Focus Areas (4) and Groups (8)

Data Architect Focus Area

- Data Analytics Group
- Data Engineering Group

Intelligent Systems Focus Area

- Human-Centered Engineering Group
- Intelligent Systems Engineering Group

Internet of Things Focus Area

- Cybersecurity Group
- Smart Systems Group

Technical Management Focus Area

- Enterprise Engineering Group
- Program Management Group

Courses by Focus Area

The focus areas offered represent related groups of courses that are relevant for students with interests in the selected areas. Students are required to choose a focus area to follow and to take at least three courses from the selected focus area, including at least one 700-level course [two of the three courses must be EN.635.xxx]. The focus areas 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.

Data Architect Focus Area

Select at least three (3) courses from the two (2) groups listed below. At least two (2) must be from 635.XXX

Data Analytics Group		Prerequisites	Summer	Fall	Spring
635.632	Data Engineering for AI Systems		O		O
635.683	E-Business: Models, Architecture, Technologies, and Infrastructure				VL
635.782	Ethics in Intelligent Systems		VL	VL	VL
605.621	Foundations of Algorithms		O/VL	O	O
605.631	Statistical Methods for Computer Science			O	O
605.632	Graph Analytics				O
605.635	Cloud Computing	605.621		O	O
605.649	Principles and Methods in Machine Learning	605.621	O	O/VL	O
605.662	Data Visualization		O	O	O
605.746	Advanced Machine Learning	605.649	O		O
625.603	Statistical Methods and Data Analysis		O	O	O
625.692	Probabilistic Graphical Models	625.603			O
625.695	Time Series Analysis	625.603		O (odd yrs)	
625.721	Probability and Stochastic Process I	625.603	O	O	
625.722	Probability and Stochastic Process II	625.721			O
625.725	Theory of Statistics I	625.603	O	O	
625.726	Theory of Statistics II	625.725			O (odd yrs)
625.740	Data Mining	625.603		O	
625.741	Game Theory	625.603		O (even yrs)	
685.648	Data Science	605.621	O	O	O
Data Engineering Group			Summer	Fall	Spring
635.632	Data Engineering for AI Systems		O		O
635.683	E-Business: Models, Architecture, Technologies, and Infrastructure				VL
605.616	Multiprocessor Architecture & Programming	605.621			O
605.621	Foundations of Algorithms		O/VL	O	O
605.641	Principles of Database Systems	605.621	O	O	O
605.643	Linked Data and the Semantic Web	605.621	O		
605.644	XML Design Paradigms	605.621	O		
605.649	Principles and Methods in Machine Learning	605.621	O	O/VL	O
605.741	Large-Scale Database Systems	605.621	O	O	O
605.744	Information Retrieval	605.621		O	

605.788	Big Data Processing Using Hadoop	605.621		O	O
685.652	Data Engineering Principles and Practice	605.621	O/VL	O/VL	O/VL

Intelligent Systems Focus Area

Select at least three (3) courses from the two (2) groups listed below. At least two (2) must be from 635.XXX

Human-Centered Engineering Group			Summer	Fall	Spring
635.661	Principles of Human Computer Interaction			O	
635.682	Website Development				O
635.782	Ethics in Intelligent Systems		VL	VL	VL
525.747	Speech Processing				VL
525.786	Human Robotics Interaction				A
535.691	Haptic Interface Design			VL	
535.782	Haptic Applications		O		
605.646	Natural Language Processing			O	
605.662	Data Visualization		O	O	O
645.650	Foundations of Human Systems Engineering			O	O
645.651	Integrating Humans and Technology			O	O
645.755	Methods in Human-System Performance Measurement and Analysis				O
Intelligent Systems Engineering Group			Summer	Fall	Spring
635.603	AI/ML Ops		O	O	O
635.629	AI Assurance			VL	
635.661	Principles of Human Computer Interaction			O	
635.683	E-Business: Models, Architecture, Technologies, and Infrastructure				VL
635.782	Ethics in Intelligent Systems		VL	VL	VL
525.645	Modern Navigation Systems			O	O
525.661	UAV Systems and Control			O	O
525.733	Deep Learning for Computer Vision				VL
525.786	Human Robotics Interaction				A
535.782	Haptic Applications		O		
585.783	Introduction to Brain-Computer Interfaces		O		
605.613	Introduction to Robotics	605.621		VL	VL
605.621	Foundations of Algorithms		O	O	O
605.645	Artificial Intelligence	605.621	O	O	O
605.649	Principles and Methods in Machine Learning	605.621	O	O/VL	O
695.634	Intelligent Vehicles: Cybersecurity for Connected and Autonomous Vehicles	605.621		VL	
695.715	Assured Autonomy	605.621		O/VL	

Internet of Things Focus Area

Select at least three (3) courses from the two (2) groups listed below. At least two (2) must be from 635.XXX

Cybersecurity Group			Summer	Fall	Spring
635.673	Protecting Critical Infrastructure from Cyber Attacks				O
635.676	Cybersecurity in Information Systems			O	O
635.775	Cyber Operations, Risk, and Compliance		O	O	O
605.731	Survey of Cloud Computing Security	695.601	O		O
695.601	Foundations of Information Assurance		O	O/VL	O
695.611	Embedded Computer Systems-Vulnerabilities, Intrusions, and Protection Mechanisms	695.601		O	O
695.612	Operating Systems Security	695.601		VL	
695.614	Security Engineering	695.601			VL
695.615	Cyber Physical Systems Security	695.601		O	
695.621	Public Key Infrastructure and Managing E-Security	695.601	VL	O	
695.622	Web Security	695.601	O	O	O
695.642	Intrusion Detection	695.601	O	O	O
695.712	Authentication Technologies	695.601		VL	
695.721	Network Security	695.601		O	VL/A
695.744	Reverse Engineering and Vulnerability Analysis	695.601		O	O
Smart Systems Group			Summer	Fall	Spring
635.611	Principles of Network Engineering				O
635.673	Protecting Critical Infrastructure from Cyber Attacks				O
635.676	Cybersecurity in Information Systems			O	O
635.711	Advanced Topics in Network Engineering			O	
635.775	Cyber Operations, Risk, and Compliance		O	O	O
635.782	Ethics in Intelligent Systems		VL	VL	VL
525.678	Next Generation Mobile Networks and Security with 5G			VL	VL
605.671	Principles of Data Communications Networks		O	O	A
605.674	Network Programming			O	
605.731	Survey of Cloud Computing Security	695.601	O		O
605.771	Wired and Wireless Local and Metropolitan Area Networks			O	
605.779	Network Design and Performance Analysis			O	
695.601	Foundations of Information Assurance		O	O/VL	O
695.611	Embedded Computer Systems-Vulnerabilities, Intrusions, and Protection Mechanisms	695.601		O	O
695.612	Operating Systems Security	695.601		VL	
695.614	Security Engineering	695.601			VL
695.615	Cyber Physical Systems Security	695.601		O	
695.621	Public Key Infrastructure and Managing E-Security	695.601	VL	O	

695.622	Web Security	695.601	O	O	O
695.624	Introduction to Internet of Things Security and Privacy	695.601		VL	VL
695.634	Intelligent Vehicles: Cybersecurity for Connected and Autonomous Vehicles	695.601		VL	
695.642	Intrusion Detection	695.601	O	O	O
695.712	Authentication Technologies	695.601		VL	
695.715	Assured Autonomy	695.601		O/VL	
695.721	Network Security	695.601		O	VL/A
695.744	Reverse Engineering and Vulnerability Analysis	695.601		O	O

Technical Management Focus Area

Select at least three (3) courses from the two (2) groups listed below. At least two (2) must be from 635.XXX

Enterprise Engineering Group		Summer	Fall	Spring
635.603	AI/ML Ops	O	O	O
635.775	Cyber Operations, Risk, and Compliance	O	O	O
635.782	Ethics in Intelligent Systems	VL	VL	VL
605.607	Agile Software Development Methods	605.621	O	O
605.609	DevOps and Secure Software Development	605.621	O	O
605.616	Multiprocessor Architecture & Programming	605.621		O
605.621	Foundations of Algorithms		O	O
605.702	Cloud-native Architecture and Microservices	605.621	VL	VL
605.705	Software Safety	605.621		O
605.716	Modeling and Simulation of Complex Systems	605.621	VL	VL
605.729	Formal Methods	605.621		VL
605.789	Service API Design and Development	605.621	O	O
645.753	Enterprise Systems Engineering		O	O
645.757	Foundations of Modeling and Simulation in Systems Engineering			O
645.761	Systems Architecting		O	O
645.764	Software Systems Engineering		O/VL	O/VL
645.767	System Conceptual Design		O/VL	O/VL
645.768	System Design & Integration		O/VL	O/VL
645.769	System Test & Evaluation		O/VL	O/VL
695.741	Information Assurance Analysis		O	O
695.791	Information Assurance Architectures and Technologies		O	O
Program Management Group		Summer	Fall	Spring
635.622	Intelligent Decision Engineering		VL	VL
635.674	AI for Entrepreneurs		VL	VL
635.775	Cyber Operations, Risk, and Compliance	O	O	O
635.782	Ethics in Intelligent Systems	VL	VL	VL
635.792	Entrepreneurship, Innovation and Corporate Success		VL	

595.660	Planning and Managing Projects		O/VL	O/VL	O/VL
605.607	Agile Software Development Methods	605.621		O	O
605.608	Software Project Management	605.621	O	O	O
605.621	Foundations of Algorithms		O	O	O
605.708	Tools and Techniques of Software Project Management	605.621			O/VL
645.667	Management of Systems Projects		O/VL	O/VL	O/VL
645.742	Management of Complex Systems		O	O	O

Independent Study and Special Topics			Summer	Fall	Spring
635.795	Information Systems Engineering Capstone Project		IS	IS	IS
635.801	Independent Study in Information Systems Engineering I		IS	IS	IS