

## Expected Course Offerings by Semester

### INFORMATION SYSTEMS ENGINEERING

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.

#### Course Offering Modalities

##### In-Person (IP)

[01 = Homewood Campus]

[31 = Applied Physics Lab]

##### Virtual-Live (VL)

[01VL = Synchronous at Homewood]

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[8VL = Synchronous Online]

##### Online (O)

[81 = Asynchronous Online]

#### Prerequisite Courses

Course #	Course Name	Pre-Req*	Summer	Fall	Spring
605.201	Introduction to Programming Using Java <b>OR</b>		O/VL	O/VL	O/VL
605.206	Introduction to Programming Using Python		O	O	O
605.203	Discrete Mathematics			O/VL	O

#### Foundation Courses

635.601	Foundations of Information Systems Engineering			O	O
635.627	Foundations of Intelligent Systems		N/A	N/A	N/A
635.631	Foundations of Data Analytics	N/A	N/A	N/A	N/A

See catalog of complete list and description of prerequisites.

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### Intelligent Systems Focus Area

For a general Intelligent Systems Focus Area (no concentration), three (3) courses from any of the concentrations listed below

Develop your skills to become an intelligent systems designer of multi-faceted and agile intelligent systems that utilize innovative technologies and techniques. Two general categories of courses under this focus area are:

**At Least Three (3) from List Below - At Least Two (2) from 635.xxx**

#### Intelligent Systems Engineering

Course #	Course Name	Pre-Req*	Summer	Fall	Spring
635.603	AI/ML Ops		O	O	O
635.627	Foundations of Intelligent Systems		N/A	N/A	N/A
635.661	Principles of Human Computer Interaction			O	
635.683	E-Business: Models, Architecture, Technologies, and Infrastructure			O	O/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				O
525.786	Human Robot Interaction				IP
535.782	Haptic Applications		O		
585.783	Introduction to Brain-Computer Interfaces	585.615 or 535.641	O		
605.613	Introduction to Robotics		O	O	O
605.645	Artificial Intelligence	605.621	O	O	O
605.649	Introduction to Machine Learning	605.202; 605.621 or 685.621 or 705.621	O	O/VL	O
685.621	Algorithms for Data Science	605.201 or equivalent	O	O	O
694.634	Intelligent Vehicles: Cybersecurity for Connected and Autonomous Vehicles			O	
695.715	Assured Autonomy			O	

**At Least Three (3) from List Below - At Least Two (2) from 635.xxx**

#### Human-Centered Engineering

Course #	Course Name	Pre-Req*	Summer	Fall	Spring
635.661	Principles of Human Computer Interaction			O	
635.682	Website Development				O
635.691	Haptic Interface Design		N/A	N/A	N/A
635.782	Ethics in Intelligent Systems		VL	VL	VL
525.747	Speech Processing	525.627 and 525.614			VL
525.786	Human Robotics Interaction				VL
535.782	Haptic Applications			O	
605.646	Natural Language Processing			O/IP	
605.662	Data Visualization		O	O	O
645.650	Foundations of Human Systems Engineering			O	O
645.651	Integrating Humans and Technology	645.662 or 655.662 or 675.600		O	O
645.755	Methods in Human-System Performance Measurement and Analysis	645.662			O

### Data Architect Focus Area

For a general Data Architect Focus Area (no concentration), three (3) courses from any of the concentrations listed below

Develop your skills to become a lead data architect who ensures that insights produced by advanced information systems are accurate and defensible. Two general categories of courses under this focus area are:

**At Least Three (3) from List Below - At Least Two (2) from 635.xxx**

#### Data Analytics

Course #	Course Name	Pre-Req*	Summer	Fall	Spring
635.631	Foundations of Data Analytics		O	O	O
635.632	Engineering Data Intensive Systems	635.601		VL	

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635.683	E-Business: Models, Architecture, Technologies, and Infrastructure			O	O/VL
635.782	Ethics in Intelligent Systems		VL	VL	VL
605.631	Statistical Methods for Computer Science			O	O
605.632	Graph Analytics				O
605.635	Cloud Computing	605.202		O	O
605.649	Introduction to Machine Learning	605.202; 605.621 or 685.621 or 705.621		O	O/VL
605.662	Data Visualization			O	O
605.746	Advanced Machine Learning	605.649		O	O
625.692	Probabilistic Graph Models	625.603			O
625.695	Time Series Analysis	625.603		O	
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
625.740	Data Mining	625.609; 625.603			O
625.741	Game Theory	625.609; 625.603			O
685.648	Data Science			O	O

Data Engineering					
<i>At Least Three (3) from List Below - At Least Two (2) from 635.xxx</i>					
Course #	Course Name	Pre-Req*	Summer	Fall	Spring
635.631	Foundations of Data Analytics		O	O	O
635.632	Engineering Data Intensive Systems	635.601		VL	
635.683	E-Business: Models, Architecture, Technologies, and Infrastructure			O	O/VL
605.616	Multiprocessor Architecture & Programming				O
605.621	Foundations of Algorithms	605.202	O/VL	O/VL	O/VL
605.641	Principles of Database Systems	605.202	O	O	O
605.643	Linked Data and the Semantic Web	605.202	O		
605.644	XML Design Paradigms	605.681	O	O	
605.649	Introduction to Machine Learning	605.202; 605.621 or 685.621 or 705.621	O	O/VL	O
605.741	Large-Scale Database Systems	605.202; 605.641	O	O	O
605.744	Information Retrieval	605.202		O	
605.788	Big Data Processing Using Hadoop	605.202; 605.681		O	O
685.652	Data Engineering Principles and Practice		VL	VL	VL

Technical Management Focus Area					
For a general Technical Management Focus Area (no concentration), three (3) courses from any of the concentrations listed below					
<i>Hone your talents to become a technical manager of complex system-of-systems programs, develop technical depth to grasp the complexities of intelligent and information systems and acquire skills to manage their development lifecycle, and learn methods for informed and data-driven decision support. Two general categories of courses under this focus area are:</i>					
<i>At Least Three (3) from List Below - At Least Two (2) from 635.xxx</i>					
Program Management					
Course #	Course Name	Pre-Req*	Summer	Fall	Spring

635.674	Generative AI for Entrepreneurs			VL	
635.775	Cyber Ops, Risk, and Compliance		O/VL	O/VL	O/VL
635.782	Ethics in Intelligent Systems		VL	VL	VL
635.792	Entrepreneurship, Innovation and Corporate Success			VL	
635.622	Applied Decision Science		N/A	N/A	N/A
595.660	Planning and Managing Projects		O/VL	O/VL	O/VL
605.607	Agile Software Development Methods	605.601		O	O
605.608	Software Project Management		O	O	O
605.708	Tools and Techniques of Software Project Management				O/VL
645.667	Management of Systems Projects		O/VL	O/VL	O/VL

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645.742	Management of Complex Systems	645.769 or 655.769 or instructor and advisor approval		O	O

<b>Enterprise Engineering</b>					
<i>At Least Three (3) from List Below - At Least Two (2) from 635.xxx</i>					
Course #	Course Name	Pre-Req*	Summer	Fall	Spring
635.601	Foundations of Information Systems Engineering			O	O
635.603	AI/ML Ops		O	O	O
635.782	Ethics in Intelligent Systems		VL	VL	VL
635.672	Privacy Engineering		N/A	N/A	N/A
635.775	Cyber Ops, Risk, and Compliance		O/VL	O/VL	O/VL
605.607	Agile Software Development Methods	605.601		O	O
605.609	DevOps and Secure Software Development		O	O	O
605.616	Multiprocessor Architecture & Programming				O
605.701	Software Systems Engineering	605.202; (1) software eng. course beyond 605.601		O	
605.702	Cloud-native Architecture and Microservices	605.601; 605.704	N/A	N/A	N/A
605.705	Software Safety	605.202		O/VL	
605.716	Modeling and Simulation of Complex Systems				O/VL
605.729	Formal Methods				O/VL
605.786	Enterprise System Design and Implementation		N/A	N/A	N/A
605.789	Service API Design and Development	605.644; 605.681	N/A	N/A	N/A
645.753	Enterprise Systems Engineering	645.769 or instructor and advisor approval	O	O	O
645.757	Foundations of Modeling and Simulation in Systems Engineering	645.662 or 655.662		O	O
645.761	Systems Architecting	645.769 or 655.769 or instructor and advisor approval	O	O	O
645.764	Software Systems Engineering	645.662 or 655.662; 645.667 or 655.667; or instructor and advisor approval	O/VL	O/VL	O/VL
645.767	System Conceptual Design	645.764 or instructor and advisor approval	O/VL	O/VL	O/VL
645.768	System Design & Integration	645.767 or instructor and advisor approval	O/VL	O/VL	O/VL
645.769	System Test & Evaluation	645.768 or instructor and advisor approval	O/VL	O/VL	O/VL
695.741	Information Assurance Analysis	695.601	O	O	O
695.791	Information Assurance Architectures and Technologies	605.202; 695.601; 605.671 or 635.611	N/A	N/A	N/A

<b>Internet of Things Focus Area</b>					
The IoT Focus Area requires at least three (3) courses from the Smart Systems and Cybersecurity groups below; two (2) courses must be from 635.xxx					
<i>Develop your skills to become an architect that designs, builds, and secures modern IoT enterprise systems whose foundations are built upon cyber systems. Two general categories of courses under this focus area are:</i>					
<b>Smart Systems</b>					
Course #	Course Name	Pre-Req*	Summer	Fall	Spring
635.611	Principles of Network Engineering				O
635.673	Protecting Critical Infrastructure from Cyber Attacks	605.649; 605.674			O
635.676	Cyber Security in Information Systems			O	O
635.711	Advanced Topics in Network Engineering	635.611 or 605.671		O	
635.775	Cyber Ops, Risk, and Compliance		O/VL	O/VL	O/VL
635.776	Building Information Governance		N/A	N/A	N/A
635.782	Ethics in Intelligent Systems		VL	VL	VL
525.678	Next Generation Mobile Networks and Security with 5G			VL	VL
525.768	Wireless Networks		N/A	N/A	N/A
605.602	Software Analysis and Design		N/A	N/A	N/A
605.671	Principles of Data Communications Networks		O	O	IP
605.674	Network Programming	605.671 or 605.614		O	
605.677	Internetworking with TCP/IP I	605.202; 605.671	O	O	O
605.731	Survey of Cloud Computing Security		O		O
605.771	Wired and Wireless Local and Metropolitan Area Networks	605.202; 605.671 or 635.611		O	
605.772	Network Security Management		N/A	N/A	N/A

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605.776	Fourth Generation Wireless Communications: WiMAX and LTE			N/A	N/A
605.777	Internetworking with TCP/IP II	605.202; 605.677			O
605.779	Network Design and Performance Analysis			O	
695.601	Foundations of Information Governance			O	O/VL
695.611	Embedded Computer Systems-Vulnerabilities, Intrusions, and Protection Mechanisms	605.202; 695.601		O	O
695.612	Operating Systems Security			O	
695.614	Security Engineering	695.601			O
695.615	Cyber Physical Systems Security				VL
695.621	Public Key Infrastructure and Managing E-Security			VL	O
695.622	Web Security	605.202		O	O
695.624	Introduction to Security and Privacy				VL
695.634	Intelligent Vehicles: Cybersecurity for Connected and Autonomous Vehicles				VL
695.642	Intrusion Detection	695.641		O	O
695.712	Authentication Technologies	605.202; 695.601			VL
695.715	Assured Autonomy				O
695.721	Network Security	605.202; 695.601 and 605.671 or 635.611			O
695.744	Reverse Engineering and Vulnerability Analysis				O

Cybersecurity					
Course #	Course Name	Pre-Req*	Summer	Fall	Spring
635.673	Protecting Critical Infrastructure from Cyber Attacks	605.649; 605.675			O
635.676	Cyber Security in Information Systems			O/VL	O
635.775	Cyber Ops, Risk, and Compliance		O/VL	O/VL	O/VL
605.602	Software Analysis and Design				O
605.731	Survey of Cloud Computing Security		O		
695.611	Embedded Computer Systems-Vulnerabilities, Intrusions, and Protection Mechanisms	605.202; 695.601		O	O
695.612	Operating Systems Security			VL	VL
695.614	Security Engineering	695.601			O/VL
695.615	Cyber Physical Systems Security			O	
695.621	Public Key Infrastructure and Managing E-Security		VL	O	
695.622	Web Security	605.202	O	O	O
695.642	Intrusion Detection	695.641	O	O	O
695.712	Authentication Technologies	605.202; 695.601		VL	
695.721	Network Security	605.202; 695.601 and 605.671 or 635.611		O	VL
695.744	Reverse Engineering and Vulnerability Analysis			O	O

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