

**EXPECTED COURSE OFFERINGS  
DATA SCIENCE PROGRAM**

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 (APL) (A), online (O), or Virtual Live (VL), as indicated.

Course Number	Course Name	Summer	Fall	Spring
<b>Prerequisite Courses</b>				
605.101	Introduction to Python	O	O	O
605.206	Introduction to Programming Using Python	O	O/VL	O/VL
625.250	Multivariable Calculus and Complex Analysis	O	O	O
625.252	Linear Algebra and Its Applications	O	O	O
	OR			
625.251	Introduction to Ordinary and Partial Differential Equations			O
	OR			
605.203	Discrete Mathematics		A/O/VL	O
<b>Foundation Courses</b>				
685.621	Algorithms for Data Science	O	O	O
625.603	Statistical Methods and Data Analysis	O	O	O/VL
<b>Required Courses</b>				
685.648	Data Science	O	O	O
685.652	Data Engineering Principles and Practice	VL	VL	VL
685.662	Data Patterns and Representations	VL	O	VL
625.661	Statistical Models and Regression	O	O	O
625.615	Introduction to Optimization		O	O
	OR			
625.664	Computational Statistics		O	O
<b>Applied and Computational Mathematics Electives</b>				

<b>Select one of the following:</b>		<b>Summer</b>	<b>Fall</b>	<b>Spring</b>
625.601	Real Analysis		VL	VL
625.609	Matrix Theory	O	O/VL odd yrs O even yrs	O
625.611	Computational Methods		O odd yrs	
625.615	Introduction to Optimization		O	O
625.618	Discrete Hybrid Optimization		VL	
625.620	Mathematical Methods for Signal Processing	VL odd yrs		
625.623	Introduction to Operations Research: Probabilistic Models		O even yrs	
625.633	Monte Carlo Methods			O
625.636	Graph Theory	VL even yrs		
625.638	Foundations of Neural Networks		VL	O
625.641	Mathematics of Finance	O		
625.642	Mathematics of Risk, Options, and Financial Derivatives			VL even yrs
625.663	Multivariate Statistics and Stochastic Analysis		VL even yrs	
625.664	Computational Statistics		O	O
625.665	Bayesian Statistics	O		
625.680	Cryptography		VL even yrs	
625.687	Applied Topology			VL odd yrs
625.690	Computational Complexity and Approximation			O odd yrs
625.692	Probabilistic Graphical Models			O
625.695	Time Series Analysis		O odd yrs	
625.717	Advanced Differential Equations: Partial Differential Equations		O even yrs	O odd yrs
625.718	Advanced Differential Equations: Nonlinear Differential Equations and Dynamical Systems		O odd yrs	VL even yrs O odd yrs
625.728	Theory of Probability			VL even yrs
<b>Select another one of the following:</b>		<b>Summer</b>	<b>Fall</b>	<b>Spring</b>
625.714	Introductory Stochastic Differential Equations with Applications	O	O	O

625.721	Probability and Stochastic Process I	VL odd yrs	VL odd yrs	
625.722	Probability and Stochastic Process II			VL even yrs
625.725	Theory Of Statistics I	O even yrs	O even yrs	
625.726	Theory of Statistics II			O odd yrs
625.734	Queuing Theory with Applications to Computer Science			VL
625.740	Data Mining		O	
625.741	Game Theory		O even yrs	
625.742	Theory of Machine Learning	O	O	O
625.743	Stochastic Optimization & Control			VL odd yrs
625.744	Modeling, Simulation, and Monte Carlo		VL odd yrs	
<b>Computer Science Electives</b>				
<b>Select one of the following:</b>		<b>Summer</b>	<b>Fall</b>	<b>Spring</b>
605.741	Large-Scale Database Systems	O	O	O
605.742	Deep Neural Networks	O	O	O
605.744	Information Retrieval		O	
605.745	Reasoning Under Uncertainty		O	
605.746	Advanced Machine Learning	O		O
605.747	Evolutionary and Swarm Intelligence		O	
605.788	Big Data Processing Using Hadoop		O	O
685.701	Data Science: Modeling and Analytics	VL	O	VL
705.742	Advanced Applied Machine Learning	VL	O	VL
<b>Additional Selections If Needed</b>				
605.632	Graph Analytics			O
605.633	Social Media Analytics		O	O
605.634	Crowdsourcing and Human Computation		O	O
605.635	Cloud Computing		O	O
605.645	Artificial Intelligence	O	O	O
605.647	Neural Networks		VL	O
605.649	Introduction to Machine Learning	O	O/VL	O/VL

605.724	Applied Game Theory			O
625.601	Real Analysis		VL	VL
625.609	Matrix Theory	O	O/VL odd yrs O even yrs	O
625.611	Computational Methods		O odd yrs	
625.618	Discrete Hybrid Optimization		VL	
625.620	Mathematical Methods for Signal Processing	VL odd yrs		
625.623	Introduction to Operations Research: Probabilistic Models		O even yrs	
625.633	Monte Carlo Methods			O
625.636	Graph Theory	VL even yrs		
625.641	Mathematics of Finance	O		
625.642	Mathematics of Risk, Options, and Financial Derivatives			VL even yrs
625.662	Design and Analysis of Experiments			VL
625.663	Multivariate Statistics and Stochastic Analysis		VL even yrs	
625.665	Bayesian Statistics	O		
625.680	Cryptography		VL even yrs	
625.687	Applied Topology			VL odd yrs
625.690	Computational Complexity and Approximation			O odd yrs
625.692	Probabilistic Graphical Models			O
625.695	Time Series Analysis		O odd yrs	
625.717	Advanced Differential Equations: Partial Differential Equations		O even yrs	O odd yrs
625.718	Advanced Differential Equations: Nonlinear Differential Equations and Dynamical Systems		O odd yrs	VL even yrs O odd yrs
625.728	Theory of Probability			VL even yrs
705.601	Applied Machine Learning	O	O	O
<b>Independent Study</b>				
685.795	Capstone Project in Data Science			O
685.801	Independent Study in Data Science I	IS	IS	IS

685.802	Independent Study in Data Science II	IS	IS	IS
<i>605.xxx see the Computer Science Program; 625.xxx see the Applied and Computational Math Program</i>				