

Course Bulletin

104507	Introduction To Computer Science			
Subject: CS	Catalog Nbr: 0011	2022 FALL	Primary	Partha Biswas
				Partha.Biswas@tufts.edu
<p>The study of computer science centers on two complementary aspects of the discipline. First, computer science is fundamentally concerned with the problem-solving methodologies it derives from its foundational fields: the design principles of engineering, mathematical theory, and scientific empirical study. Second, these methodologies are applied in the complex context of a modern day computing system. In this course we will address both of these important aspects. As a means for developing your design skills, we will discuss the fundamental features of a high level, general purpose programming language — namely C++ — and learn how to use it as a tool for problem solving. We will also consider the performance of solutions, and how to apply both analytical and empirical assessment techniques. Finally, we will explore the Unix operating system as a context for problem solving. (Additional weekly lab time scheduled at first class meeting.)</p> <p>Recommendations: High school algebra. No prior programming experience is necessary.</p>				

104621	Data Structures			
Subject: CS	Catalog Nbr: 0015	2022 FALL	Primary	Partha Biswas
				Partha.Biswas@tufts.edu
<p>A second course in computer science. Data structures and algorithms are studied through major programming projects. Topics include linked lists, trees, graphs, dynamic storage allocation, and recursion.</p> <p>Enrollment priority given to freshmen or sophomores; computer science majors or minors; or majors or minors that list CS15 as a requirement or elective.</p> <p>Prerequisite: C- or better in CS11 or CS Postbac</p>				

104981	Discrete Mathematics			
Subject: CS	Catalog Nbr: 0061	2022 SPRG	Primary	Karen Edwards
				Karen.Edwards@tufts.edu
				Emmely.Rogers@tufts.edu
<p>(Cross-listed as MATH 61). Sets, relations and functions, logic and methods of proof, combinatorics, graphs and digraphs.</p> <p>Recommendations: MATH 32 or COMP 11 or permission of instructor.</p>				

105344	Programming Languages			
Subject: CS	Catalog Nbr: 0105	2021 FALL	Primary	Richard Townsend
				Richard.Townsend@tufts.edu
<p>Principles and application of computer programming languages. Emphasizes ideas and techniques most relevant to practitioners, but includes foundations crucial for intellectual rigor: abstract syntax, lambda</p>				

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calculus, type systems, dynamic semantics. Case studies, reinforced by programming exercises. Grounding sufficient to read professional literature.

Prerequisites: CS 15 (Data Structures) and one semester of Discrete Mathematics (CS/MATH 61 or Math 65) or graduate standing.

105548	Database Systems			
Subject:	Catalog Nbr:			
CS	0115			
2022 SPRG	Primary	Cody Doucette		Cody.Doucette@tufts.edu
<p>Fundamental concepts of database systems, including conceptual design, relational and object-oriented data models, query languages (SQL, QBE), and implementation issues (indexing, transaction processing, concurrent control). The concepts and algorithms covered encompass many of those used in commercial and experimental database systems. Other topics include distributed databases and distributed query processing. Recommendations: CS 15</p>				

105569	Introduction to Security			
Subject:	Catalog Nbr:			
CS	0116			
2022 SPRG	Primary	Ming Chow		ming.chow@tufts.edu
<p>A holistic and broad perspective on cyber security. Attacking and defending networks, cryptography, vulnerabilities, reverse engineering, web security, static and dynamic analysis, malware, forensics. Principles illustrated through hands-on labs and projects, including Capture The Flag (CTF) games. Prerequisite: CS 15</p>				

105772	Introduction To Machine Learning And Data Mining			
Subject:	Catalog Nbr:			
CS	0135			
2021 FALL	Primary	Martin Allen		Martin.Allen@tufts.edu
2022 SPRG	Primary	Sang Chin		Sang.Chin@tufts.edu
<p>An overview of methods whereby computers can learn from data or experience and make decisions accordingly. Topics include supervised learning, unsupervised learning, reinforcement learning, and knowledge extraction from large databases with applications to science, engineering, and medicine. Prerequisites: (CS 15 and one of CS 61, Math 61, or Math 65), or graduate standing. Recommendations: CS 160 is highly recommended.</p>				

105893	Algorithms			
Subject:	Catalog Nbr:			
CS	0160			
2022 SPRG	Primary	Ambrose Laing		Ambrose.Laing@tufts.edu
2022 SPRG	Primary	Diane Souvaine		Diane.Souvaine@tufts.edu

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Introduction to the study of algorithms. Strategies such as divide-and-conquer, greedy methods, and dynamic programming. Graph algorithms, sorting, searching, integer arithmetic, hashing, and NP-complete problems. Prerequisites: (CS 15 and one of CS 61, Math 61, or Math 65), or graduate standing.

106079	Computation Theory			
Subject:	Catalog Nbr:			
CS	0170			
2021 FALL	Primary	Martin Allen	Martin.Allen@tufts.edu	
2022 SPRG	Primary	Lenore Cowen	lenore.cowen@tufts.edu	
2022 SPRG	Primary	Emmely Rogers	Emmely.Rogers@tufts.edu	
(Cross-listed as MATH 191). Models of computation: Turing machines, pushdown automata, and finite automata. Grammars and formal languages, including context-free languages and regular sets. Important problems, including the halting problem and language equivalence theorems. Prerequisites: (CS 15 and one of CS 61, Math 61, or Math 65), or graduate standing				

106140	Software Engineering			
Subject:	Catalog Nbr:			
CS	0121			
2021 FALL	Primary	Jeffrey Foster	Jeffrey.Foster@tufts.edu	
2022 SPRG	Primary	Ronald Simmons	Ronald.Simmons@tufts.edu	
Core principles and ideas that enable development of large-scale software systems, with a focus on programming. Abstraction, modularity, design patterns, specification, testing, verification, and debugging. Recommendations: CS 40				

143784	Principles of Data Science in Python			
Subject:	Catalog Nbr:			
DS	0205			
Fundamentals of python programming for data analysis. Common python data structures and algorithms. Design of python programs. Coding standards and practices. Use and creation of software libraries. Examples drawn from data preparation and transformation, statistical data analysis, machine learning, deep learning, and deep data science including recommendation systems and trend analysis. Labs utilizing iPython and the Jupyter data analysis workflow framework.				

145159	Database Systems			
Subject:	Catalog Nbr:			
CSO	0115			
2021 SUMR	Primary	Cody Doucette	Cody.Doucette@tufts.edu	
Fundamental concepts of database systems, including conceptual design, relational and object-oriented data models, query languages (SQL, QBE), and implementation issues (indexing, transaction processing, concurrent control). The concepts and algorithms covered encompass many of those used in commercial and				

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experimental database systems. Other topics include distributed databases and distributed query processing.

145459	Master of Science Capstone Project I		
Subject:	Catalog Nbr:		
CS	0288		
2022 SPRG	Primary	Ming Chow	ming.chow@tufts.edu
<p>Part one of a two-course, hands-on, and project-based culmination to the Master of Science in Computer Science Online program. Application of principles, strategies, methods, and tools for requirements analysis and design of a programming project, including project planning, project management, and proof of concept prototyping. Formulation of a project plan, including estimation of project completion requirements and timeline. To be taken in the second-to-last term of the Master of Science in Computer Science Online degree. Not available to students outside that program.</p> <p>Prerequisites: CS 180 or 121, and enrollment in the Master of Science in Computer Science Online program.</p>			