

# Computer Science, MSCS—Align (Vancouver)

Master of Science in Computer Science—Align students come from a wide variety of backgrounds, with undergraduate majors including math, biology, history, engineering, and classics. The program begins with a two-semester introductory sequence, which provides the foundational knowledge for students from nontechnical backgrounds to succeed. Students have an opportunity to acquire both the knowledge needed to transition into a new career and the practical skills to build the next great app.

## MS Thesis Committee

The MS thesis committee must satisfy the following conditions:

1. A total of three members, including the advisor.
2. Two members from Khoury College of Computer Sciences (or affiliated to Khoury).
3. At least one member who is at “arm’s length” from the particular work in the thesis. This means that there should be at least one member who isn’t a co-advisor on the thesis.
4. External members are allowed but not required.

More members (internal or external) can be added as readers to the committee, so long as the above minimum requirements are fulfilled.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

## Align Bridge Coursework

Students are required to take all bridge courses unless otherwise determined by the program.

A grade of B or higher is required in each course.

Code	Title	Hours
<b>Fundamentals</b>		
CS 5001 and CS 5003	Intensive Foundations of Computer Science and Recitation for CS 5001	4
<b>Discrete Structures</b>		
CS 5002	Discrete Structures	4
<b>Object-Oriented Design</b>		
CS 5004 and CS 5005	Object-Oriented Design and Recitation for CS 5004	4
<b>Additional ALIGN courses</b>		
CS 5008 and CS 5009	Data Structures, Algorithms, and Their Applications within Computer Systems and Recitation for CS 5008	4

## Core Requirements

Code	Title	Hours
CS 5800	Algorithms	4
CS 7980	Research Capstone	4

## Breadth Areas

Code	Title	Hours
Select three courses from two of the three following breadth areas:		
<b>Artificial Intelligence and Data Science</b>		
CS 5100	Foundations of Artificial Intelligence	
CS 5150	Game Artificial Intelligence	
CS 5200	Database Management Systems	
CS 5330	Pattern Recognition and Computer Vision	
CS 6120	Natural Language Processing	
CS 6140	Machine Learning	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	

CS 6240	Large-Scale Parallel Data Processing
CS 7140	Advanced Machine Learning
<b>Systems and Software</b>	
CS 5400	Principles of Programming Language
CS 5500	Foundations of Software Engineering
CS 5520	Mobile Application Development
CS 5600	Computer Systems
CS 5610	Web Development
CS 5700	Fundamentals of Computer Networking
CS 6410	Compilers
CS 6510	Advanced Software Development
CS 6650	Building Scalable Distributed Systems
<b>Theory and Security</b>	
CS 6760	Privacy, Security, and Usability
CS 7805	Complexity Theory
CY 5770	Software Vulnerabilities and Security
CY 6740	Network Security

## Electives

Code	Title	Hours
Complete 8 semester hours from the following:		8
CS 5097	Mixed Reality	
CS 5170	Artificial Intelligence for Human-Computer Interaction	
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5310	Computer Graphics	
CS 5335	Robotic Science and Systems	
CS 5340	Computer/Human Interaction	
CS 5350	Computational Geometry	
CS 5360	Noninteractive Computer Graphics	
CS 5540	Game Programming	
CS 5963	Topics	
CS 5964	Projects for Professionals	
CS 5976	Directed Study	
CS 6130	Affective Computing	
CS 6350	Empirical Research Methods	
CS 6640	Operating Systems Implementation	
CS 6954	Co-op Work Experience - Half-Time	
CS 6955	Co-op Work Experience Abroad - Half-Time	
CS 6964	Co-op Work Experience	
CS 6965	Co-op Work Experience Abroad	
CS 6983	Topics in Computer Science	
CS 7150	Deep Learning	
CS 7170	Seminar in Artificial Intelligence	
CS 7180	Special Topics in Artificial Intelligence	
CS 7200	Statistical Methods for Computer Science	
CS 7240	Principles of Scalable Data Management: Theory, Algorithms, and Database Systems	
CS 7250	Information Visualization: Theory and Applications	
CS 7260	Visualization for Network Science	
CS 7270	Seminar in Database Systems	
CS 7280	Special Topics in Database Management	
CS 7290	Special Topics in Data Science	
CS 7295	Special Topics in Data Visualization	
CS 7300	Empirical Research Methods for Human Computer Interaction	

CS 7332	Machine Learning with Graphs
CS 7340	Theory and Methods in Human Computer Interaction
CS 7375	Seminar in Human-Computer Interaction
CS 7380	Special Topics in Graphics/Image Processing
CS 7400	Intensive Principles of Programming Languages
CS 7430	Formal Specification, Verification, and Synthesis
CS 7470	Seminar in Programming Languages
CS 7480	Special Topics in Programming Language
CS 7485	Special Topics in Formal Methods
CS 7575	Seminar in Software Engineering
CS 7580	Special Topics in Software Engineering
CS 7600	Intensive Computer Systems
CS 7680	Special Topics in Computer Systems
CS 7610	Foundations of Distributed Systems
CS 7670	Seminar in Computer Systems
CS 7675	Master's Research
CS 7680	Special Topics in Computer Systems
CS 7770	Seminar in Computer Networks
CS 7775	Seminar in Computer Security
CS 7800	Advanced Algorithms
CS 7805	Complexity Theory
CS 7810	Foundations of Cryptography
CS 7840	Foundations and Applications of Information Theory
CS 7870	Seminar in Theoretical Computer Science
CS 7880	Special Topics in Theoretical Computer Science
CS 7990	Thesis
CS 8674	Master's Project
CS 8982	Readings
CY 5001	Cybersecurity: Technologies, Threats, and Defenses
CY 5010	Cybersecurity Principles and Practices
CY 5130	Computer System Security
CY 6120	Software Security Practices
DS 5110	Essentials of Data Science
DS 5230	Unsupervised Machine Learning and Data Mining

### Program Credit/GPA Requirements

36-44 total semester hours required

Minimum 3.000 GPA required