COMPUTATIONAL MODELING AND DATA ANALYTICS MAJOR WITH BIOLOGICAL SCIENCES OPTION

Program Curriculum

Code	Title	Credits
Degree Core Requirements		
CMDA 3605	Mathematical Modeling: Methods and Tools [1]	3
CMDA 3606	Mathematical Modeling: Methods and Tools [1]	3
CMDA 3634	Computer Science Foundations for Computational Modeling and Data Analytics [1]	3
CMDA 3654	Introductory Data Analytics and Visualization [1]	3
CMDA 4654	Intermediate Data Analytics and Machine Learning [1]	3
MATH 2114	Introduction to Linear Algebra [1]	3
Subtotal		18
Major Requirements		
CMDA 1634	Discovering Computational Modeling and Data Analytics (Any approved First Year Experience course will satisfy this requirement.) [1]	3
CMDA 2005	Integrated Quantitative Sciences [1,2]	6
CMDA 2006	Integrated Quantitative Sciences [1,2]	6
CS 1064	Introduction to Programming in Python [1,3]	3
CS 2064	Intermediate Programming in Python [1,3]	3
CS 2114	Software Design and Data Structures [1]	3
Subtotal		24
Option Required Courses		
BIOL 1105	Principles of Biology	3
BIOL 1115	Principles of Biology Laboratory	1
BIOL 1106	Principles of Biology	3
BIOL 1116	Principles of Biology Laboratory	1
Select two of the following:		6
BIOL 2004	Genetics [1]	
BIOL 2134	Cell Function and Differentiation [1]	
BIOL 2604	General Microbiology [1]	
BIOL 2704	Evolutionary Biology [1]	
BIOL 2804	Ecology [1]	
Subtotal		14
BIOL/SYSB Elective Courses		
Select two of the following:		6-8
BIOL 4004	Freshwater Ecology [1]	
BIOL 4114	Global Change Ecology [1]	
BIOL 4134	Evolutionary Genetics [1]	
BIOL 4564	Infectious Disease Ecology [1]	
BIOL 4624	Microbial Genetics [1]	
BIOL 4664	Virology [1]	
BIOL 4874	Cancer Biology [1]	
SYSB 3035	Genomics and Bioinformatics [1]	
SYSB 3036	Genomics and Bioinformatics [1]	
SYSB 3115	Network Dynamics and Cell Physiology [1]	
SYSB 3116	Network Dynamics and Cell Physiology [1]	
Subtotal		6-8
CMDA Elective Courses		
Select one of the following:		3
CMDA 4664	Computational Intensive Stochastic Modeling [1]	
CS 3824	Introduction to Computational Biology and Bioinformatics [1]	
MATH 4454	Applied Mathematical Modeling [1]	
STAT 4364	Introduction to Statistical Genomics [1]	
Subtotal		3
Free Electives		
Select remaining credits of free electives		6-8
Subtotal		6-8
Pathways to General Education		
Pathways Concept 1 - Discourse		
Select six credits in Pathway 1f (https://catalog.vt.edu/course-search/?attrs_pathways=attrs_pathways_G01F)		6
Select three credits in Pathway 1a (https://catalog.vt.edu/course-search/?attrs_pathways=attrs_pathways_G01A)		3
Pathways Concept 2 - Critical Thinking in the Humanities		
Select six credits in Pathway 2 (https://catalog.vt.edu/course-search/?attrs_pathways=attrs_pathways_G02)		6
Pathways Concept 3 - Reasoning in the Social Sciences		
Select six credits in Pathway 3 (https://catalog.vt.edu/course-search/?attrs_pathways=attrs_pathways_G03)		6
Pathways Concept 4 - Reasoning in the Natural Sciences		
CHEM 1035	General Chemistry	3
CHEM 1036	General Chemistry	3
Pathways Concept 5 - Quantitative and Computational Thinking		
MATH 1225	Calculus of a Single Variable (5F)	4
MATH 1226	Calculus of a Single Variable (5F)	4
CMDA 4864	Computational Modeling and Data Analytics Capstone Project (5A) [1]	3
Pathways Concept 6 - Critique and Practice in Design and the Arts		
Select three credits in Pathway 6a (https://catalog.vt.edu/course-search/?attrs_pathways=attrs_pathways_G06A)		3
Select three credits in Pathway 6d (https://catalog.vt.edu/course-search/?attrs_pathways=attrs_pathways_G06D)		3
Pathways Concept 7 - Critical Analysis of Identity and Equity in the United States		
Select three credits in Pathway 7 (https://catalog.vt.edu/course-search/?attrs_pathways=attrs_pathways_G07)		3
Subtotal		47
Total Credits		**118-122**

1. Course will be used for computing the "in major" GPA.
2. MATH 2204 Introduction to Multivariable Calculus, MATH 2214 Introduction to Differential Equations, STAT 3005 Statistical Methods, STAT 3006 Statistical Methods, & STAT 3104 Probability and Distributions will substitute for CMDA 2005 Integrated Quantitative Sciences and CMDA 2006 Integrated Quantitative Sciences.

[3] CS 1114 Introduction to Software Design will substitute for CS 1064 Introduction to Programming in Python and CS 2064 Intermediate Programming in Python.

Graduation Requirements

120 credit hours are required for graduation. These credits must include the courses required for the major (see above sections). To graduate, a student must have at least a 2.0 in-major GPA and overall GPA. If 120 credit hours are reached and a student does not meet the GPA requirement, the student must take additional in-major courses to raise the in-major GPA to a 2.0.

Prerequisites

Some courses have prerequisites. Students are required to double check course prerequisites and equivalents. Please see your advisor or consult the Undergraduate Course Catalog for more information.

Progress Toward Degree

Three conditions are required for continuation in the major:

1. Upon having attempted 72 total credit hours (including transfer, AP, advanced standing, credit by examination, course withdrawal) majors must have completed the following courses with grades of C— or better in a maximum of two attempts (including attempts that were withdrawn): Upon having attempted 72 total credit hours (including transfer, AP, advanced standing, credit by examination, course withdrawal) majors must have completed the following courses with grades of **C—** or better in a maximum of two attempts (including attempts that were withdrawn): MATH 1225 Calculus of a Single Variable; MATH 1226 Calculus of a Single Variable; MATH 2114 Introduction to Linear Algebra; (CMDA 2005 Integrated Quantitative Sciences and CMDA 2006 Integrated Quantitative Sciences) or (STAT 3005 Statistical Methods, STAT 3006 Statistical Methods, STAT 3104 Probability and Distributions; MATH 2204 Introduction to Multivariable Calculus, MATH 2214 Introduction to Differential Equations).
2. Upon having attempted 72 total credit hours (including transfer, AP, advanced standing, credit by examination, course withdrawal) majors must have completed the following courses with grades of **C** or better in a maximum of two attempts (including attempts that were withdrawn): (CS 1064 Introduction to Programming in Python and CS 2064 Intermediate Programming in Python) or CS 1114 Introduction to Software Design; CS 2114 Software Design and Data Structures.
3. Upon having attempted 12 credits of courses designated as counting for the in-major GPA, students must maintain an in-major GPA of 2.0 or better.

Foreign Language Requirement

Students who did not successfully complete at least two years of a single foreign, classical, or sign language during high school must successfully complete six credit hours of a single foreign, classical, or sign language at the college level. Courses taken to meet this requirement do not count toward the hours required for graduation. Please consult the Undergraduate Catalog for details.