

College of Science
Bachelor of Science in Computational Modeling and Data Analytics
Major in Computational Modeling and Data Analytics (CMDA)
For students graduating in calendar year 2020

CORE REQUIREMENTS (39 credits)

*Complete all following courses in CMDA, Computer Science, and Mathematics. Courses marked with * will be used for computing the "in major" GPA. In accordance with State Council guidelines, courses used to fulfill the SCHEV approved degree core may not also be used to meet Curriculum for Liberal Education or major requirements.*

CMDA 2005*#	Integrated Quantitative Sciences	(6)()
CMDA 2006*#	Integrated Quantitative Sciences	(6)()
CMDA 3605*	Mathematical Modeling: Methods and Tools	(3)()
CMDA 3606*	Mathematical Modeling: Methods and Tools	(3)()
CMDA/CS 3634*	Computer Science Foundations for Computational Modeling & Data Analytics	(3)()
CMDA/CS/STAT 3654*	Introductory Data Analytics & Visualization	(3)()
CMDA/CS/STAT 4654*	Intermediate Data Analytics and Machine Learning	(3)()
CMDA 4864*	CMDA Capstone	(3)()
CS 1114	Introduction to Software Design	(3)()
CS 2114	Software Design and Data Structures	(3)()
MATH 2114	Introduction to Linear Algebra	(3)()

MATH 2204, MATH 2214, STAT 3005, STAT 3006 & STAT 3104 will substitute for CMDA 2005 and 2006.

RESTRICTED ELECTIVES (12 credits)

*Complete four courses from the list below (continued on the next page). These courses, all marked with *, will also be used for computing the "in major" GPA.*

CMDA 4604*	Intermediate Topics in Mathematical Modeling	(3)()
CMDA/STAT 4664*	Computational Intensive Stochastic Modeling	(3)()
CMDA 4964*#	Field Study	(3)()
CMDA 4994*#	Undergraduate Research	(3)()
CS 3114*	Data Structures and Algorithms	(3)()
CS 4104*	Data and Algorithm Analysis	(3)()
CS 4824*/ECE 4424*	Machine Learning	(3)()
CS 4604*	Introduction to Data Base Management Systems	(3)()
MATH 3134*	Applied Combinatorics	(3)()
MATH 4144*	Linear Algebra	(3)()
MATH 4175*	Cryptography	(3)()
MATH 4176*	Cryptography	(3)()
MATH 4425*	Fourier Series and Partial Differential Equations	(3)()
MATH 4426*	Fourier Series and Partial Differential Equations	(3)()
MATH 4445*	Introduction to Numerical Analysis	(3)()
MATH 4446*	Introduction to Numerical Analysis	(3)()

RESTRICTED ELECTIVES, *continued*

STAT 4004*	Methods of Statistical Computing	(3)()
STAT 4204*	Experimental Designs	(3)()
STAT 4214*	Methods of Regression Analysis	(3)()
STAT 4364*	Introduction to Statistical Genomics	(3)()
STAT 4444*	Applied Bayesian Statistics	(3)()
STAT 4504*	Applied Multivariate Analysis	(3)()
STAT 4534*	Applied Time Series	(3)()
PHYS 4755*	Intro to Computational Physics	(3)()
PHYS 4756*	Intro to Computational Physics	(3)()
BIOL 4075*	Bioinformatics Methods	(3)()
BIOL 4076*	Bioinformatics Methods	(3)()

‡ A maximum of 3 credits from either CMDA 4964 or CMDA 4994 may count as a CMDA restricted elective.

**REQUIREMENTS FOR THE COLLEGE AND UNIVERSITY
CURRICULUM FOR LIBERAL EDUCATION (40 credits)**

Consult the University Undergraduate Course Catalogue or the CLE Guide at <http://www.cle.prov.vt.edu> for approved courses.

Area 1: Writing and Discourse

_____ (3)() _____ (3)()

Area 2: Ideas, Cultural Traditions and Values

_____ (3)() _____ (3)()

Area 3: Society and Human Behavior

_____ (3)() _____ (3)()

Area 4: Scientific Reasoning and Discovery

_____ (4)() _____ (4)()

Area 5: Quantitative and Symbolic Reasoning

MATH 1225 Calculus of a Single Variable (4)() MATH 1226 Calculus of a Single Variable (4)()

Area 6: Creativity and Aesthetic Experience

_____ (3)()

Area 7: Critical Issues in a Global Context

_____ (3)()

FREE ELECTIVES (29 credits)

	(3) ()		(3) ()
	(3) ()		(3) ()
	(3) ()		(3) ()
	(3) ()		(3) ()
	(3) ()		(2) ()

Prerequisites

Some courses in the major requirements and electives above 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 semester credits (including transfer, AP, advanced standing, credit by examination, course withdrawal) majors must have completed the following courses with grades of C- or better in two or fewer attempts (including attempts that were withdrawn): MATH 1225; MATH 1226; MATH 2114; (CMDA 2005 and CMDA 2006) or (STAT 3005, 3006, 3104 ; MATH 2204, 2214).
- (2) Upon having attempted 72 semester credits (including transfer, AP, advanced standing, credit by examination, course withdrawal) majors must have completed the following courses with grades of C or better in two or fewer attempts (including attempts that were withdrawn): CS 1114; CS 2114.
- (3) Upon having attempted 90 semester credits, students must have 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 semester 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.

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.