College of Science
Bachelor of Science in Computational Modeling and Data Analytics
Major in Computational Modeling and Data Analytics (CMDA)
Option: Physics
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	Intro to Linear Algebra	(3)( )

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

PHYSICS OPTION REQUIREMENTS (10 credits)
*Complete all following Physics courses. These courses, all marked with * will be used for computing the "in major" GPA.*

PHYS 3324*	Modern Physics	(4)( )
PHYS 4755*	Introduction to Computational Physics	(3)( )
PHYS 4756*	Introduction to Computational Physics	(3)( )

PHYSICS ELECTIVES FOR THE PHYSICS OPTION (15 credits)
Complete five courses from the list below.
*These courses, all marked with *, will also be used for computing the "in major" GPA.*

PHYS 3355*	Intermediate Mechanics	(3)( )
PHYS 3356*	Intermediate Mechanics	(3)( )
PHYS 3405*	Intermediate Electricity & Magnetism	(3)( )
PHYS 3406*	Intermediate Electricity & Magnetism	(3)( )
PHYS 3704*	Thermal Physics	(3)( )
PHYS 4455*	Introduction to Quantum Mechanics	(3)( )
PHYS 4456*	Introduction to Quantum Mechanics	(3)( )
PHYS 4504*	Introduction to Nuclear & Particle Physics	(3)( )
PHYS 4554*	Introduction to Solid State Physics	(3)( )
PHYS 4574*	Nanotechnology	(3)( )
PHYS 4614*	Optics	(3)( )
PHYS 4674*	Introduction to General Relativity	(3)( )
PHYS 4714*	Introduction to Biophysics (Pre: PHYS 2206 or PHYS 2306)	(3)( )

**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

PHYS 2305 Foundations of Physics I   (4) ( )   PHYS 2306 Foundations of Physics I   (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 (16 credits)

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

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

_____ (3) ( ) _____ (1) ( )

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

Two 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.