APPROVED
University Registrar

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 **2018**

CORE REQUIREMENTS (50 Credits)

Complete all following courses in CMDA, STAT, MATH, CS & PHYS

CMDA 3605*[1]	Math Modeling: Methods, Tools (Pre: CMDA 2006)	(3)( )
CMDA 3606*	Math Modeling: Methods, Tools (Pre: CMDA 3605)	(3)( )
CMDA/CS 3634*	CS Founds for CMDA (Pre: CS 2114)	(3)( )
CMDA/STAT/CS 3654*[1]	Intr Data Analytics and Visualization (Pre: CMDA 2006, CS 1114)	(3)( )
CMDA/STAT/CS 4654*[1]	Intermed Data Analytics & ML (Pre: CMDA 2006)	(3)( )
CMDA 4864*[1]	CMDA Capstone (Pre: (CMDA 3605, 3606) or (CMDA 3654, 4654) or (CMDA 3634, CS 2114))	(3)( )
CS 1114	Introduction to Software Design	(3)( )
CS 2114	Software Design and Data Structures (Pre: CS 1114 (C) or CS 1124 (C))	(3)( )
MATH 1225	Calculus of a Single Variable	(4)( )
MATH 1226	Calculus of a Single Variable (Pre: MATH 1225)	(4)( )
MATH 2114	Introduction to Linear Algebra (Pre: MATH 1225 (B) or MATH 1226 (P))	(3)( )
MATH 2204*#	Intro Multivariable Calculus (Pre: MATH 1226)	(3)( )
MATH 2214*#	Introductory Differential Equations (Pre: MATH 2114, 1226)	(3)( )
STAT 3005*#	Statistical Methods (Pre: MATH 1226)	(3)( )
STAT 3006*#	Statistical Methods (Pre: STAT 3005)	(3)( )
STAT 3104*#	Probability and Distributions (Pre: (MATH 1206 or 1226 or 2015 or 1026 or 1526), (MATH 3005 or 3615))	(3)( )

PHYSICS ELECTIVES (15 Credits)

Complete five courses from the list below

PHYS 3355*	Intermediate Mechanics (Pre: MATH 2204 or 2204H, MATH 2214, PHYS 2306, PHYS 2504)	(3)( )
PHYS 3356*	Intermediate Mechanics (Pre: PHYS 3355)	(3)( )
PHYS 3405*	Intermediate Electricity and Magnetism (Pre: MATH 2214, PHYS 2306, PHYS 2504)	(3)( )
PHYS 3406*	Intermediate Electricity and Magnetism (Pre: PHYS 3405)	(3)( )
PHYS 3704*	Thermal Physics (Pre: PHYS 2306, PHYS 3324; Co: MATH 2214, PHYS 2504)	(3)( )
PHYS 4455*	Introduction to Quantum Mechanics (Pre: PHYS 3356; Co: PHYS 3406)	(3)( )
PHYS 4456*	Introduction to Quantum Mechanics (Pre: PHYS 4455)	(3)( )
PHYS 4504*	Introduction to Nuclear and Particle Physics (Consent required. Co: PHYS 4456)	(3)( )
PHYS 4554*	Introduction to Solid State Physics (Consent required. Co: PHYS 4456)	(3)( )
PHYS 4574*	Nanotechnology (Pre: PHYS 2206 or PHYS 2306)	
PHYS 4614*	Optics (Pre: PHYS 2306, MATH 2214, MATH 2224 or MATH 2204 or MATH 2204H)	(3)( )
PHYS 4674*	Introduction to General Relativity (Pre: MATH 2214 or MATH 2514, PHYS 3356; Co: PHYS 3406)	(3)( )
PHYS 4714*	Introduction to Biophysics (Pre: PHYS 2206 or PHYS 2306)	(3)( )

PHYSICS OPTION (18 Credits)

Complete all courses from the list below

PHYS 2305*	Foundations of Physics (Pre: MATH 1225; Co: MATH 1226)	(4)( )
PHYS 2306*	Foundations of Physics (Pre: MATH 1226, PHYS 2305)	(4)( )
PHYS 3324*	Modern Physics (Pre: PHYS 2306; Co: MATH 2214, PHYS 2504)	(4)( )
PHYS 4755*	Intro to Computational Physics (Pre: 2306, CS 1044)	(3)( )
PHYS 4756*	Intro to Computational Physics (Pre: PHYS 4455, PHYS 4755)	(3)( )

APPROVED
University Registrar

* Courses for computing "in-major GPA."
# CMDA 2005 and CMDA 2006 will substitute for MATH 2204, MATH 2214, STAT 3005, STAT 3006 and STAT 3104.
1 Prerequisites for this course include MATH 2114, MATH 2214, MATH 2204, STAT 3005, STAT 3006, STAT 3104.
Prerequisites: Students are required to double check course prerequisites and equivalents.

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): STAT 3005, 3006, 3104; MATH 1225, 1226, 2114, 2204, 2214; CS 1114, 2114.
(2) Upon having attempted 90 semester credits, students must have an in-major GPA of 2.0 or better.

Foreign Language
The College of Science requires three units of a single foreign or classical language during high school or the second semester of a college-level foreign or classical language. These credit hours do not count toward the total minimum hours required for the declared degree program.

Graduation Requirements: 120 credit hours are required for graduation. These credits must include the courses required for the major (see above section). 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.

Requirements for the College and University Curriculum for Liberal Education (CLE)

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

Area 1
Writing & Discourse **(6)**
_____ (3) ( )
_____ (3) ( )

Area 2
Ideas, Cultural Traidtions & Values **(6)**
_____ (3) ( )
_____ (3) ( )

Area 3
Society & Human Behavior **(6)**
_____ (3) ( )
_____ (3) ( )

Free Electives (13)
_____ (3) ( )
_____ (3) ( )
_____ (3) ( )
_____ (3) ( )
_____ (1) ( )

Area 6
Creativity & Aesthetic Experience **(3)**
_____ (3) ( )

Area 7
Critical Issues in a Global Context **(3)**
_____ (3) ( )