College of Science
Bachelor of Science in Neuroscience
For Students Graduating in Calendar Year 2022 and for Student Date of Entry Under UG Catalog 2020-2021
Major: Computational and Systems Neuroscience

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1. Pathways to General Education Requirements (47 Credits)

Concept 1F: Discourse (Foundational)

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

Concept 1A: Discourse (Advanced)

_____ (3) ( )

Concept 2: Critical Thinking in the Humanities

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

Concept 3: Reasoning in the Social Sciences

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

Concept 4: Reasoning in the Natural Sciences

BIOL 1105 Principles of Biology[1] (3) ( )   BIOL 1106 Principles of Biology[1] (3) ( )

Concept 5F: Quantitative and Computational Thinking (Foundational)

MATH 1225 Elementary Calculus[1] (4) ( )   MATH 1226 Elementary Calculus[1] (4) ( )

Concept 5A: Quantitative and Computational Thinking (Advanced)

#STAT 3005 Biological Statistics (3) ( )

Concept 6A: Critique and Practice in Design and the Arts (Arts)

_____ (3) ( )

Concept 6D: Critique and Practice in Design and the Arts (Design)

_____ (3) ( )

Concept 7: Critical Analysis of Identity and Equity in the United States

_____ (3) ( )

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2. Core Neuroscience Requirements (21 Credits)

Course	Title				
CHEM 1035-1036[1]	General Chemistry	(3) ( )	(3) ( )
NEUR 1004[1]	Neuroscience Orientation Seminar		(1) ( )
#NEUR 2025-2026[1]	Introduction to Neuroscience	(3) ( )	(3) ( )
NEUR 2035-2036[1]	Neuroscience Laboratory	(1) ( )	(1) ( )
#NEUR 4044[1]	Neuroscience Senior Seminar		(3) ( )
PSYC 1004[1]*	Introductory Psychology		(3) ( )

*note that because PSYC1004 is in the "Core" requirements, it *may not* double count as a concept 3 course

3. Computational and Systems Neuroscience Major Requirements (25 Credits)

BIOL1115-1116[1]	Principles of Biol. Lab	(1)	( )	(1)	(	)
CS 1114	Introduction to Software Design			(3)	(	)
#NEUR 3084	Cognitive Neuroscience			(3)	(	)
#NEUR 3844	Computational Neuroscience and Neural Engineering			(3)	(	)
#NEUR 3234	The Artificial Brain			(3)	(	)
#PHYS 2305-2306	Foundations of Physics I and II	(4)	( )	(4)	(	)
#STAT 3006	Statistical Methods			(3)	(	)

4. Restricted Electives (12 Total Credits)

Students must complete 12 credits of restricted electives including:

  a. At least two (2) of the following: NEUR3144, NEUR4544, NEUR3914
  b. At least three (3) additional credits of courses with a "NEUR" prefix from the approved list
  c. At least three (3) additional restricted elective credits from the approved list

Section 4a. (6 credits)

*Choose two (2) of the following **courses**. Courses may not double count with the credits chosen for any other CSNU requirement.*

#NEUR 3144	Mechanisms of Learning and Memory	(3)	(	)
#NEUR 4454	Neuroeconomics	(3)	(	)
#NEUR 3914	Neuroscience of Drug Addiction	(3)	(	)

Section 4b. (3 credits)

*Choose one (1) of the following **courses**. Courses may not double count with the credits chosen for any other CSNU requirement. If NEUR4994 is selected, research must total to 3 credits.*

NEUR 2464	Neuroscience and Society	(3)	(	)
#NEUR 2554	Experimental Neuroscience	(3)	(	)
#NEUR 3044	Cellular and Molecular Neuroscience	(3)	(	)
#NEUR 3144	Mechanisms of Learning and Memory	(3)	(	)
#NEUR 3554	Neuroscience Research and Practical Experience	(3)	(	)
#NEUR3774	Neuroendocrinology	(3)	(	)
#NEUR 3914	Neuroscience of Drug Addiction	(3)	(	)
#NEUR 3944	War and the Brain	(3)	(	)
#NEUR 3954	Neurobiology of Psych Disorders	(3)	(	)
#NEUR 4034	Diseases of the Nervous System	(3)	(	)
#NEUR 4314	Genetics in Neuroscience	(3)	(	)
#NEUR 4364	Neuroscience of Language and Communication Disorders	(3)	(	)
#NEUR 4454	Neuroeconomics	(3)	(	)

(NEUR 4454 is cross listed with ECON4454 and PSYC4454)

#NEUR 4514	Neuroimmunology	(3)	(	)
#NEUR 4544	Synaptic Structure and Function	(3)	(	)
#NEUR 4594	Clinical Neuroscience in Practice	(3)	(	)
NEUR 4994	Undergraduate Research	(3)	(	)

(NEUR4994 may only be taken after two terms of research at the 2994 level)

Section 4c. (3 credits)
Choose at least three (3) **credits** from the below list of courses. Courses may not double count with the credits chosen for any other CSNU requirement.

Code	Course					
#ALS 2304	Comparative Animal Physiology and Anatomy				(4)	( )
#ALS/BIOL 4554	Neurochemical Regulation				(3)	( )
#BIOL 2004	Genetics				(3)	( )
#BIOL 2134	Cell Function and Differentiation				(3)	( )
#BIOL 3404	Introductory Animal Physiology				(3)	( )
#BIOL 4824	Bioinformatics Methods				(3)	( )
#BMES 2104	Introduction to Biomedical Engineering				(3)	( )
#BMES 3134	Introduction to Biomedical Imaging				(3)	( )
#BMSP 2135-2136	Human Anatomy and Physiology	(3)	( )		(3)	( )
CHEM 1045-1046	General Chemistry Lab	(1)	( )		(1)	( )
#CHEM 2535-2536	Organic Chemistry	(3)	( )		(3)	( )
#CHEM 2545-2546	Organic Chemistry Lab	(1)	( )		(1)	( )
#CHEM 4554	Drug Chemistry				(3)	( )
#CHEM 4615-4616	Physical Chemistry for the Life Sciences	(3)	( )		(3)	( )
#CS 3724	Introduction to Human-Computer Interaction				(3)	( )
#CS 3824	Intro to Computational Biology & Informatics				(3)	( )
#CS 4804	Introduction to Artificial Intelligence				(3)	( )
NEUR 2464	Neuroscience and Society				(3)	( )
#NEUR 2554	Experimental Neuroscience				(3)	( )
#NEUR 3044	Cellular and Molecular Neuroscience				(3)	( )
#NEUR 3144	Mechanisms of Learning and Memory				(3)	( )
#NEUR 3554	Neuroscience Research and Practical Experience				(3)	( )
#NEUR3774	Neuroendocrinology				(3)	( )
#NEUR 3914	Neuroscience of Drug Addiction				(3)	( )
#NEUR 3944	War and the Brain				(3)	( )
#NEUR 3954	Neurobiology of Psych Disorders				(3)	( )
#NEUR 4034	Diseases of the Nervous System				(3)	( )
#NEUR 4314	Genetics in Neuroscience				(3)	( )
#NEUR 4364	Neuroscience of Language and Communication Disorders				(3)	( )
#NEUR 4454	Neuroeconomics				(3)	( )

(NEUR 4454 is cross listed with ECON4454 and PSYC4454)

Code	Course					
#NEUR 4514	Neuroimmunology				(3)	( )
#NEUR 4544	Synaptic Structure and Function				(3)	( )
#NEUR 4594	Clinical Neuroscience in Practice				(3)	( )
NEUR 4994	Undergraduate Research				(3)	( )

(NEUR4994 may only be taken after two terms of research at the 2994 level)

Code	Course					
#PHYS 2504	Math Methods in Physics				(3)	( )
#PHYS 3314	Intermediate Laboratory				(3)	( )
#PHYS 3405-3406	Intermediate Electricity and Magnetism	(3)	( )		(3)	( )
#PHYS 3704	Thermal Physics				(3)	( )
#PHYS 4315	Modern Experimental Physics				(2)	( )
#PHYS 4714	Introduction to Biophysics				(3)	( )
#PSYC 2044	Psychology of Learning				(3)	( )
#PSYC 2064	Nervous Systems and Behavior				(3)	( )
#PSYC 4044	Advanced Learning				(3)	( )

#PSYC 4114	Cognitive Psychology				(3)	( )
#PSYC 4064	Physiological Psychology				(3)	( )
#PSYC 4074	Sensation and Perception				(3)	( )
#STAT 4204	Experimental Designs				(3)	( )
#SYSB 2025-2026	Introduction to Systems Biology	(3)	( )		(3)	( )

Free Electives (15 Credits)

_____	(__cr)	_____	(__cr)
_____	(__cr)	_____	(__cr)
_____	(__cr)		

Acceptable Substitutions:
BIOL 1105: BIOL 1005 General Biology
BIOL 1106: BIOL 1006 General Biology
BIOL 1115: BIOL 1015 General Biology Lab
BIOL 1116: BIOL 1016 General Biology Lab
CHEM 1035-1036: CHEM 1055-1056 General Chemistry for Majors
CHEM 1045-1046: CHEM 1065-1066 General Chemistry Lab for Majors

Double Majors/Minors: The School of Neuroscience offers majors in Cognitive and Behavioral Neuroscience, Clinical Neuroscience, Computational and Systems Neuroscience, and Experimental Neuroscience. Courses for these majors overlap slightly. Therefore, students may not pursue multiple majors within the School.

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.

[1]**Grade Requirements:** Students must earn a grade of "C-" or better in all core neuroscience coursework (CHEM1035, CHEM1036, NEUR1004, NEUR2025, NEUR2026, NEUR2035, NEUR2036, NEUR4044, PSYC1004) or the equivalent coursework. Students must also earn a "C-" or better in BIOL1105, BIOL1106, BIOL1115, BIOL1116, MATH1225, and MATH1226. Only two attempts, including course withdrawals with a grade of "W," are allowed for each core neuroscience course, BIOL1105, BIOL1106, BIOL1115, BIOL1116, MATH1225, and MATH1226.

Graduation Requirements: Student must complete a minimum of 120 credit hours with an overall GPA of 2.0 and a minimum in-major GPA of 2.0. For purposes of GPA computation, courses IN-MAJOR will include Core requirements, Major requirements, Restricted Electives, BIOL 1105, 1106, 1115, 1116, and MATH 1225 and 1226.

#**Prerequisites:** This check sheet contains courses that have at least one prerequisite that may not be included as part of this degree. Please see your advisor or consult the Undergraduate Course Catalog for more information.

Progress Toward Degree Policy: After attempting 72 credits, students must have completed BIOL 1105, 1106, 1115, 1116, CHEM 1035-1036, NEUR 2025-2026 and 2035-2036; have a minimum overall GPA of 2.5; and have completed at least 24 credits that apply to the Pathways to General Education requirements.

Terminology:

Pathways Requirements: Pathways to General Education is defined by the university as "A vibrant, flexible, and innovative general education program that provides a coherent and meaningful learning experience and allows students to integrate the learning for use throughout their lifetimes."

Core Neuroscience Requirements: Core neuroscience requirements are those requirements that must be fulfilled by all students in the School of Neuroscience, regardless of major.

Major Requirements: Major requirements are those requirements that are unique to the CSNU major and do not apply across all School of Neuroscience majors.

Restricted Elective: Restricted elective courses provide students the autonomy to select 12 or more credits of coursework within an approved list to count towards the students' degree requirements. These courses expand on the depth and breadth of the CSNU major.

Free Elective: Free elective credits may consist of any credit-bearing Virginia Tech coursework to ensure that students reach the 120 credits required by the university to earn a bachelor's degree. Coursework that does not apply elsewhere towards the degree will apply here (this includes non-duplicative coursework for double majors, minors, or AP coursework that does not count elsewhere towards the degree).