RESOLUTION TO APPROVE THE ESTABLISHMENT OF A SCHOOL OF NEUROSCIENCE AT VIRGINIA TECH

Documents included:

- Resolution to Approve the Establishment of a School of Neuroscience at Virginia Tech
 Supporting Documentation-School of Neuroscience at Virginia Tech
 Presentation slides

WHEREAS, neuroscience is a broad and diverse field of study that does not rely on one particular academic discipline for laying the interdisciplinary and translational understanding of the workings of the human neurological system, from the cellular level to an appreciation of that which concerns the human mind and behavior; and

WHEREAS, research and education in neuroscience is a broad and multi-faceted subject that requires interaction between academic disciplines to develop and to deliver world class education and research; and

WHEREAS, faculty from the College of Science, the University, and the Virginia Tech Carilion Research Institute wish to combine their respective program strengths and partner across traditional boundaries; and

WHEREAS, faculty, with support from their respective departments and colleges, have proposed the establishment of a School of Neuroscience at Virginia Tech; and

WHEREAS, the oversight and administration required to bring neuroscience to the forefront of Virginia Tech's scholarly landscapes is above the level of a typical academic department; and

WHEREAS, the proposed School will increase the quality of undergraduate programs and the number of students completing graduate degrees in Neuroscience with a research component; and

WHEREAS, the proposed School supports the mission of the College of Science at Virginia Tech with continued emphasis on giving students a comprehensive foundation in the scientific method coupled with training from a translational perspective so that tomorrow's graduates can implement their knowledge in ways that contribute to the public good; and

WHEREAS, the proposed School supports the mission of Virginia Tech to serve the Commonwealth, the nation, and world community through the discovery and dissemination of new knowledge; and

WHEREAS, the proposed School will enhance the stature of Virginia Tech as an internationally recognized university for research and scholarship; and

WHEREAS, the proposed School will provide a unified identity within Virginia Tech, to the academic community and be the only School of its kind in the nation,

NOW, **THEREFORE**, **BE IT RESOLVED**, that the proposal for the establishment of a School of Neuroscience at Virginia Tech, housed within the College of Science, be approved and the proposal forwarded to the President, Board of Visitors and State Council of Higher Education for Virginia (SCHEV) for approval.

RECOMMENDATION:

That the resolution for the establishment of a School of Neuroscience at Virginia Tech be approved. November 9, 2015

Virginia Polytechnic Institute and State University Organizational Change

Formation of the School of Neuroscience

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Virginia Polytechnic Institute and State University Organizational Change

Formation of the School of Neuroscience

Institution

Virginia Tech

Proposed Change

Establish a new School of Neuroscience to be housed within the College of Science, effective Fall 2016

Background

Neuroscience has quickly emerged as one of the "hottest" disciplines in the life sciences. In response to this demand, over the past six years, Virginia Tech has been keenly focused on expanding its ability to educate and train students in the field of neuroscience. One such innovation was Virginia Tech's formation of the Virginia Tech Carilion Research Institute (VTCRI) in Roanoke. A second innovation was the formation of the Academy of Integrated Science within the College of Science into which several cutting-edge, cross-disciplinary degree programs have been placed. The Academy of Integrated Science, which Dean Lay Nam Chang established in 2011, now encompasses undergraduate degree programs in computational modeling and data analytics, nanoscience, systems biology, and neuroscience. It is also the home to the Integrated Science Curriculum and the Division of Science, Technology, and Law. The last innovation, the B.S. degree in Neuroscience, is one of the emerging new undergraduate majors that many students are seeking at Virginia Tech. Neuroscience has a far reach into essentially any aspect of human endeavor. It is a discipline that explores how people perceive the world, make decisions, develop emotions, and show empathy. It is a science that uses a factbased approach to examine and evaluate interactions among individuals and interactions between genes and the environment that shape minds, behavior and susceptibility to disease. As such, neuroscience is not just the application of biology to the brain, but instead a science that informs and is informed by essentially every aspect of human endeavor.

Purpose of Proposed Change

The School of Neuroscience will provide the oversight and administration required to bring neuroscience to the forefront of Virginia Tech's scholarly landscape, which requires coordination above the level of the typical academic department. The School of Neuroscience will lay the foundation for the interdisciplinary and translational understanding of the workings of the human neurological system, from the cellular level, to an appreciation of all that is essential to the human mind and behavior. As such, the focus on neuroscience involves not only trained scholars and researchers in the field, but scholars in essentially every department in the extant College of Science (i.e., Biological Systems, Psychology, Mathematics, Physics, Chemistry, Statistics, and Economics), and many other colleges at Virginia Tech (Engineering, Agriculture and Life Sciences, Liberal Arts and Human Studies, Veterinary Medicine).

Rationale

Located within the College of Science, the Virginia Tech School of Neuroscience will provide support and visibility to the innovations in neuroscience mentioned above, including Virginia Tech's new B.S. in Neuroscience degree program. The establishment of the School will facilitate the recruitment of faculty members who traditionally have sought employment at medical schools incorporating multiple neuroscience foci such as Neurology, Neurosurgery, Anesthesiology, and Neurobiology. Importantly, the School of Neuroscience at Virginia Tech will be able to recruit a significant number of additional students, both within the Commonwealth and across the nation, who would otherwise choose to attend other colleges and universities with integrated neuroscience foci. Thus, the School of Neuroscience will be a way of promoting Virginia Tech as a leader in education, research, and outreach in this important field.

Virginia Tech is currently not maximizing available research funding earmarked by NIH, NSF and DOD for Neuroscience research, including marquis programs such as the Administrations \$400 Mio Brain Initiative. Through recruitment of new faculty members to the School of Neuroscience, Virginia Tech has the opportunity to tap into these additional research funds to increase its market share. This effort will have a significant impact on extramural funding to VT and the Commonwealth.

The proposed School of Neuroscience fits well with the overall mission of Virginia Tech, which is to serve the Commonwealth, the nation, and world community through the discovery and dissemination of new knowledge. Paramount to the School of Neuroscience mission is teaching a superior caliber of students in this new and cutting edge area of knowledge in order to: expand their professional opportunities, advance social and community development, foster economic competitiveness, and improve the quality of life.

The proposed School of Neuroscience also supports the mission of the College of Science at Virginia Tech with continued emphasis on giving students a comprehensive foundation in the scientific method coupled with training from a translational perspective so that tomorrow's graduates can implement their knowledge in ways that contribute to the public good. The College of Science is dedicated to fostering a research-intensive environment that promotes scientific inquiry and outreach, and the School of Neuroscience will embrace the same mission.

Curriculum

The proposed School of Neuroscience will immediately administer the B.S. Neuroscience degree, which started in fall 2015. Over the next several years, Virginia Tech plans to develop

an additional B.A. in Neuroscience degree (tailored to pre-professional students seeking careers in Business, Finance, Law, or Public Policy) and a Minor in Neuroscience. The current and future degree programs will be built on collaborative work and education of students in the classroom, and on student interactions with researchers and practitioners, providing an unparalleled breadth of neuroscience education at the undergraduate level. Through the curriculum and research training, students learn the theories and methods that link behaviors observed in everyday life with new discoveries in neuroscience, obtained by advanced technologies. Graduates of the programs will be proficient in understanding genetic, molecular, structural, physiological, cognitive, and behavioral aspects of the central and peripheral nervous systems in humans and in nonhuman animals. In addition, they will learn the application of neuroscience to engineering, to art, to architecture, and to decision-making. This portfolio of skills ensures that program graduates are highly competitive for the biomedical research employment market in industry and in government, and for graduate degree programs in neuroscience and across related life sciences.

The expanded curriculum will include innovative courses in neuro-law, neuro-analytics, neuroscience of decision making, neuro-economics, neuro-sociology, neuro-ethics, neuro-robotics, neuro-arts, neuro-architecture, and many others, which will give future professionals with an interest in business, finance, management, law, and policy a distinct advantage, and will differentiate a Virginia Tech Neuroscience major from any other in the country.

As the proposed School of Neuroscience grows, it will also pursue additional graduate degrees including Masters and Ph.D. programs. In the immediate future the program will partner with the existing Translational Biology in Medicine and Health (TBMH) program, which has a Neuroscience track.

Faculty

Faculty in the new School of Neuroscience comprise those with academic appointments directly in the School and those who hold joint appointments in other academic units. Existing faculty with expertise and an interest in neuroscience will be invited to join the School of Neuroscience as founding faculty members. VT expects to expand the neuroscience faculty by recruiting five new faculty members in academic years 2015/16 and 2016/17, with the majority being recruited at the tenure track Assistant Professor level. However, well-qualified midcareer applicants will also be considered. These positions derive from the existing pool of faculty lines appropriated to the college of science. The long-term goal is to recruit an additional ten faculty members. These new faculty will hold their tenure in the School of Neuroscience, ensuring that their academic advancement is being reviewed by a fitting group of peers. Since Neuroscience is a laboratory-intensive course, we will utilize two instructors (one existing, one to be hired in the future) to run multiple concurrent sessions of the introductory and advanced laboratories. Finally, post-doctoral fellows will be recruited and funded through faculty externally-funded research grants.

Administration

Dr. Harald Sontheimer, a recently appointed Professor of Neuroscience and I. O. Wilson Chair in the College of Science, will serve as Head and direct the School of Neuroscience. Dr. Sontheimer is an expert on the biology of glial cells in cortical functioning, and occupies a joint faculty appointment with the Virginia Tech Carilion Research Institute. He previously directed a center for developmental disabilities research, overseeing the activity of 92 faculty members with a \$38.4M annual budget. Dr. Sontheimer will be responsible for the daily function of the School of Neuroscience, including the managerial oversight, hiring of all faculty and staff, development of an innovative curriculum, seeking out extramural funding opportunities, soliciting philanthropic support, and promoting the School's visibility through community outreach and national advertisements.

Dr. Sontheimer will be joined by Ms. Anne Wailes (Operations/Business Manager), Ms. Naya Sou (Assistant Director for Academic Advising).

At present, there is adequate space (existing and planned) to accommodate the new School of Neuroscience. The School of Neuroscience will be located in Sandy Hall on the Blacksburg campus, with renovations scheduled for completion in 2017. This facility will provide main administrative offices for the director and related staff (including advising space), as well as offices for student advisors, instructional faculty, and future post-doctoral fellows. This space will also contain gathering and study spaces for neuroscience majors and minors including a Neuroscience Commons that will serve as a meeting hub for the students. It is important to stress that the distributed nature of this discipline, which involves many departments across the colleges, requires a centrally located hub that the students are naturally drawn to for advising and collegial learning. The renovation plans are in the advanced stages of programming and with funding in place, construction will begin in December 2015. Until the completion of this space, the School of Neuroscience's administrative space will be housed in Suite 4500 on the North End Center in the College of Science.

For the five new faculty recruits, laboratory and office space has been secured in Virginia Tech's existing Virginia Bioinformatics Institute and the Integrated Life Sciences Building. Programmatic joint hires, such as the recruitment of a neurochemist, may be placed in existing departmental space, upon mutual agreement with the relevant unit.

Evaluation of the Proposed School

The evaluation of the proposed school will follow the guidelines of Virginia Tech Policy 6150. The evaluation is based on a five-year cycle, with the first assessment of the efficacy of the school scheduled to occur in 2021. In accordance with Policy 6150, internal and external review panels will examine the demonstrated accomplishments of the school. The evaluation criteria are

to involve: the benefit of the school to the university, assembly of a critical mass of neuroscience faculty, the success of the degree program, effective interdisciplinarity (in education, research and outreach), external funding, and the operation of the school both in administrative and fiscal management.

The evaluation of the approved degree program is to be an important contribution to the evaluation of the proposed school. Following the guidelines of the SCHEV approved proposal, the internal evaluation of the Neuroscience degree will take place in 2019. The first complete SCHEV review process will occur in 2022 and then follow a seven-year cycle.

The benchmarks of success for the degree program are:

- Attain at least 100 majors by the target year of operation
- 80% or more of the majors complete the program requirements in 4 years
- 50% of the graduates seeking entry-level positions find employment in Neuroscience related fields within one year after graduation
- 20% of the graduates gain acceptance into medical training
- 15% of the graduates gain acceptance into post-baccalaureate education (e.g., M.S. and/or Ph.D. neuroscience programs) within one year after graduation
- 75% of employers report high satisfaction with graduate job performance after 1 year of employment (via surveys)

Other evaluation criteria of the degree program include annual assessments of student progress through the major and annual on-line interviews of all Neuroscience Majors. From these data, longitudinal studies on the program are to be performed.

As all degree programs at Virginia Tech are required to meet the guidelines of Academic Quality and Improvement (AQI) process, the information gathered from the Neuroscience degree review will support evidence-based decision making in the program and will foster continuous improvement in the academic community. This improvement will, in turn, have a pronounced impact on the growth and efficacy of the proposed school.

Resources

All administrative and faculty positions will be funded centrally by the School of Neuroscience, in direct conjunction with the College of Science. The operating budget for the School of Neuroscience is listed on the following page. The items listed under "current operations" comprise the salary and fringe of two individuals who are currently working in the College of Science on the existing Neuroscience degree program. Items listed under the heading of "allocated resources" include T&R faculty and start-ups, teaching, support, and administrative positions for the proposal school. Virginia Tech will not request any new state resources to initiate or maintain the School of Neuroscience.

Current Operations	FTE	Amount
Salaries, Director and Admin Assistant	2 (1 each)	\$259,250
including Fringe		\$84,946
Allocated Resources	FTE	
New Faculty salaries	5	\$450,000
Fringe 36.29%		\$163,290
Faculty Start-up @ \$750,000	5 start-ups	\$3,750,000
Operations Manager	1	\$100,000
Fringe 35.14%		\$35,135
Instructors	2	\$120,000
Fringe 42.05%		\$50,454
Advisors	1	\$60,000
Fringe 42.05%		\$25,227
IT/Technical Support	0.25	\$20,000
Fringe 37.73%		\$7,545
Recruiting & Advertising		\$20,000
Seminars & Outreach		\$20,000
Items		
Signage		\$300
Business cards		\$200
Promotional materials		\$1,000
Website development		\$5,000
Estimated Total		\$5,172,347
Allocated Resources	\$4,828,151	





Appendix 2: Letter of Support from Dean of College

WirginiaTech College of Science	Office of the Dean (0405) College of Science North End Center, Suite 4300, Virginia Tech 300 Turner Street NW Blacksburg, Virginia 24061 540/231-5422 Fax: 540/231-3380 www.science.vt.edu
August 24, 2015	
To whom it may concern:	
Neuroscience is becoming one of the faste beyond the traditional domains of biological appealing to a large number of students, fa across multiple disciplines.	est growing arenas of study. It is having an impact science, and biomedical research. It is a field that is culty and researchers, precisely because it reaches
Virginia Tech is well positioned to be a key science and engineering, and in social scier will offer unique venue for education, resear As such, this enterprise cannot be containe intellectual power within the University requ beginning to cut across organizational bound which will be located within the College of S	player in this field. Building upon strengths in basic nce and humanities, the neuroscience program here rch and outreach important to many parts of society. ed in one traditional department. To fully engage the irres the establishment of a unit that is built from the daries. Hence the proposed School of Neuroscience, cience as its launch point.
The College has been planning for this outco of students and faculty, and also in terms o combination of existing College resources, requisite pieces came together. We now ha I.D. Wilson Professor, an entering class of faculty members with a broad collective expe been identified, and through careful plannin any of the existing programs.	me for the last four years, both in terms of recruitment f budgetary constraints. In the past year, through a and substantial help from the University, all of the ave a Director, Dr. Harald Sontheimer, the inaugural close to two hundred students, and a plan to recruit ertise. Required resources to support the effort have ng, I don't expect the School to compromise fiscally
Sincerely,	
X. N. Thay	
Lay Nam Chang Dean College of Science	
	Invent the Future

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Appendix 3: Letter of Support from Department Heads

WirginiaTech Office of the Dean (0405) College of Science College of Science North End Center, Suite 4300, Virginia Tech 300 Turner Street NW Blacksburg, Virginia 24061 540/231-5422 Fax: 540/231-3380 www.science.vt.edu August 24, 2015 To the Review Committee: We write to express our support for the proposed "School of Neuroscience", which, upon approval, will be housed in the College of Science. It is for this reason that we support housing Neuroscience in a School as opposed to a Department. We further believe that by establishing the School of Neuroscience, Virginia Tech has the opportunity to recruit outstanding additional faculty members and most importantly to attract a significant number of students seeking to obtain a degree in Neuroscience who would otherwise choose to join one of our competitors. Sincerely, 1 Horhell Peter Haskell Brenda Winkel Chair Head Department of Biological Sciences Department of Mathematics Patrick Huber James M. Tanko Chair Chair Department of Chemistry Department of Physics Sudipta Sarangi Robert Stephens Head Chair Department of Econor Department of Psychology Nancy Ronald Fricker Jr. Head Head Department of Geosciences Department of Statistics Invent the Future VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY An equal opportunity, affirmative action institution Appendix 3, page 7

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The Proposed School of Neuroscience BOV 11/9/2015





VIRGINIA TECH COLLEGE OF SCIENCE







What is Neuroscience?

The scientific study of Brain-Mind & Behavior

- Broad, interdisciplinary
- Attempts to explain complex behavior at a genetic, molecular, cellular and systems level
- Evolved from neurology and biology as independent discipline
- One of the "hot" emerging majors with tremendous student interest





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What draws students to Neuroscience?





Neuroscience Subdisciplines

- Genetic Neuroscience
- Molecular Neuroscience
- Cellular Neuroscience
- Neurophysiology
- Systems Neuroscience
- Developmental Neuroscience
- Cognitive Neuroscience
- Clinical Neuroscience

- Behavioral Neuroscience
- Social Neuroscience
- Neuroeconomics
- Neuroethology
- Neuro-Law
- The Artistic Brain
- Computational Neuroscience
- Neuro-Robotics





Careers Paths of Neuroscience Students

Pre-Health Major (Med/Dentistry/Vet/PA/Optometry)

- Physician, Dentist, Veterinarian, Physicians Assistant

Pre-Lifesciences Major (Graduate studies)

Graduate Faculty, Federal Research National
 Institutes of Health (NIH)/Centers for Disease Control
 and Prevention (CDC), Biotech, Big Pharma, Sales &
 Product Support



- **Pre-Professional Major (A broad range of professions)**
 - Law, Business, Finance, Architecture, Marketing, Art,
 Science Policy, Educational Leadership

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Why a "School of Neuroscience"?

- Captures the interdisciplinary nature of Neuroscience and prevents "siloing"
- Communicates to students and faculty that Virginia Tech is making this a major emphasis area
- Positions VT-Neuroscience to be a **Destination Program**
- Support the "One Health Mission" of Virginia Tech, Virginia Tech Carilion Research Institute (VTCRI), Veterinary Medicine and Carilion Clinic
- Tremendous potential economic impact for Virginia Tech and the Commonwealth

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Direct Economic Impact

- Additional 800-1000 students
 - => \$4M/year additional tuition revenue
- 30 additional faculty at Virginia Tech & VTCRI
 => \$20 M/year grant expenditures
- Institutional & individual training grants
- Joint large grant initiatives with engineering, computer science, Veterinary Medicine, Carilion Clinic
- Access to federal funding streams where Virginia Tech is not currently receiving its market share (NINDS, NIMH, NIDA, NSF, DOD)

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Federal Funding: National Institutes of Health (NIH)



Source: AAAS Report: Research and Development series and agency budget documents. FY 2012 and FY 2013 figures are latest estimates. © 2012 AAAS

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Virginia Tech Funding (2014)

NIH Funding 2014







We don't realize our fair market share and have plenty of room to grow!

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Federal Funding:

National Science Foundation (NSF)



\$10

\$9

\$8

\$7

\$6

\$5

\$4







ENG GEO MPS ■ Other R&RA EHR MREFC ■ All Other

NSF ARRA

SBE

estimates and FY 2013 figures are President's request. © 2012 AAAS





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NSF - 2016 Appropriations Bill

- \$146.9M in total funding for neuroscience, an increase of \$40.5M above the FY15 level
- Virginia Tech is uniquely positioned to take advantage of funding requests for neuro-engineering projects such as brain machine interfaces, neuro-robotics and smart prostheses



Attachment C



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THE WHITE HOUSE IS ANNOUNCING OVER \$300 MILLION IN PUBLIC AND PRIVATE INVESTMENTS IN SUPPORT OF THE BRAIN INITIATIVE



BRAIN INITIATIVE

the WHITE HOUSE

BRAIN RESEARCH THROUGH ADVANCING INNOVATIVE NEUROTECHNOLOGIES

Since President Obama announced the **BRAIN Initiative** in April 2013, dozens of leading technology firms, academic institutions, scientists and other key contributors to the field of neuroscience have answered his call and made significant commitments to advancing the Initiative.

FEDERAL COMMITMENTS

Building off of \$100 million in commitments announced last year at NIH, NSF and DARPA, the BRAIN Initiative is growing to five participating federal agencies with the addition of FDA and IARPA.

PURKINJE CELLS

NIH NATIONAL INSTITUTES OF HEALTH

NIH is announcing \$46 million in new BRAIN-related grant awards, focusing o new tools and techniques

DARPA is building on

FDA FOOD AND DRUG ADMINISTRATION

FDA is joining the BRAIN Initiative, with the goal to enhance the transparency of the regulatory landscape for neurological medical devices

IARPA INTELLIGENCE ADVANCED RESEARCH PROJECTS ACTIVITY

IARPA is joining the BRAIN Initiative and will use multidisciplinary approaches to advance understanding of cognition and computation in the brain

DARPA DEFENSE ADVANCED RESEARCH PROJECTS AGENCY

DARPA is building on four existing programs and is planning new investments in the BRAIN Initiative, with the ultimate goal of relieving and rehabilitating warfighters and civilians suffering from traumatic injury and neuro-psychiatric illness

NSF NATIONAL SCIENCE FOUNDATION

NSF is continuing to make investments to support BRAIN Initiative by accelerating fundamental research and the development of new technologies for neuroscience and neuroengineering



Return on investment (annual)

- 1. Tuition: \$4-6M
- 2. Grants: \$20M
- 3. Contracts: \$10M
- 4. Licensures
- 5. Startup Companies



POSSIBLE LONG-TERM OUTCOMES

The BRAIN Initiative has the potential to do for neuroscience what the Human Genome Project did for genomics by supporting the development and application of innovative technologies that can create a dynamic understanding of brain function. It aims to help researchers uncover the mysteries of brain disorders, such as Alzheimer's and Parkinson's diseases, depression, Post-Traumatic Stress Disorder (PTSD), and traumatic brain injury (TBI).



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Indirect impact

- Supports the growth of Virginia Tech Carilion Research Institute and Carilion Clinic
- Move towards one campus

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- Expanding entrepreneurship opportunities
- Strengthens Virginia Tech's role in Virginia's Brain State Initiative
- Growth of additional graduate programs in NS related fields, neuro-robotics, neuroeconomics, neuro-medicine
- Increase research impact/publications and thereby school ranking
- Community outreach/raising awareness





Current status of Neuroscience

- Degree approved for fall 2015
- Already 178 students enrolled
- Core curriculum in place
- A growing list of electives in place
- New electives rolling out in 2016
- 61 faculty members affiliated
- 15 additional faculty members to be hired over the next 3 years, with 5 new hires in 2015/2016







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NEW Neuroscience courses in 2016

Some will be offered as "Special Study" in the coming semesters

NEUR 4034 Diseases of the nervous system NEUR 3144 Mechanisms of learning and memory NEUR 4984 Neuroeconomics NEUR 3464 Neuroscience and society NEUR 3XXX Molecular basis for addiction NEUR 3XXX Neuroimmunology NEUR 3XXX Neurogenetics NEUR 4544 Synaptic structure and function NEUR 4964 Neuroscience capstone experience



Future of Neuroscience at Virginia Tech

- School of Neuroscience => 2016
- Additional majors including a B.A.
- A minor will be added (2017)
- Master's/Ph.D. pathways planned (2017/18)
- New location: Sandy Hall (2017)







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Sandy Hall, School of Neuroscience







Neuroscience Q & A







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