

**RESOLUTION TO APPROVE MASTER OF SCIENCE IN TRANSLATIONAL  
BIOLOGY, MEDICINE AND HEALTH**

Documents included:

1. Resolution to Establish Master of Science in Translational Biology, Medicine and Health
2. Supporting Documentation- Master of Science in Translational Biology, Medicine and Health
3. Presentation – slides

**STATE COUNCIL OF HIGHER EDUCATION FOR VIRGINIA  
PROGRAM PROPOSAL COVER SHEET**

<p>1. Institution</p> <p>Virginia Polytechnic Institute and State University</p>	<p>2. Academic Program (Check one):</p> <p>New program proposal    <input checked="" type="checkbox"/> _____</p> <p>Spin-off proposal            <input type="checkbox"/> _____</p> <p>Certificate document        <input type="checkbox"/> _____</p>
<p>3. Name/title of proposed program</p> <p>Translational Biology, Medicine, and Health</p>	<p>4. CIP code</p> <p>26.0102</p>
<p>5. Degree/certificate designation</p> <p>Master of Science (M.S.)</p>	<p>6. Term and year of initiation</p> <p>Fall 2018</p>
<p>7a. For a proposed spin-off, title and degree designation of existing degree program</p> <p>7b. CIP code (existing program)</p>	
<p>8. Term and year of first graduates</p> <p>Spring 2019</p>	<p>9. Date approved by Board of Visitors</p>
<p>10. For community colleges:</p> <p>date approved by local board</p> <p>date approved by State Board for Community Colleges</p>	
<p>11. If collaborative or joint program, identify collaborating institution(s) and attach letter(s) of intent/support from corresponding chief academic officers(s)</p>	
<p>12. Location of program within institution (complete for every level, as appropriate and specify the unit from the choices).</p> <p>Departments(s) or division of    <u>Faculty of Health Sciences</u></p> <p>School(s) or college(s) of        <u>Graduate School</u></p> <p>Campus(es) or off-campus site(s) <u>Blacksburg, VA and Roanoke, VA</u></p> <p>Mode(s) of delivery: face-to-face _____ distance (51% or more web-based) _____</p> <p>hybrid (both face-to-face and distance) <input checked="" type="checkbox"/> _____</p>	
<p>13. Name, title, telephone number, and e-mail address of person(s) other than the institution's chief academic officer who may be contacted by or may be expected to contact Council staff regarding this program proposal.</p> <p>Audra Van Wart, TBMH Program Co-Director, 540-526-2005, <a href="mailto:avanwart@vtc.vt.edu">avanwart@vtc.vt.edu</a></p> <p>Dr. Rosemary Blieszner, Asst. Vice Provost, Degree Management, (540) 231-5645, <a href="mailto:rmb@vt.edu">rmb@vt.edu</a></p>	

**COVER SHEET - NEW and REVISED CHECKSHEETS, OPTIONS, CONCENTRATIONS and DEGREES**

Commission on Undergraduate Studies and Policies/ Commission on Graduate Studies and Policies  
Effective September 2010

•SEE APPENDIX FOR NOTES, EXPLANATIONS AND ADDITIONAL GUIDELINES•  
•PRINT CLEARLY, TYPE or COMPLETE ELECTRONICALLY•

**PROPOSAL DATE:** 11/15/2016      **15-DAY REVIEW END DATE:**

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**DEPARTMENT:** Faculty of Health Sciences

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**DEGREE NAME:** M.S. Translational, Biology, Medicine, and Health (TBMH)

MAJOR                                       MINOR                                       OPTION/CONCENTRATION

GRADUATE CERTIFICATE               UNIVERSITY CONCENTRATION

**DEAN and/or DEPARTMENTAL CONTACT:** Audra Van Wart, Ph.D; Hal Irvin, Ph.D.      **CONTACT MAILCODE:** 2 Riverside Circle (0801), Roanoke, VA 24016

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**CONTACT PHONE:** 540-526-2005; 540-526-2097      **CONTACT E-MAIL:** avanwart@vt.edu; hirvin@vtc.vt.edu

**CHECK ONLY ONE OF THE FOLLOWING BOXES**

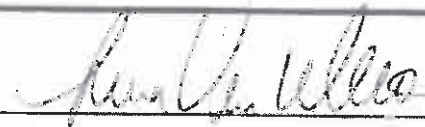
<input type="checkbox"/> <b>NEW UNDERGRADUATE CHECKSHEET</b>	<input type="checkbox"/> <b>REVISED CHECKSHEET</b> [Revision >20% _____ Revision <20% _____] (Attach copy of current APPROVED checksheet)	
<input type="checkbox"/> <b>NEW MINOR</b>	<input type="checkbox"/> <b>REVISED MINOR</b> (Attach copy of current APPROVED checksheet)	<input type="checkbox"/> <b>DISCONTINUED MINOR</b> (Attach Transition Plan)
<input type="checkbox"/> <b>NEW OPTION</b>	<input type="checkbox"/> <b>REVISED OPTION</b> (Attach copy of current APPROVED checksheet)	<input type="checkbox"/> <b>DISCONTINUED OPTION</b> (Attach Transition Plan)
<input type="checkbox"/> <b>NEW UNIVERSITY CONCENTRATION</b>	<input type="checkbox"/> <b>REVISED UNIVERSITY CONCENTRATION</b> (Attach copy of current APPROVED checksheet)	<input type="checkbox"/> <b>DISCONTINUED UNIVERSITY CONCENTRATION</b> (Attach Transition Plan)
<input type="checkbox"/> <b>NEW CONCENTRATION</b>	<input type="checkbox"/> <b>REVISED CONCENTRATION</b> (Attach copy of current APPROVED checksheet)	<input type="checkbox"/> <b>DISCONTINUED CONCENTRATION</b> (Attach Transition Plan)
<input type="checkbox"/> <b>NEW GRADUATE CERTIFICATE</b>	<input type="checkbox"/> <b>REVISED GRADUATE CERTIFICATE</b>	
<input checked="" type="checkbox"/> <b>NEW DEGREE</b>	<input type="checkbox"/> <b>REVISED DEGREE</b>	<input type="checkbox"/> <b>DISCONTINUED DEGREE</b> (Attach Transition Plan)


• **EFFECTIVE DATE: GRADUATING CLASS OF** 2020 **(List Year Only)**

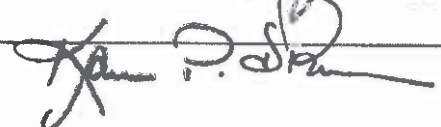
- **FOR ALL CHECKSHEETS, NEW AND REVISED:** Attach Statement from Dean or Departmental Representative Outlining the Changes from the Currently APPROVED Checksheet and Method(s) of Communication to Students Impacted by these Changes.
- **Attach Appropriate Letters of Support from Affected Departments and/or Colleges**
- **Revised checksheets with 20% or less revision can be forwarded directly to the Office of the University Registrar (0124) for Administrative Approval. Supporting documentation should be attached.**

**Revision Summary:**

**APPROVAL SIGNATURES**

Department Representative:  Date: 11/15/16

College Curriculum Committee Representative:  Date: 11/2/16

College Dean:  Date: 11/21/16

## **M.S. in Translational Biology, Medicine, and Health (CIP: 26.0102)**

**Type of degree action:** New

### **Program description**

The proposed M.S. program in Translational Biology, Medicine, and Health (TBMH) is an integrative, multidisciplinary, and innovative graduate program in the biomedical and health sciences that emphasizes the concept of “translational science” at multiple levels of investigation and across multiple disciplines. Faculty from departments across the College of Science, College of Veterinary Medicine, College of Engineering, College of Agriculture and Life Sciences, College of Natural Resources and Environment, and College of Liberal Arts and Human Sciences, as well as the Virginia Tech Carilion Research Institute, the Biocomplexity Institute, and the Fralin Life Science Institute, have developed an integrated graduate-level curriculum. This curriculum covers the fundamental molecular processes that dictate the development and life-long homeostatic regulatory function of cells, tissues and organs; the dysfunction of these mechanisms in a wide range of disorders; and adoption, integration and application of translational discoveries, their cost, commercialization, delivery, effectiveness and related policy issues. The M.S. program will graduate individuals who will be employed in research and research-related positions in universities, biotechnology and pharmaceutical companies, health systems, hospitals and clinics, public health and other healthcare and human service agencies, and foundations, with a focus on interdisciplinary and translational research applications.

The M.S. program will begin in Fall 2018. As the core coursework is already being offered at Virginia Tech, we expect the first students could graduate as early as May 2019. Due to the interdisciplinary nature of the program and the diversity of the faculty instructors, including clinical faculty who will instruct in formal courses and participate on committees, formal course instruction will take place at Virginia Tech’s Blacksburg and Roanoke facilities, with some utilization of videoconferencing capabilities. Participating faculty constitute part of the Faculty of Health Sciences, which will serve as the academic home for the program. The program will be administered through the Graduate School.

### **Curriculum summary**

The M.S. is a thesis-based program. Students pursuing an M.S. degree must earn a minimum of 38 credit hours beyond the B.S. degree, including 19 core credits, 8 concentration credits, and 11 hours of research and thesis. Exceptional applicants from a variety of scientific backgrounds will be considered for acceptance to the program.

Students will utilize graduate level coursework that was designed previously during development of the Ph.D. program in TBMH. They will take an intensive Gateway course (TBMH 5004, 8 credits) in semester 1, where they will learn the principles of biomedicine, physiological systems, and translational science. They will then select a focus area in semester 2 and take an equally intensive Fundamentals course (8 credits) covering in depth the essentials of that focus area, with heavy emphasis on translational exemplars and case studies. The six focus areas are: Neuroscience; Cancer; Health Implementation Science; Metabolism and Cardiovascular Science; Immunity and Infectious Disease; and Development, Aging, and Repair. Before beginning their course of study, students will pre-select their faculty research mentor and begin research training during their first term. In their second year, students will focus on their thesis research, supervised by their selected research mentor.

### **Relevance to university mission and strategic planning**

With respect to Virginia Tech's strategic goals, the proposed interdepartmental, intercollege, and interdisciplinary program is expected to enhance the quality and increase the quantity of the graduate student population, in alignment with the Virginia Tech strategic goals of increasing the number of graduate students, particularly in the health sciences and STEMH; facilitate interactions between faculty across disciplines without regard to departmental or college boundaries; enhance Virginia Tech's national and international identity in the biomedical and health sciences; and substantially increase and broaden Virginia Tech's extramural funding portfolio in research and training as it relates to the biomedical and health sciences.

Finally, Virginia Tech's Beyond Boundaries strategic initiative is exploring ways to expand on Virginia Tech's multifaceted and comprehensive curriculum towards addressing the complex challenges of tomorrow. One of the proposed "destination areas" of institutional focus is "the adaptive brain and behavior" which would benefit from the talent the M.S. in Translational Biology, Medicine, and Health would attract (<http://provost.vt.edu/destination-areas.html>).

### **Justification for the proposed program**

Human health represents the single largest challenge and domestic expenditure in U.S. society, and despite the progress and investment in basic biomedical research, the progress in terms of delivering successful new therapies and diagnostics has not kept pace. There is a critical and immediate need for transdisciplinary training of translational researchers at all levels in the biomedical and health sciences, in order to accelerate the transformation of fundamental biological discoveries into preventions, diagnostics, treatments, cures, and healthier behaviors to avoid the costs and consequences of compromised health at the individual and population levels.

The growing interest and demand for such programs is evidenced by national initiatives over the past decade to integrate translational and clinical topics into basic biomedical graduate education (such as the Howard Hughes Medical Institute's "Med to Grad" initiative) and recent calls for similar interdisciplinary and translationally focused efforts from the National Institutes of Health, Federation of American Societies for Experimental Biology, and the Association of American Medical Colleges. The proposed TBMH M.S. program will incorporate these elements and expand upon them to provide a curriculum that deviates from a traditional M.S. degree structure to one that includes a diverse cohort of students from a wide range of educational backgrounds and fields of study, balances breadth and depth, and prepares students for the new age of biomedical and health research by focusing on how to identify the key challenges, formulate translatable hypotheses, and implement the translation of discoveries (made at bench and bedside) into meaningful solutions to human health problems.

This is the right time to launch such a program at Virginia Tech, as the university merges strengths in the basic life and chemical sciences, social and behavioral sciences, bioinformatics, computational sciences, and engineering, with an expanding biomedical enterprise, producing an increasing cohort of faculty with federally funded biomedical and health related research programs that provide opportunities and needs for this type of graduate student. Over 200 faculty from these areas at Virginia Tech have already been appointed to the Faculty of Health Sciences, which serves as the academic home for the program. The coursework for the TBMH M.S. degree is already being delivered as part of the TBMH Ph.D. program, which has been recognized by the Association of American Medical Colleges for innovation in graduate education and training.

Additionally, the Virginia Tech Carilion School of Medicine is attracting a set of students who are interested in pursuing advanced degrees beyond the M.D., and new emerging and expanded partnerships with medical centers (e.g., Carilion Clinic, Wake Forest University School of Medicine, and Children's National Medical Center) are providing rich new sources of collaborations, data, samples, and patients to Virginia Tech faculty and graduate students who are primarily interested in health related research programs.

Nationally, such translational graduate programs are attracting large cohorts of bright students. For example, among the top 20 NIH-funded universities, each has a large and vibrant graduate program in biomedical sciences that trains students in contemporary interdisciplinary approaches to biomedical, translational, and health-related research. Thus, this M.S. program will assist Virginia Tech in constructively growing its graduate student body, and assist in producing students who are ready to

work in translational research and research-related positions. Upon completion of the program, successful graduates will be qualified for a number of positions where an M.S. in a biomedical field is required or preferred. These include research scientists or research liaisons in the pharmaceutical or biotechnology industries; research scientists and research technicians at universities; research scientist or health science administrator in a government or private non-profit agency, hospital or clinic; or a non-research position where biomedical/health research expertise and excellent communication skills are required, such as science writer, editor, or journalist; patent agent; public policy analyst; or scientific or business consultant.

### **Student demand**

Based on the successful launch of the Ph.D. TBMH program which already has almost 60 students enrolled in its third year of operation, we plan a program size for the new M.S. TBMH program of approximately 5 – 10 students per year. The program design should attract strong applicants, based on national data and early success with the Ph.D. TBMH program, which is attracting talented student applicants nationally and internationally. Indeed, TBMH program staff has received numerous inquiries from prospective students who wish to pursue positions that require research training beyond the B.S., but do not require a PhD. Other inquiries come from individuals with other advanced degrees (MPH, MD), who wish to receive research training at the M.S. level. Given the growth in the health care industry and translationally focused academic research, the proposed M.S. in TBMH will be an attractive option for these students, and will well prepare them for these careers.

There is a need to bridge the gap between traditional disciplines, and to promote greater collaboration, cooperation, and understanding among basic and clinical scientists in order to speed progress in delivering successful new therapies and diagnostics (Bond & Galbraith, 2012). Today's students need to understand not only how bodies work, but what goes wrong in disease, how decisions affect health, the costs and barriers to particular strategies for improving health, and where translational medicine has succeeded and failed, in order to design optimal experiments in basic, clinical, and population/community-based research which can translate to health care practice.

Thus, the program will appeal to students who are interested in working at the boundaries of scientific research and seeing their work applied in health care settings. While the program will be of interest to students considering a career in medicine, as well as to existing M.D. students at the Virginia Tech Carilion School of Medicine, the majority of students who apply will be embarking on health related research careers in academia, industry, and health systems.

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The growing interest and demand for such programs is evidenced by national initiatives over the past decade to integrate translational and clinical topics into basic biomedical graduate education (such as the Howard Hughes Medical Institute's "Med to Grad" initiative) and recent calls for similar interdisciplinary and translationally focused efforts from the National Institutes of Health, Federation of American Societies for Experimental Biology, and the Association of American Medical Colleges. The proposed TBMH M.S. program will incorporate these elements and expand upon them to provide a curriculum that deviates from a traditional M.S. degree structure to one that includes a diverse cohort of students from a wide range of educational backgrounds and fields of study, balances breadth and depth, and prepares students for the new age of biomedical and health research by focusing on how to identify the key challenges, formulate translatable hypotheses, and implement the translation of discoveries (made at bench and bedside) into meaningful solutions to human health problems.

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### **Student demand**

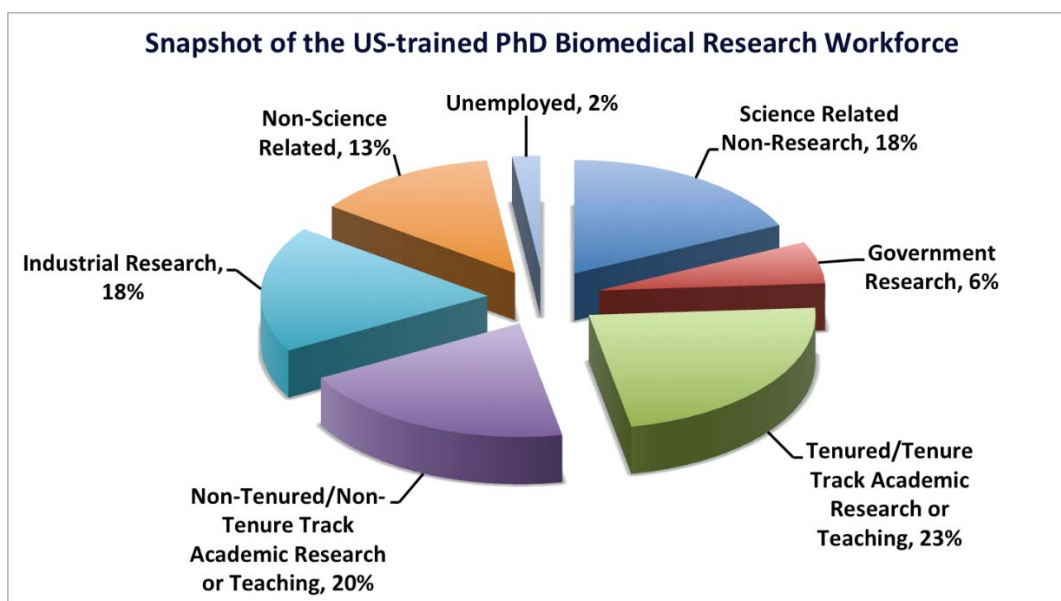
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### **Market/employer demand**

A recent study by the Biomedical Workforce Working Group for the National Institutes of Health states: “graduate training continues to be aimed almost exclusively at preparing people for academic research positions. Therefore, the working group believes that graduate programs must accommodate a greater range of anticipated careers for students.” (Biomedical Workforce Working Group Report, 2012) The chart below, plotting data from the Working Group Report, shows less than half of US-trained biomedical PhD program graduates work in an academic setting.



The M.S. in TBMH program will recognize this reality by providing foundational training that will prepare students for careers in academia, as well as for positions in health care and industry. Job advertisements may specify particular areas of expertise, such as neuroscience, cancer, infectious disease, cardiovascular science, aging, and health care implementation. These positions include:

- Research Scientists in the pharmaceutical or biotechnology industries (titles include Scientist, Project Manager, Principal Scientist, Research Scientist, Senior Scientist, Senior Scientific Manager, Senior Staff Scientist)
- Research Scientists or Health Science Administrators in government agencies (including titles such as Program Officer or Scientific Review Administrator)
- Research-related positions where a M.S. and excellent communication skills are required, such as: Science or Technical Writers (industry), Scientific

Editors (academic publishing), Science Journalists (newspapers, magazines, web); Patent Agent (industry, law firms); Health Science Administrator at a university/government/hospital or other non-profit; Public Policy Analyst; Scientific Consultant, and/or Scientific Grant Officer at a funding agency.

While the U.S. Bureau of Labor Statistics (USBLS) and the Virginia Employment Commission (VEC) do not have job categories specifically labeled “translational scientists” or even “biomedical scientists”, these jobs are included within other categories, listed below.

### Health Scientists

Table 1: Employment Projections 2014 - 2024 (U.S. Bureau of Labor Statistics)<sup>1</sup>

<b>Title</b>	<b>SOC Code</b>	<b>Employment 2014</b>	<b>Projected Employment 2024</b>	<b>Percent Change 2014-2024</b>	<b>Numeric Change 2014-2024</b>
Biochemists and Biophysicists	19-1021	34,100	36,900	8%	2,800
Biomedical Engineers	17-2031	22,100	27,200	23%	5,100
Medical Scientists	19-1042	107,900	116,900	8%	9,000
Post-secondary Teachers	25-1000	1,313,000	1,490,000	13%	177,000
Post-secondary Administrators	11-9033	175,100	190,300	9%	15,200

Roles filled by TBMH graduates will be classified under Biochemists & Biophysicists, defined by the USBLS as scientists who “study the chemical and physical principles of living things and of biological processes such as cell development, growth, and heredity” and who “play a key role in developing new medicines to fight diseases such as cancer”. Employment of biochemists and biophysicists is projected to increase by 8% nationally from 2014 to 2024, faster than the average for all occupations, and by 16% in Virginia

<sup>1</sup> <http://www.bls.gov/ooh/>; accessed November, 2016

alone. The USBLS reports that more of these scientists will be needed to use the knowledge they have gained from basic research to develop biological products and processes that improve lives. Other relevant job categories include Post-Secondary Teachers (for teaching-focused instructors, including Biological Science Teachers), Medical Scientists, Biomedical Engineers (particularly for students taking coursework in the program's Development, Aging, and Repair focus area), and Post-Secondary Administrators (for those who focus on overseeing academics and research at colleges and universities). Growth in these categories ranges from 8% to 23% as outlined in Table 1.

Table 2: Employment Projections 2014 - 2024 (Virginia Employment Commission)<sup>2</sup>

Title	SOC Code	Employment 2014	Projected Employment 2024	Numeric Change 2014-2024	Annual Percent Change 2014-2024	Total Percent Change
Biochemists and Biophysicists	19-1021	620	718	98	1.5%	15.8%
Biomedical Engineers	17-2031	367	457	90	2.2%	24.5%
Biological Scientists (all others)	19-1029	588	580	-8	-.1%	-1.4%
Biological Science Teachers, Postsecondary	25-1042	1,592	1,936	344	2%	21.6%
Medical Scientists	19-1042	1,985	2,280	295	1.4%	14.9%

### Issues of duplication

While there are a number of departmental-based M.S. programs covering specific areas of biomedical or health science offered in Virginia, we are offering a uniquely integrated program for students who want to develop a specific expertise (such as cancer biology or neuroscience) but will also be well prepared to apply this knowledge to tackle broad-based, translationally-driven problems in biomedical and health

<sup>2</sup> [www.virginialmi.com](http://www.virginialmi.com); accessed November, 2016

research as part of interdisciplinary teams. There are only two graduate programs like this in Virginia, utilizing CIP 26.0102 (Biomedical Sciences, General).

The Ph.D. program in Clinical and Translational Sciences at Virginia Commonwealth University has an M.S. program open only to VCU scholar-researchers. The VCU program is heavily focused on clinical research training, and also does not have overlapping concentration areas with the TBMH M.S. program. The Ph.D. program in Biomedical Sciences at Old Dominion University does not offer a M.S. option. Therefore, there is no duplication in Virginia for the new M.S. TBMH degree proposed by Virginia Tech which derives in part from the existing Ph.D. TBMH program and which will not limit applications to internal candidates.

### **Resource needs**

The degree program does not require any new targeted state resources to initiate and sustain the program. Since an administrative structure is already in place for the TBMH Ph.D. program, the development of this new degree will build on that foundation. In addition, this is a M.S. program for which students will pay tuition rather than being funded by graduate assistantships. Teaching and thesis mentoring by faculty will not require any additional financial resources, as they reflect the activities of faculty already in place at the university and available to participate in the program (letters of support from department chairs are part of the full degree proposal), and faculty who are already part of planned recruitments in clusters that reflect the university's strategic plan. By increasing the quantity of talented graduate students at Virginia Tech, investment in this graduate program will have a direct positive impact on faculty research grant funding and their research productivity by providing increased intellectual and technical capital and talent for faculty to successfully compete for contemporary research grants in a competitive environment with institutions that already have a commitment to interdisciplinary biomedical and health sciences graduate education.

**Faculty.** The Ph.D. program is already led by two internally appointed faculty members who serve as Program Co-Directors to administer the program. These program Co-Directors will also administer the M.S. Program, dedicating a combined total of .10 FTE of their time toward additional coordination and leadership of the M.S. program.

Many existing faculty members campus-wide are already actively participating in the TBMH program as research mentors, instructors, and committee members. The teaching responsibilities of most faculty are minimal, and the coursework is team-taught by a collection of faculty with appropriate and complementary expertise. Teaching credit is assigned to faculty and departments commensurate with their level of involvement in each course. Faculty at the VTCRI are heavily involved, as they do not have major

teaching responsibilities in departments and are able to focus their graduate teaching efforts in this program, although faculty from many departments and colleges across the entire VT campus are involved in teaching, mentoring and committee service, as well. Because no new coursework is being proposed as part of the M.S., we do not expect significant additional time commitment towards teaching, although there will be a need for additional faculty time spent mentoring students in their research, and serving on committees. We expect 10 TBMH faculty will be involved in mentoring students in research and dissertation (.10 FTE x 10, or 1 FTE).

**Administrative staff.** The TBMH Ph.D. Program currently has two existing administrative staff to assist with the core operations of the program. We estimate 0.5 FTE for additional administrative needs of the M.S. program.

**Library.** Reading assignments from the primary research literature will be critical to most of the core coursework, and access to specific key journals will be important for the students' thesis research and education. M.S. TBMH students will use titles already available through the Virginia Tech library, and will have similar library needs as the Ph.D. students.

**Space.** No new resources are requested. The physical resources for this program exist in current Virginia Tech facilities, including four existing seminar rooms equipped with projectors, whiteboards, wireless internet, and interactive videoconferencing technology at the university's Virginia Tech Carilion Research Institute, as well as space at Virginia Tech's facilities at 1 Riverside Circle that include 3 classrooms equipped with videoconferencing technology, administrative offices, and a student workspace that seats 31 students.

<b>RESOURCE</b>	<b>ESTIMATED COSTS (use NA if not applicable)</b>
<b>Faculty</b>	\$126,500
<b>Administrative Staff</b>	\$24,500
<b>Graduate Teaching/ Graduate Research Assistants</b>	NA
<b>Space</b>	\$0
<b>Library</b>	\$0
<b>Equipment</b>	\$0
<b>Other</b>	\$0



TBMH M.S. Curriculum										
Fall Year One					Spring Year One					
Course Name	Credit Hrs	Core	Graded hours		Course Name	Credit Hrs	Core	Graded Hours		
TBMH 5004	Translational Biology, Medicine, and Health	8	8	8	TBMH 50X4	Fundamentals of Focus Area (select one of five 8 cr classes)	8	0	8	
TBMH 5304	Research Experience in TBMH	3	3	3	TBMH 5304	Research Experience in TBMH	3	3	3	
		11	11	11			11	3	11	
Fall Year Two					Spring Year Two					
TBMH 5994	Research and Thesis	3		0	TBMH 5994	Research and Thesis	8		0	
TBMH 5105	Professional Development and Ethics	2	2	2						
TBD	Quantitative Elective	3	3	3						
		8	5	5			8	0	0	
<b>Total Program Hours</b>		<b>38</b>								
<b>Total Core</b>		19								
<b>Total Concentration</b>		8								
<b>Total Graded</b>		27								
<b>Total Thesis Credit</b>		11								
38-credit program is designed as a two-year, four-semester experience										
Students formulate their plan of study with faculty advisors to include 19 core credits, 8 concentration credits, and 11 research credits.										
The TBMH MS program offers 6 concentration areas: NEU, CAN, DAR, IID, MCS, HIS										
The Plan of Study is due by the end of the second academic semester for all MS students										
*eligible for assistantships only if registered for 12 credits										

[1] TBMH contains six proposed focus areas (Neuroscience (NEU), Cancer (CAN), Health, Implementation Sciences (HIS), Metabolism and Cardiovascular Science (MCS), Immunity and Infectious Disease (IID), and Development, Aging, and Repair (DAR)). The TBMH 50X4 offerings are aligned with these areas as follows: TBMH 5014 (NEU), 5024 (CAN), 5034 (HIS), 5044 (MCS), 5054 (IID), & 5064 (DAR).

# Proposed M.S. in Translational Biology, Medicine and Health (TBMH)



Audra Van Wart, Ph.D.  
Assistant Vice President for Health Sciences Education  
Co-Director, Ph.D. program in TBMH  
Virginia Tech Board of Visitors  
June 5, 2017

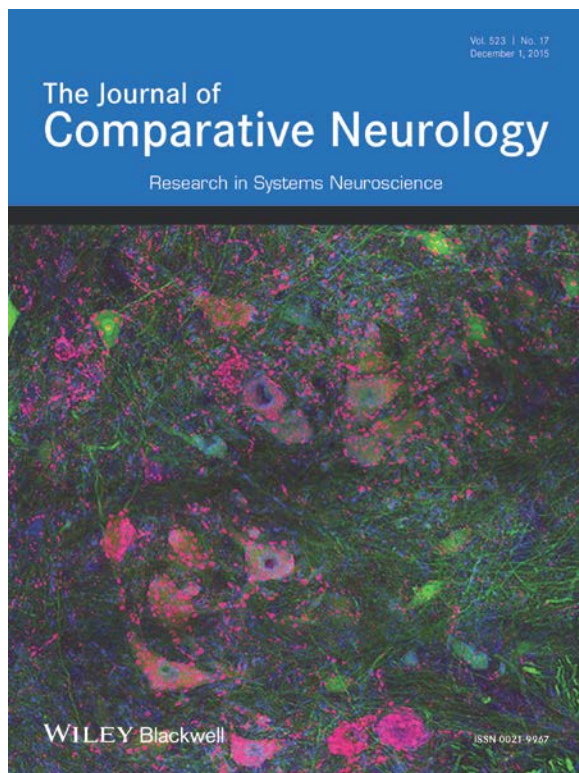
# Background

- National need for accelerating pace of translation of biomedical discoveries for diagnostics, treatments, cures and their implementation
- Major national organizations (e.g., National Institutes of Health, Association of American Medical Colleges) call for new approaches to train biomedical and health scientists
- Leading institutions (e.g. Baylor College of Medicine, UC San Francisco, Vanderbilt, U Pittsburgh) implementing new training approaches
- Interdisciplinary approaches, communication across levels, effective discovery and translation, preparation for diverse careers in industry, academia, government
- VT's growth in biomedical science, technology, engineering, mathematics, health sciences (STEMH) – faculty and student demand

# Foundation of Success

- Ph.D. in translational biology, medicine and health (TBMH) launched in 2014

**53 publications**



**90 abstracts and presentations**

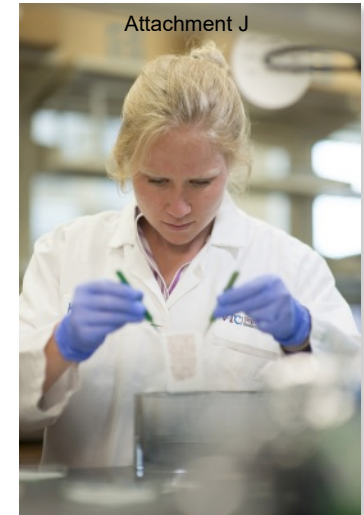


**13 awards  
5 fellowships**



# Goals for M.S. Program

- Attract a new cohort of highly qualified students interested in translational research in biomedical and health sciences
- Provide innovative education for multiple career paths
- Grow extramural funding for research and training in biomedical and health sciences
- Leverage investments in biomedical and health sciences; enhance faculty recruitment and retention



# Organization and Implementation

- Use existing Ph.D. TBMH infrastructure
- Academic oversight in Faculty of Health Sciences
- Administered through Graduate School
- Team teaching
- Joint thesis mentoring
- Personal career development plans



# 6 Colleges, 29 Departments

## 200 faculty

Attachment J

### College of Agriculture and Life Sciences

Agricultural and Applied Economics  
Animal and Poultry Sciences  
Biochemistry  
Entomology  
Human Nutrition, Food, and Exercise

### Virginia-Maryland College of Veterinary Medicine

Biomedical Sciences and Pathobiology  
Large Animal Clinical Sciences  
Population Health Sciences

### College of Natural Resources and Environment

Fish and Wildlife Conservation

### College of Liberal Arts and Human Sciences

Human Development

### College of Science

Biological Sciences  
Chemistry  
Economics  
Physics  
Psychology  
School of Neuroscience  
Statistics

### College of Engineering

Biomedical Engineering and Mechanics  
Chemical Engineering  
Electrical and Computer Engineering

### Affiliations

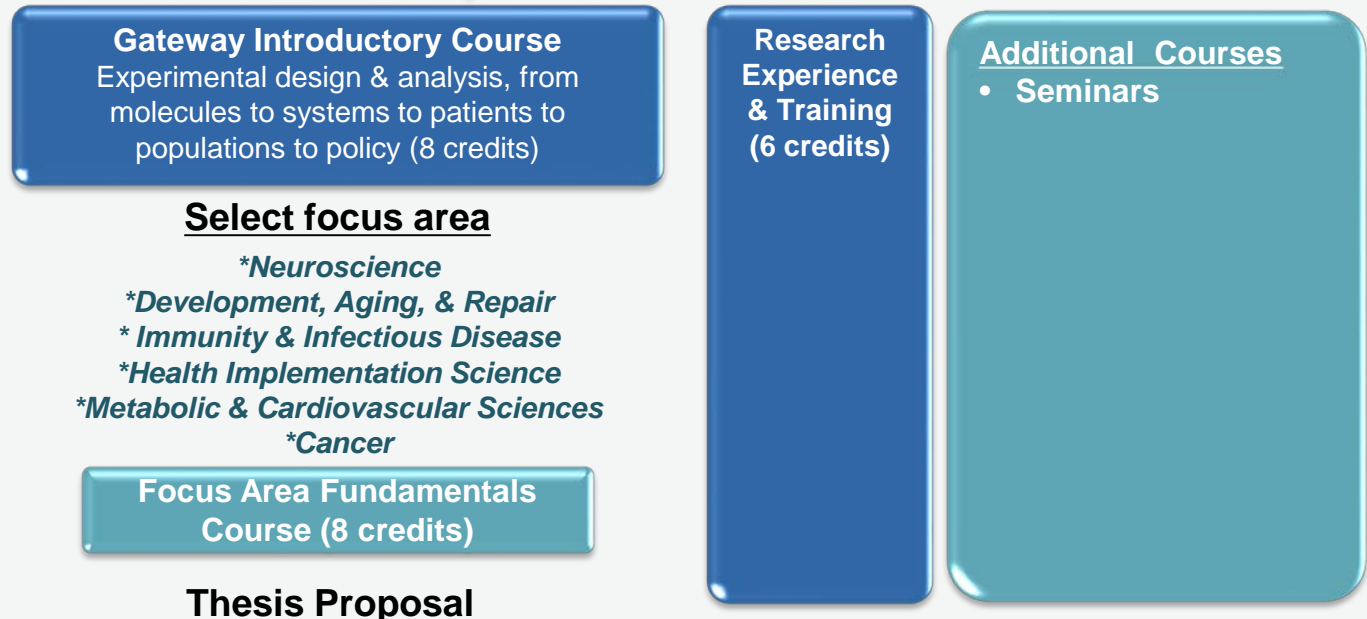
Biocomplexity Institute of Virginia Tech  
Virginia Tech Center for Drug Discovery  
Fralin Life Science Institute  
Center for Gerontology  
Institute for Creativity, Arts, and Technology  
Virginia Tech Carilion School of Medicine  
Virginia Tech Carilion Research Institute

# M.S. TBMH

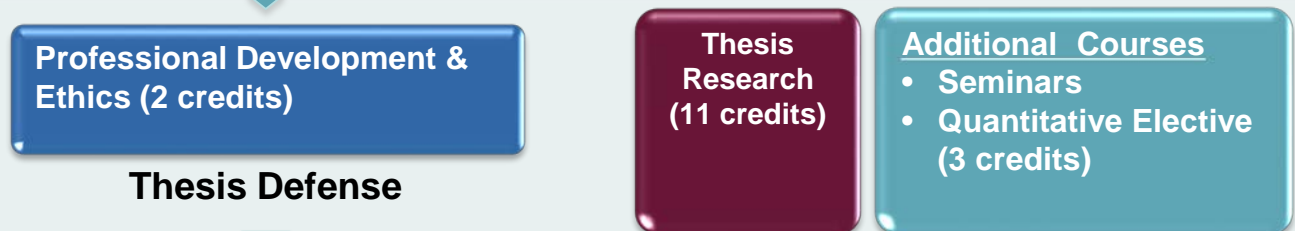
## (38 credits; 10 students/year)

Students from biological sciences, biochemistry, chemistry, computer science, economics, engineering, mathematics, physics, psychology, social sciences

### Year 1



### Year 2



Employment: Academic Health Centers, Colleges, Pharmaceutical & Biotechnology Industry, Government Agencies & Public Policy, Hospitals & Health Care, Non-profit Organizations



## RECOMMENDATION:

That the resolution recommending the establishment of the Master of Science in Translational Biology, Medicine and Health be approved.

June 5, 2017