

Ben Spiller

Vanderbilt University School of Medicine
Department of Pharmacology
Department of Pathology, Microbiology, and Immunology
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EDUCATION

2000-2005 Postdoctoral fellowship in Structural Biology, Harvard University/HHMI
1999-2000 Postdoctoral fellowship in Structural Biology, Yale University/HHMI
1994-1999 Ph.D. in Molecular and Cellular Biology, University of California at Berkeley
1989-1994 B.S. in Biochemistry, University of California at Davis

PROFESSIONAL EXPERIENCE

2015-present Associate Professor of Pharmacology, Associate Professor of Pathology, Microbiology and Immunology, Vanderbilt University School of Medicine.

2006-2015 Assistant Professor of Pharmacology, Assistant Professor of Pathology, Microbiology and Immunology, Vanderbilt University School of Medicine.

2003-2006 Joint postdoctoral fellow with Stephen Harrison and David Clapham, Harvard Medical School. **Structure-function analysis of bacterial voltage-gated Na⁺ channels.**

2000-2003 Joint postdoctoral fellow with Stephen Harrison and Donald Wiley, Harvard University. **Efforts toward crystallization of G-Protein Coupled Receptors.**

1999-2000 Postdoctoral fellow with Paul B. Sigler, Yale University.

1995-1999 **Efforts toward crystallization of chemokine receptors.**
Graduate studies in Raymond Stevens' Laboratory, UC-Berkeley.
Crystallographic structure determination of para-Nitrobenzyl esterase: wild type, organophile, thermophile.

Crystallographic structure determination of a Diels-Alderase antibody and its germline precursor.

Structure determination of a Ferrochelatase catalytic antibody.

1993-1994 Undergraduate research in the laboratory of William F. Benisek, UC-Davis.
Bronstead analysis of Keto Steroid Isomerase.

1991-1993 Undergraduate research in the laboratory of James Murray, UC-Davis
Antisense downregulation of endogenous methyl-transferase.

AWARDS

Helen Hay Whitney Foundation Fellowship
Agouron Foundation Fellowship
Paul Benjamin Sigler Memorial Fellow
Irvington Immunology Institute Fellowship (declined)

RESEARCH INTEREST

I have extensive training and experience (>20 years) in structural biology and structural immunology. My research has focused on structural studies at the interface between the immune system and foreign proteins. Although the projects being studied in my laboratory are quite diverse, they interest us because they all address novel mechanisms and new paradigms at this interface. Our work ranges from epitope discovery, including bacterial and viral systems as well as newer work to identify IgE epitopes on common food allergens, to

development of novel uses for conventional and single chain antibodies. I have particular interests in molecular pathogenesis, host-pathogen interactions, and antibody affinity maturation. A principal interest of my research is the host's response to pathogens. Toward this end, we are studying multiple viral and bacterial antigens to determine the mechanism of antibody neutralization. For many of our projects we collaborate with other groups, including structural studies of bacterial toxins and viral glycoproteins and their neutralization by antibodies (collaborations with the Lacy and Crowe labs, respectively). These projects have led to us to begin studies, with Scott Smith in the Department of Medicine, to elucidate the mechanism by which human IgE antibodies cause allergies. Our interests in epitope discovery has also led us to study single chain camelid antibodies, which are more amenable to phage display methods and inherently much smaller and more able to bind in small crevices than traditional antibodies. The two topics that excite me most for the next phase of my career are novel applications of nanobodies and IgE epitopes.

PUBLICATIONS AS A VANDERBILT FACULTY MEMBER

1. A new paradigm for regulation of protein phosphatase 2A function via Src and Fyn kinase-mediated tyrosine phosphorylation.
Sontag JM, Schuhmacher D, Taleski G, Jordan A, Khan S, Hoffman A, Gomez RJ, Mazalouskas MD, Hanks SK, **Spiller BW**, Sontag E, Wadzinski BE. *J Biol Chem*. 2022 Aug;298(8):102248. doi: 10.1016/j.jbc.2022.102248. PMID: 35760390
2. Human IgE mAbs identify major antigens of parasitic worm infection.
Hadadianpour A, Daniel J, Zhang J, **Spiller BW**, Makaraviciute A, DeWitt ÅM, Walden HS, Hamilton RG, Peebles RS Jr, Nutman TB, Smith SA. *J Allergy Clin Immunol*. 2022 Jun 24:S0091-6749(22)00843-0. doi: 10.1016/j.jaci.2022.05.022. PMID: 35760390
3. Longitudinal Consumption of Ergothioneine Reduces Oxidative Stress and Amyloid Plaques and Restores Glucose Metabolism in the 5XFAD Mouse Model of Alzheimer's Disease.
Whitmore CA, Haynes JR, Behof WJ, Rosenberg AJ, Tantawy MN, Hachey BC, Wadzinski BE, **Spiller BW**, Peterson TE, Paffenroth KC, Harrison FE, Beelman RB, Wijesinghe P, Matsubara JA, Pham W. *Pharmaceuticals (Basel)*. 2022 Jun 13;15(6):742. doi: 10.3390/ph15060742. PMID: 35745661
4. Jensen JL, Yamini S, Rietsch A, **Spiller BW**. The structure of the Type III secretion system export gate with CdsO, an ATPase lever arm. *PLoS Pathog*. 2020 Oct 13;16(10):e1008923. doi: 10.1371/journal.ppat.1008923. eCollection 2020 Oct. PMID: 33048983
5. Farrow MA, Chumber NM, Bloch SC, King M, Moton-Melancon K, Shupe J, Washington MK, **Spiller BW**, Lacy DB. Small Molecule Inhibitor Screen Reveals Calcium Channel Signaling as a Mechanistic Mediator of Clostridium difficile TcdB-Induced Necrosis. *ACS Chem Biol*. 2020 Jan 14. doi: 10.1021/acscchembio.9b00906.
6. Joyce S, **Spiller BW**, Van Kaer L. What one lipid giveth, another taketh away. *Nat Immunol*. 2019 Dec;20(12):1559-1561. doi: 10.1038/s41590-019-0525-8. No abstract available. PMID: 31636467
7. Kroh HK, Chandrasekaran R, Zhang Z, Rosenthal K, Woods R, Jin X, Nyborg AC, Rainey GJ, Warrenner P, Melnyk RA, **Spiller BW**, Lacy DB. A neutralizing antibody that blocks delivery of the enzymatic cargo of Clostridium difficile toxin TcdB into host cells. *J Biol Chem*. 2018 Jan 19;293(3):941-952. doi: 10.1074/jbc.M117.813428PMID: 29180448
8. Kroh HK, Chandrasekaran R, Rosenthal K, Woods R, Jin X, Ohi MD, Nyborg AC, Rainey GJ, Warrenner P, **Spiller BW**, Lacy DB. Use of a neutralizing antibody helps identify structural features critical for binding of Clostridium difficile toxin TcdA to the host cell surface. *J Biol Chem*. 2017 Sep 1;292(35):14401-14412. doi: 10.1074/jbc.M117.781112. Epub 2017 Jul 13. PMID: 28705932

9. Louis M. Luttrell and Benjamin W. Spiller
Arrestin-dependent ERK activation and its disruption. Chapter in *The Structural Basis of Arrestin Functions*, Springer Publishing 2017.
10. Benjamin W. Spiller, Xuanzhi Zhan, Vsevolod V. Gurevich. Arrestin-3: the structural basis of lower receptor selectivity. Chapter in *The Structural Basis of Arrestin Functions*, Springer Publishing 2017.
11. Gonzalez-Rivera C, Barke T, Pyburn T, Ohi M, **Spiller BW**, Cover TL, and Lacy DB. A structural analysis of the monomeric p88 vacuolating toxin from *Helicobacter pylori*. *Infection and Immunity*. 2016 Aug 19;84(9):2662-70. doi: 10.1128/IAI.00254-16. Print 2016 Sep.
12. LeNoue-Newton ML, Wadzinski BE, Spiller BW. The three Type 2A protein phosphatases, PP2Ac, PP4c and PP6c, are differentially regulated by Alpha4. *Biochem Biophys Res Commun*. 2016 May 8. pii: S0006-291X(16)30728-8. doi: 10.1016/j.bbrc.2016.05.036. [Epub ahead of print] PubMed PMID: 27169767.
13. Chumbler NM, Rutherford SA, Zhang Z, Farrow MA, Lisher JP, Farquhar E, Giedroc DP, Spiller BW, Melnyk RA, and Lacy DB. Crystal structure of Clostridium difficile toxin A. Crystal structure of Clostridium difficile toxin A. *Nature Microbiology* 1, Article number: 15002 (2016).
<http://doi.org/10.1038/nmicrobiol.2015.2>
14. Winarski KL, Thornburg NJ, Yu Y, Sapparapu G, Crowe JE Jr, **Spiller BW**. Vaccine-elicited antibody that neutralizes H5N1 influenza and variants binds the receptor site and polymorphic sites. *Proc Natl Acad Sci U S A*. 2015 Jul 28;112(30):9346-51. doi: 10.1073/pnas.1502762112. Epub 2015 Jul 13. PMID: 26517043.
15. Archuleta TL, **Spiller BW**. A gatekeeper chaperone complex directs translocator secretion during type three secretion. *PLoS Pathog*. 2014 Nov 6;10(11). PMID: 25375170
16. Markadieu N, Rios K, Spiller BW, McDonald WH, Welling PA, Delpire E. Short forms of Ste20-related proline/alanine-rich kinase (SPAK) in the kidney are created by aspartyl aminopeptidase (Dnpep)-mediated proteolytic cleavage. *J Biol Chem*. 2014 Oct 17;289(42):29273-84. PMID: 25164821.
17. Aiyegbo MS, Eli IM, **Spiller BW**, Williams DR, Kim R, Lee DE, Liu T, Li S, Stewart PL, Crowe JE Jr. Differential Accessibility of a Rotavirus VP6 Epitope in Trimers Comprising Type I, II, or III Channels as Revealed by Binding of a Human Rotavirus VP6-Specific Antibody. *J Virol*. 2013 Oct 23. PMID: 24155406.
18. Thornburg NJ, Nannemann DP, Blum DL, Belser JA, Tumpey TM, Deshpande S, Fritz GA, Sapparapu G, Krause JC, Lee JH, Ward AB, Lee DE, Li S, Winarski KL, **Spiller BW**, Meiler J, Crowe JE Jr. Human antibodies that neutralize respiratory droplet transmissible H5N1 influenza viruses. *J Clin Invest*. 2013 Sep 3. PMID: 23999429
19. Aiyegbo MS, Sapparapu G, **Spiller BW**, Eli IM, Williams DR, Kim R, Lee DE, Liu T, Li S, Woods VL Jr, Nannemann DP, Meiler J, Stewart PL, Crowe JE Jr. Human rotavirus VP6-specific antibodies mediate intracellular neutralization by binding to a quaternary structure in the transcriptional pore. *PLoS One*. 2013 May 9;8(5):e61101. PMID 23671563
20. Mchaourab HS, Lin YL, **Spiller BW**. Crystal structure of an activated variant of small heat shock protein Hsp16.5 *Biochemistry*. 2012 Jun 26;51(25):5105-12. PMID: 22670769
21. Watkins GR, Wang N, Mazaloukas MD, Gomez RJ, Guthrie CR, Kraemer BC, Schweiger S, **Spiller BW**, Wadzinski BE. Monoubiquitination promotes calpain cleavage of the protein phosphatase 2A

- (PP2A) regulatory subunit □ cleavage of the protein phosphatase 2A (PP2A) regulatory subunit
unit y subunJ Biol Chem. 2012 Jul 13;287(29):24207-15. PMID: 22613722.
22. Pruitt RN, Chumbler, NM, Rutherford SA, Farrow MA, Friedman DB, **Spiller B**, Lacy DB. Structural determinants of the *Clostridium difficile* toxin A glucosyltransferase activity. *J Biol Chem* 2012 Mar 9;287(11):8013-20.
 23. Archuleta TL, Du Y, English CA, Lory S, Lesser C, Ohi MD, Ohi R, **Spiller BW**. The *Chlamydia* effector chlamydial outer protein N (CopN) sequesters tubulin and prevents microtubule assembly. *J Biol Chem*. 2011 Sep 30;286(39):33992-8.
 24. Coffa S, Breitman M, **Spiller BW**, Gurevich VV. A single mutation in arrestin-2 prevents ERK1/2 activation by reducing c-Raf1 binding. *Biochemistry*. 2011 Aug 16;50(32):6951-8.
 25. LeNoue-Newton M., Watkins GR, Zou P, Germane KL, McCorvey LR, Wadzinski BE, **Spiller BW**. The Mid1 and PP2Ac binding domains of Alpha4 are both required for Alpha4 to inhibit PP2Ac degradation. 2011 May 20;286(20):17665-71.
 26. Germane KL, **Spiller BW**. Structural and functional studies indicate that the EPEC effector, EspG, directly binds p21 activated kinase. *Biochemistry* 2011 Feb 15;50(6):917-9.
 27. Zhan X, Gimenez LE, Gurevich VV, **Spiller BW**. Crystal structure of arrestin-3 reveals the basis of the difference in receptor binding between two non-visual subtypes. *J Mol Biol*. 2011 406(3):467-78.
 28. Schmitt J, Karalewitz A, Benefield DA, Mushrush DJ, Pruitt RN, **Spiller BW**, Barbieri JT, Lacy DB. Structural analysis of botulinum neurotoxin type G receptor binding. *Biochemistry*. 2010 Jun 29;49(25):5200-5.
 29. McConnell JL, Watkins GR, Soss SE, Franz HS, McCorvey LR, **Spiller BW**, Chazin WJ, Wadzinski BE. Alpha4 is a Ubiquitin-Binding protein that regulates PP2A ubiquitination. *Biochemistry*. 2010. 49(8):1713-8.
 30. Pruitt RN, Chagot B, Cover M, Chazin WJ, **Spiller B**, Lacy DB. Structure-function analysis of inositol hexakisphosphate-induced autoprocessing in *Clostridium difficile* toxin A. *J Biol Chem*. 2009 Aug 14;284(33):21934-40.
 31. Germane KL, Ohi R, Goldberg MB, **Spiller BW**. Structural and functional studies indicate that *Shigella* VirA is not a protease and does not directly destabilize microtubules. *Biochemistry*. 2008 Sep 30;47(39):10241-3.
 32. Gangwer KA, Mushrush DJ, Stauff DL, **Spiller B**, McClain MS, Cover TL, Lacy DB. Crystal structure of the *Helicobacter pylori* vacuolating toxin p55 domain. *Proc Natl Acad Sci U S A*. 2007 Oct 9;104(41):16293-8.

PUBLICATIONS PRIOR TO EMPLOYMENT AT VANDERBILT

- 17 Fujinami S, Sato T, Trimmer JS, **Spiller BW**, Clapham DE, Krulwich TA, Kawagishi I, and Ito M (2007) The Voltage-Gated Na⁺ Channel 1 NaVBP Co-localizes with Methyl-Accepting Chemotaxis Protein at Cell Poles of Alkaliphilic *Bacillus pseudofirmus* OF4. *Microbiology* Dec;153(Pt 12):4027-38.
18. Koishi R, Xu HX, Ren DJ, Navarro B, **Spiller BW**, Shi Q, Clapham DE (2004). A superfamily of voltage-gated sodium channels in bacteria. *J Biol Chem*. **279** 9532-9538.
19. **Spiller B**, Gershenson A, Arnold FH, and Stevens RC (1999). A Structural view of Evolutionary Divergence. *Proc Natl Acad Sci U S A.*, **96**, 12305-12310.

20. Romesberg FE, Santarsiero BD, **Spiller B**, Yin J, Barnes D, Schultz PG, Stevens RC (1998) Structural Evidence for Strain in Biological Catalysis. *Biochemistry* **37**, 14404-14409.
21. Romesberg FE,* **Spiller B**,* Schultz PG, Stevens RC (1997) Immunological Origins of Binding and Catalysis in a Diels-Alderase Antibody. *Science* **279**, 1929-1933. ***(authors contributed equally)**
22. Stevens RC, Hsieh-Wilson LC, Santarsiero BD, Wedemayer GJ, **Spiller B**, Wang LH, Barnes D, Ulrich HD, Patten PA, Romesberg FE, and Schultz PG (1996) Structural Studies of Catalytic Antibodies *Israel Journal of Chemistry*, **36** 121-132

GRANTS and CONTRACTS

ACTIVE

1R01AI155668-01 (Smith/Spiller Co-PI) **04/01/2020 - 03/31/2025**
 NIH/NIAID \$200,000 direct/year
 Comprehensive antigenic mapping of the human anti-peanut IgE antibody response

U19AI174999
 NIH/NIAID \$225,000 direct/year
 Vanderbilt Antibody and Antigen Discovery for Clostridioides difficile Vaccines
 Antibody discovery project and Core lead

Medimmune Contract (Spiller, B. PI)
 Epitope determination for SAN481 and SAN177.
 Remaining Award Amount: \$89,987

COMPLETED

1R43AI149906-01 Vitrici/Martin 09/01/2019 - 08/31/2021
 NIH/Vitrici
 A Novel Probiotic-Based Nanobody Delivery Platform

1R01AI108778-01 (Spiller, B. PI) 07/01/2014-06/30/2021 NCE
 NIH/NIAID ~\$15,000 remaining
 CopN mechanism as a key to understanding Type Three Secretion in bacteria

Discovery Grant: Vanderbilt University (Spiller, B PI) 6/1/2016-6/30/2017
 Vanderbilt \$50,000 per year direct
 Structural studies of human IgE antibodies bound to natural allergens.
 We have begun a collaboration with Scott Smith in the Dept. of Medicine to determine the first structures of IgE antibodies in complex with allergens.

Center For Aids Research Core Award (Spiller, B PI) 6/1/2016-6/30/2018
 NIH/NIAID \$50,000 per year direct
 Structural studies of human IgE antibodies bound to natural allergens.
 We have begun a collaboration with Scott Smith in the Dept. of Medicine to determine the first structures of IgE antibodies in complex with allergens.

R21 AI092268-01A1 (Spiller, B.) 08/15/2011-07/31/2014
 Epitope shifting and antibody maturation during rotavirus infection

We will determine the mechanism of a newly identified aspect of affinity maturation, epitope shift, and provide new molecular immunology paradigms that may influence the choice of antigens and the use of surrogate markers

HHSN272200900047C (Crowe, J. PI) 09/30/2009 – 09/29/2014
Genetic and Structural basis for virus neutralization

2R01 EY012018-11 (Mchaourab, H.) 02/01/2008-01/31/2013
Mechanisms of chaperone functions in the lens
To determine the structure of mutant forms of the small heat shock protein from *Methanococcus jannaschii*, with the overall goal of determining how changes in oligomeric state are functionally important.

R01 AI072453-05 (Lacy, Dana B.) 05/1/2011-04/30/2012
Directed evolution of inhibitors of anthrax toxin
The goal here was to develop drug candidates for disseminated anthrax, a disease incurable with antibiotics. With anthrax toxin as the target, peptide ligands were produced by ribosomal display.

R01 AI075259-04 (Lacy, Dana B.) 01/01/2011-12/21/2013
Structural Mechanisms of Botulinum Neurotoxin Pathogenesis
This project was focused on understanding the pore-forming and receptor binding mechanisms of different serotypes of botulinum neurotoxin.

DDRC Pilot Grant. 3p30 DK058404-08S1 06/1/09-05/31/11
Structural & Functional Study of VirA in Shigellosis

5R01 GM 081778-02 (B.W. Spiller PI) 09/15/2007-07/31/2011
Structural Studies of Voltage Gating in Voltage-Gated Sodium Channels
The major goals of this grant were to develop methods to stabilize flexible structures, and to complete the structure of a bacterial sodium channel.

ACS-IRG-58-009-49 (Spiller, B.) 07/01/2007-06/30/2008
ACS
Crystal structure determination of alpha4, a novel phosphatase subunit
To determine the structure of alpha4 and characterize the phosphatase binding surface.

Helen Hay Whitney Post-doctoral Fellowship 05/01-05/04
Structural Studies of Chemokine Receptors
The goal of this project was post-doctoral training and structure determination of a chemokine receptor.
Role: Investigator

INVITED PRESENTATIONS

2021 Vanderbilt University, Nashville, TN
2021 Igenix, San Francisco, CA
2020 VIRTICI, Seattle, WA
2020 TN Alpaca Association
2017 Tennessee Technical University
2016 Baylor College of Medicine
2015 *Chlamydia* Basic Sciences Meeting
2014 Purdue University
2014 University of Illinois, Chicago
2014 Notre Dame University
2014 University of North Carolina, Chapel Hill
2013 Midwestern Microbial Pathogenesis Meeting, The Ohio State University

2013 Middle Tennessee State University
 2012 Oklahoma Health Sciences, Dept of Microbiology.
 2012 University of Massachusetts Amherst, Dept of Chemistry.
 2011 Advanced Photon Source LS-CAT users meeting
 2010 Vanderbilt University Center for Structural Biology
 2009 NIH Roadmap to High Resolution Membrane Protein Structures
 2008 Rinat Pharmaceuticals, South San Francisco
 2007 NIH Roadmap to High Resolution Membrane Protein Structures
 2003 Agouron Institute
 2003 Helen Hay Whitney Foundation
 1999 West Coast Crystallography Meeting. Asilomar, CA

ACADEMIC SERVICE

Teaching

2021 (2) Pharmacology, Targets, PHARM320, 3 hours, 8 students
 (3) IGP MMII: Biologic Drug Development; 13 students 16 hours

2020 (1) Pharmacology, Fundamentals, PHARM320, 4 hours, 3 student
 (2) Pharmacology, Targets, PHARM320, 3 hours, 1 student
 (3) IGP MMII: Biologic Drug Development; 12 students 16 hours

2019 (1) Graduate Seminar in Molecular Biophysics, BCHM349, ~15 students, 1 hour
 (2) Pharmacology, Targets, PHARM320, 4 hours, ~10 students
 (3) IGP MMII: Biologic Drug Development; 12 students 16 hours

2018 (1) Graduate Seminar in Molecular Biophysics, BCHM349, ~15 students, 1 hour
 (2) Pharmacology, Targets, PHARM320, 3 hours, ~10 students
 (3) IGP MMII: Biologic Drug Development; 12 students 16 hours

2017 (1) Graduate Seminar in Molecular Biophysics, BCHM349, ~15 students, 1 hour
 (2) Pharmacology, Targets, PHARM320, 3 hours, ~10 students
 (3) Chemical and Physical Biology, CPB306, ~15 students 10 hours
 (4) Advanced Membrane Protein Biology: from Molecule to Disease. IGP MM1 21 students
 16 hours

2016 (1) Graduate Seminar in Molecular Biophysics, BCHM349, ~15 students, 1 hour
 (2) Pharmacology, Targets, PHARM320, 3 hours, ~10 students
 (3) Foundations of Microbiology and Immunology, M&IM 332 10 students, 4 hours.
 (4) Advanced topics in virology, M&IM ~10 students, 1 hour.
 (5) Chemical and Physical Biology, CPB306, ~15 students 10 hours
 (6) Advanced Membrane Protein Biology: from Molecule to Disease. IGP MM1 21 students
 16 hours

2015 (1) Graduate Seminar in Molecular Biophysics, BCHM349, ~15 students, 1 hour
 (2) Pharmacology, Targets, PHARM320, 3 hours, ~10 students
 (3) Foundations of Microbiology and Immunology, M&IM 332 10 students, 4 hours.
 (4) Advanced topics in virology, M&IM ~10 students, 1 hour.
 (5) Chemical and Physical Biology, CPB306, ~15 students 10 hours
 (6) Advanced Membrane Protein Biology: from Molecule to Disease. IGP MM1 21 students,
 16 hours
 (7) Protein interfaces. IGP MM2. 22 students, 2 hours.

2014 (1) Graduate Seminar in Molecular Biophysics, BCHM349, ~15 students, 1 hour
 (2) Pharmacology, Targets, PHARM320, 3 hours, ~10 students

- (3) Foundations of Microbiology and Immunology, M&IM 332 10 students, 4 hours.
 - (4) Advanced topics in virology, M&IM ~10 students, 1 hour.
 - (5) Chemical and Physical Biology, CPB306, ~15 students 10 hours
 - (6) Advanced Membrane Protein Biology: from Molecule to Disease. IGP MM1 10 students, 16 hours
- 2013
- (1) Graduate Seminar in Molecular Biophysics, BCHM349, ~15 students, 1 hour
 - (2) Pharmacology, Targets, PHARM320, 3 hours, ~10 students
 - (3) Foundations of Microbiology and Immunology, M&IM 332 12 students, 4 hours.
 - (4) Advanced topics in virology, M&IM ~10 students, 1 hour.
 - (5) Chemical and Physical Biology, CPB306, ~15 students 10 hours
 - (6) Advanced Membrane Protein Biology: from Molecule to Disease. IGP MM1 ~15 students, 16 hours
- 2012
- (1) Graduate Seminar in Molecular Biophysics, BCHM349, ~15 students, 1 hour
 - (2) Pharmacology, Targets, PHARM320, 6 hours, ~15 students
 - (3) Foundations of Microbiology and Immunology, M&IM 332 12 students, 4 hours.
 - (4) Advanced topics in virology, M&IM ~10 students, 3 hours.
 - (5) Chemical and Physical Biology, CPB306, ~20 students 6 hours
- 2011
- (1) Graduate Seminar in Molecular Biophysics, BCHM349, ~15 students, 1 hour
 - (2) Pharmacology, Targets, PHARM320, 6 hours, ~15 students
 - (3) Foundations of Microbiology and Immunology, M&IM 332 12 students, 4 hours.
 - (4) Advanced topics in virology, M&IM ~10 students, 3 hours.
 - (5) Chemical and Physical Biology, CPB306, ~20 students 6 hours
- 2010
- (1) Graduate Seminar in Molecular Biophysics, BCHM349, ~15 students, 1 hour
 - (2) X-ray crystallography, BCHM303, ~10 students, 9 hours
 - (3) Foundations of Microbiology and Immunology, M&IM 332 12 students, 4 hours.
 - (4) Advanced topics in virology, M&IM ~10 students, 3 hours.
 - (5) Chemical and Physical Biology, CPB306, ~20 students 9 hours
- 2009
- (1) Graduate Seminar in Molecular Biophysics, BCHM349, 7 students, 1 hour
 - (2) X-ray crystallography, BCHM303 (course organizer 2009), ~10 students, 9 hours
 - (3) Introduction to X-ray crystallography, IGP, 25 students, 4 hours.
 - (4) Foundations of Microbiology and Immunology, M&IM 332 12 students, 4 hours.
- 2008
- (1) Graduate Seminar in Molecular Biophysics, BCHM349, 7 students, 1 hour discussion
 - (2) X-ray crystallography, BCHM303, 2 students 6 hours.
 - (3) Foundations of Microbiology and Immunology, M&IM 332 12 students, 4 hours.
 - (4) Advanced Topics in Neurobiology: Excitable Membranes, NURO 324, 12 students 4 hours
 - (5) Bridges to Success: Excitable Membranes, IGP, 15 students 6 hours
- 2007
- (1) Graduate Seminar in Molecular Biophysics, BCHM349, 7 students, 1 hour discussion
 - (2) Introduction to X-ray crystallography, IGP, 25 students, 4 hours.
- 2006
- (1) Graduate Seminar in Molecular Biophysics, BCHM349, 7 students, 1 hour discussion
 - (2) Introduction to X-ray crystallography, IGP, 25 students, 4 hours.

Training of Graduate Students

Katherine Germane, 2007-2011, B.S. from University of Pittsburg, Pennsylvania, 2006. Funded by the Molecular Biophysics Training Grant. Currently employed at the SEDD Biotechnology Office, Army Research Lab.

Mohammed Aiyegbo, 2007- 2013. Joint with J. Crowe. Funded by R21.

Michele LeNoue, 2008-present, B.S. from University of Louisville, 2000. Funded by the Pharmacology Training Grant, followed by NIH NRSA.

Tara Archuleta, 2009-present, B.S. from University of Arizona, 2009. Funded by Integrative Training in Therapeutic Discovery, followed by AHA Fellowship

Katherine Winarski, 2010-present, B.S. from University of Pittsburg, Pennsylvania, 2007. Funded by the Molecular Biophysics Training Grant, followed by R21

Thesis Committees (Advisor)

Aiyegbo, Mohammed (Crowe)

Archuleta, Tara (Spiller)

Bokiej, Magda (Dermody)

LeNoue, Michele (Spiller)

Kelvin, Loung (Fesik)

Gibson, Elisabeth (Osheroff)

Jagessar, Kevin (Mchaourab)

Perry, Nicole (Gurevich)

Wan, William (Stubbs)

Wandishin, Clayton (Crowe)

Watkins, Guy (Wadzinski)

Winarski, Katherine (Spiller)

Willis, Jordan (Crowe)

Yufenyuy, Ernest (Aiken)

University Service

2006-present Member of Vanderbilt Center for Structural Biology

2006-present Member of Vanderbilt X-Ray Crystallography Users' Group

2007-2010 Member of minority recruitment committee, Molecular Biophysics Training Grant

2010-present Member of Chemical and Physical Biology curriculum committee

2014-present Chair of Chemical and Physical Biology curriculum committee

2016-present Pharmacology curriculum committee

Ad hoc Manuscript Review

Nature Immunology

Acta Crystallography

Biochemistry

Cell Reports

Journal of Biological Chemistry

Journal of Molecular Biology

Molecular Pharmacology

Protein Science

Proceedings of the National Academy of Sciences

Science

Cellular Microbiology

Journal of Lipid Research

Ad hoc Grant Review Committees

North Carolina Biotechnology Center

NIH RFA-RM-09-012

NIH Neurotransporters, Receptors, Channels, and Calcium Signaling study section

Advanced Photon Source Beamtime Allocation Proposals.
Medical Research Council, UK
Advanced Photon Source
NIH: ZRG1 BCMB-G