BOSTON COLLEGE

Morrissey College of Arts and Sciences

GRADUATE PROGRAM

Biology

A MESSAGE FROM THE BIOLOGY FACULTY AT BOSTON COLLEGE

The Graduate Program in Molecular and Cellular Biology at Boston College combines coursework and independent research toward the completion of a Ph.D. thesis. While courses and lab work provide foundational technical and theoretical skills, the overarching purpose of the program is to train graduate students to become independent scientists with the intellectual skills to function as leaders in biological and biomedical research. This includes the ability to independently devise and conduct a research program, including hypothesis development, experimental design, proposal writing, and communication of results in both oral and written formats, as well as the ability to mentor and teach others in a research-intensive environment. Graduate students who successfully complete the program are prepared and qualified to function as independent scientists, and are competitive for research-intensive positions in industry, government, and academia.

The Biology Department comprises a close-knit group of graduate students, faculty, postdocs, and research staff who collaborate in an atmosphere of congenial learning and discovery. The department hosts many activities that create a strong intellectual community and sense of collegiality among our students and faculty, including an annual Scientific Retreat, year-round seminars, a bi-weekly Data Club, and interest group meetings in Cell/Developmental Biology and Microbiology.

Research strengths in the department fall into three categories: Microbiology and Infectious Disease; Cell and Developmental Biology; and Computational Biology. We are well-equipped for modern molecular, cellular, genomic, proteomic, biochemical, imaging, and bioinformatics research. We have state-of-the-art instrumentation for genomics research, fluorescence, and high-resolution live-cell imaging and flow cytometry, excellent animal facilities, and substantial computational resources.

In addition to research, we aim to develop the communication skills necessary for the pursuit of a variety of potential careers. Most students gain practice in mentoring by working with undergraduate research assistants. Skills in the formal presentation of scientific data are honed at the departmental Data Club. Our students are integrated into the scientific community by a number of mechanisms. On campus, students engage with leading scientists who present their work in our departmental Seminar Series. Our program is further enhanced by the opportunities to participate in the Greater Boston area topical research meetings and seminars. Additionally, the Biology Department provides funding for students to attend and present their research at local, national, and international meetings.

The city of Boston boasts a vibrant biomedical sciences research community, providing our students with many opportunities for collaboration and future employment opportunities in both academia and industry.

CONTENTS

PROGRAM OVERVIEW

Our Ph.D. program provides an in-depth training experience. Core course work is provided to hone skills in critical thinking, experimental design, and scientific writing. Advanced electives are available in all areas of faculty expertise. A student presentation enables development of oral communication skills, and graduate students are exposed to a broad array of areas in the biological sciences through weekly departmental seminars that also provide important networking opportunities. Research experience is provided by working in close cooperation with faculty members, postdoctoral fellows, and senior students in a collaborative, supportive environment. Our department welcomes graduate students of diverse backgrounds and strives to support each individual student through their Ph.D. journey. Our goal is for every student to develop the strong analytical, technical, and communication skills that are necessary for research during their graduate experience.

Focus on Research

Research lies at the heart of the biology experience at Boston College. The department offers a wide array of opportunities for scientific investigation within the areas of:

- Microbiology and Infectious Disease
- Cell and Developmental Biology
- Computational Biology

For specific areas of research in the department, please refer to our faculty profiles.

GRADUATE FACULTY PROFILES

EMRAH ALTINDIS

Assistant Professor

Ph.D., Bologna University

RESEARCH INTERESTS

Gut microbiome and autoimmune diseases (type 1 diabetes, celiac disease), insulin/igf signaling and characterization of viral insulin and igf-1 like peptides

SELECTED PUBLICATIONS

- Chrudinová, M.; Kirk, N.S.; Chuard, A.; Venugopal, H.; Zhang, F.; Lubos, M.; Gelfanov, V.; Páníková, T.; Žáková, L.; Cutone, J.; Mojares, M.; Dimarchi, R.; Jiráček, J.; Altindis, E. 2024. A Viral Insulin-Like Peptide Inhibits Igf-1 Receptor Phosphorylation and Regulates Igf1r Gene Expression. *Molecular Metabolism*. 80:101863. doi: 10.1016/j.molmet.2023.101863.
- Girdhar, K.; Dogru, Y.D.; Huang, Q.; Yang, Y.; Chrudinova, M.; Raisingani, A.; Oh, J.; Tolstikov, V.; Kiebish, M.A.; Kelley, K.; Ludvigsson, J.F.; Palm, N.W.; Ludvigsson, J.; Altindis, E. 2023. Dynamics of Gut Microbiome, IgA Response and Plasma Metabolome in Development of Pediatric Celiac Disease. *Microbiome*. 11:9. doi: 10.1186/s40168-022-01429-2.
- Girdhar, K.; Huang, Q.; Chow, I.; Raisingani, A.; Brady, C.; Atkinson, M.; Kwok, W.; Kahn, C.R.; Altindis, E. 2022. A Gut Microbial Peptide and Molecular Mimicry in the Pathogenesis of Type 1 Diabetes. *PNAS*. 119(31):e2120028119. doi: 10.1073/pnas.2120028119.

ANTHONY T. ANNUNZIATO

Professor

Ph.D., University of Massachusetts, Amherst

RESEARCH INTERESTS

Molecular biology, chromatin assembly and histone modifications in human cells and fission yeast

SELECTED PUBLICATIONS

- Annunziato, A.T. 2015. The fork in the road: Histone partitioning during DNA replication. *Genes*. 6:353-71. doi: 10.3390/genes6020353.
- Tong, K.; Keller, T.; Hoffman, C.S.; Annunziato, A.T. 2012. Schizosaccharomyces pombe Hat1 (Kat1) is required for telomeric silencing. *Eukaryotic Cell*. 11:1095-103. doi: 10.1128/EC.00123-12.
- Annunziato, A.T. 2012. Assembling chromatin: the long and winding road. *Biochimica et Biophysica Acta*. 1819:196-210. doi: 10.1016/j.bbagrm.2011.07.005.

Note: Prof. Annunziato is no longer accepting rotation students or Ph.D. candidates.

DAVID R. BURGESS

Professor

Ph.D., University of California, Davis

RESEARCH INTERESTS

Cytokinesis and the polarization of the cytoskeleton

SELECTED PUBLICATIONS

- Rosfelter, A.; de Labbey, G.; Chenevert, J.; Dumollard, R.; Schaub, S.; Machaty, Z.; Besnardeau, L.; Suarez, D.G.; Hebras, C.; Turlier, H.; Burgess, D.R.; McDougall, A. 2024. Reduction of cortical pulling at mitotic entry facilitates aster centration. *Journal of Cell Science*. 137(7):jcs262037. doi.org/10.1242/jcs.262037.

FACULTY PROFILES

- Meaders J.L.; de Matos, S.N.; Burgess, D.R. 2020. A pushing mechanism for microtubule aster positioning in a large cell type. *Cell Reports*. 33(1):108213. doi: 10.1016/j.celrep.2020.108213.
- Costache, V.; Hebras, C.; Pruliere, G.; Besnardeau, L.; Failla, M.; Copley, R.; Burgess, D.R.; Chenevert, J.; McDougall, A. 2017. Kif2 localizes to a subdomain of cortical endoplasmic reticulum that drives asymmetric spindle position. *Nature Communications*. 8(1):917. doi: 10.1038/s41467-017-01048-8.

PETER CLOTE

Professor

Ph.D., Duke University

Doctorat d'Etat de l'Université Paris VII

RESEARCH INTERESTS

Computational design of RNA molecules, RNA thermodynamics-based algorithms, folding kinetics and network properties of RNA, machine learning in bioinformatics

SELECTED PUBLICATIONS

- Clote. P. 2020. Are RNA networks scale-free? *Journal of Mathematical Biology*. 80(5):1291-1321. doi: 10.1007/s00285-019-01463-z.
- Bayegan, A.H.; Clote. P. 2020. RNAmountAlign: Efficient software for local, global, semiglobal pairwise and multiple RNA sequence/structure alignment. *PLOS ONE*. 15(1):e0227177. doi: 10.1371/journal.pone.0227177.
- Surujon, D.; Ponty, Y.; Clote. P. 2019. Small-world networks and RNA secondary structures. *Journal of Computational Biology*. 26(1):16-26. doi: 10.1089/cmb.2018.0125.

MAITREYI E. DAS

Associate Professor and Graduate Program Director

Ph.D., Indian Institute of Technology

RESEARCH INTERESTS

Cell polarity, cytokinesis, cell cycle, cell signaling, actin cytoskeleton in the fission yeast Schizosaccharomyces pombe

SELECTED PUBLICATIONS

- Harrell, M.; Liu, Z.; Campbell, B.F.; Chinsen, O.; Hong, T.; Das, M. 2024. Arp2/3-dependent endocytosis ensures Cdc42 oscillations by removing Pak1-mediated negative feedback. *Journal of Cell Biology*. doi: 10.1083/jcb.202311139.
- Onwubiko U.N.; Kalathil D.; Koory E.; Pokharel S.; Roberts H.; Mitoubsi A.; Das, M. 2023. Cdc42 prevents precocious Rho1 activation during cytokinesis in a Pak1-dependent manner. *Journal of Cell Science*. 136(8):jcs261160. doi: 10.1242/jcs.261160.
- Rich-Robinson, J.; Russell, A.; Mancini, E.; Das, M. 2021. Cdc42 reactivation at growth sites is regulated by cell-cycle-dependent loss of its GAP Rga4 in fission yeast. *Journal of Cell Science*. 134(19):jcs.259291. doi: 10.1242/jcs.259291.

ERIC S. FOLKER

Associate Professor and Director of Undergraduate Studies

Ph.D., University of Notre Dame

RESEARCH INTERESTS

Mechanisms and functions of nuclear movement and nuclear spacing in syncytial cells

SELECTED PUBLICATIONS

- Padilla, J.R.; Ferreira, L.M.; Folker, E.S. 2022. Nuclear movement in multinucleated cells. *Development*. 149(21). doi: 10.1242/dev.200749
- Collins, M.A.; Coon, L.A.; Thomas, R.; Mandigo, T.R.; Wynn, E.; Folker, E.S. 2021. Ensconsin-dependent changes in microtubule organization and LINC complex-dependent changes in nucleus-nucleus interactions result in quantitatively distinct myonuclear positioning defects. *Molecular Biology of the Cell*. 32(21):ar27. doi: 10.1091/mbc.E21-06-0324.
- Mandigo, T.R.; Turcich, B.D.; Anderson, A.J.; Hussey, M.R.; Folker, E.S. 2019. Drosophila emerins control LINC complex localization and transcription to regulate myonuclear position. *Journal of Cell Science*. 132(20):jcs235580. doi: 10.1242/jcs.235580.

JUAN MANUEL GONZALEZ-ROSA

Assistant Professor

Ph.D., Spanish National Center for Cardiovascular Research and Universidad Autónoma de Madrid

RESEARCH INTEREST

Heart development and regeneration; zebrafish genetics; role of fibrosis, inflammation, and polyploidy in regeneration

SELECTED PUBLICATIONS

- Sande-Melon, M.; Bergemann, D.; Fernandez-Lajarin, M.; Gonzalez-Rosa, J.M.; Cox, A.G. 2024. Development of a hepatic cryoinjury model to study liver regeneration. *bioRxiv*. doi: 10.1101/2023.07.24.550437 (forthcoming).
- Akam-Baxter, E.A.; Bergemann, D.; Ridley, S.J.; To, S.; Andrea, B.; Moon, B.; Ma, H.; Zhou, Y.; Aguirre, A.; Caravan, P.; Gonzalez-Rosa, J.M.; Sosnovik, D.E. 2024. Dynamics of collagen oxidation and cross linking in regenerating and irreversibly infarcted myocardium. *Nature Communications*. 15(1):4648. doi: 10.1038/s41467-024-48604-7.
- González-Rosa, J.M. 2022. Zebrafish Models of Cardiac Disease: From Fortuitous Mutants to Precision Medicine. *Circulation Research*. 130(12):1803-26. PMID: 35679360.

MARC-JAN GUBBELS

Professor

Ph.D., Utrecht University, The Netherlands

RESEARCH INTEREST

Comparative genomics of apicomplexan parasite cell division plasticity and cell biology of *Toxoplasma gondii* host cell invasion

SELECTED PUBLICATIONS

- Zarringhalam, K.; Ye, S.; Lou, J.; Rezvani, Y.; Gubbels, M.-J. 2023. Cell cycle-regulated ApiAP2s and parasite development: The Toxoplasma paradigm. *Current Opinion in Microbiology*. 76:102383. doi: 10.1016/j.mib.2023.102383.
- Engelberg, K.; Bechtel, T.J.; Michaud, C.; Weerapana, E.; Gubbels, M.-J. 2022. Proteomic characterization of the Toxoplasma gondii cytokinesis machinery portrays an expanded hierarchy of its assembly and function. *Nature Communications*. 13:4644. doi: 10.1038/s41467-022-32151-0.
- Gubbels, M.-J.; Keroack, C.D.; Dangoudoubiyam, S.; Worliczek, H.L.; Paul, A.S.; Bauwens, C.; Elsworth, B.; Engelberg, K.; Howe, D.K.; Coppens, I.; Duraisingh, M.T. 2020. Fussing About Fission: Defining Variety Among Mainstream and Exotic Apicomplexan Cell Division Modes. *Frontiers in Cellular and Infection Microbiology*. 10:269. doi: 10.3389/fcimb.2020.00269.

ZOË A. HILBERT

Assistant Professor

Ph.D., Massachusetts Institute of Technology

RESEARCH INTERESTS

Host-fungal interactions, adaptive evolution of pathogenic fungi and their hosts

SELECTED PUBLICATIONS

- Schwiesow, M.J.W.; Elde, N.C.; Hilbert, Z.A. 2024. Distinct routes to thermotolerance in the fungal pathogen Cryptococcus neoformans. *bioRxiv*. 2024. doi: 10.1101/2024.04.08.588590.
- Hilbert, Z.A.; Bednarek, J.M.; Schwiesow, M.J.W.; Chung, K.Y.; Moreau, C.T.; Brown, J.C.S.; Elde, N.C. 2023. Distinct pathways of adaptive evolution in Cryptococcus neoformans reveal a mutation in adenylyl cyclase with trade-offs for pathogenicity. *Current Biology*. 33(19):4136-49.e9. doi: 10.1016/j.cub.2023.08.054.
- Hilbert, Z.A.; Haffener, P.E.; Young, H.J.; Schwiesow, M.J.W.; Leffler, E.M.; Elde, N.C. 2023. Rapid Evolution of Glycan Recognition Receptors Reveals an Axis of Host-Microbe Arms Races beyond Canonical Protein-Protein Interfaces. *Genome Biology and Evolution*. 15(7). doi: 10.1093/gbe/evad119.

CHARLES S. HOFFMAN

Professor and Department Chairperson

Ph.D., Tufts University Graduate School of Biomedical Sciences

RESEARCH INTERESTS

Cyclic nucleotide signaling, small molecule screening/ drug development, and transcriptional regulation in the fission yeast *Schizosaccharomyces pombe*

SELECTED PUBLICATIONS

- Mahmood, S.U.; Lozano Gonzalez, M.; Tummalapalli, S.; Eberhard, J.; Ly J, Hoffman, C.S.; Kelly, M.P.; Gordon, J.; Colussi, D; Childers, W.; Rotella, D.P. 2023. First Optimization of Novel, Potent, Selective PDE11A4 Inhibitors for Age-Related Cognitive Decline. *Journal of Medicinal Chemistry*. 66(21):14597-608. doi: 10.1021/acs.jmedchem.3c01088.
- Hoffman, C.S. 2022. Use of a Fission Yeast Platform to Identify and Characterize Small Molecule PDE Inhibitors. *Frontiers in Pharmacology*. 12:833156. doi: 10.3389/fphar.2021.833156.
- Eberhard, J.; Hoffman, C.S. 2021. cAMP export by the fission yeast *Schizosaccharomyces pombe*. *microPublication Biology*. 10:17912. doi: 10.17912/micropub.biology.000384.

WELKIN E. JOHNSON

Professor

Ph.D., Tufts University Graduate School of Biomedical Sciences

RESEARCH INTERESTS

Retroviruses, endogenous retroviruses (ERV), coevolution of viruses and their hosts

SELECTED PUBLICATIONS

- Johnson, W.E. 2019. Origins and Evolutionary Consequences of Ancient Endogenous Retroviruses. *Nature Reviews Microbiology*. 17:355-70. doi: 10.1038/s41579-019-0189-2.
- Henzy, J.E.; Gifford, R.J.; Kenaly, C.P.; Johnson, W.E. 2017. An Intact Retroviral Gene Conserved in Spiny-Rayed Fishes for over 100 My. *Molecular Biology Evolution*. 34(3):634-39. doi: 10.1093/molbev/msw262.
- Diehl, W.E.; Patel, N.; Halm, K.; Johnson, W.E. 2016. Tracking interspecies transmission and long-term evolution of an ancient retrovirus using the genomes of modern mammals. *eLIFE*. 5:e12704. doi: 10.7554/eLife.12704.

VICKI P. LOSICK

Assistant Professor

Ph.D., Tufts University Graduate School of Biomedical Sciences

RESEARCH INTERESTS

Role and regulation of polyploidy in wound repair and aging

SELECTED PUBLICATIONS

- Dehn, A.S.; Duhaime, L.; Gogan, N.; Nishina, P.M.; Kelly, K.; Losick, V.P. 2023. Epithelial mechanics are maintained by inhibiting cell fusion with age in Drosophila. *Journal of Cell Science*. 136(20):jcs260974. doi: 10.1242/jcs.260974.
- Losick, V.P.; Duhaime, L. 2021. The endocycle restores tissue tension in Drosophila abdomen post wound repair. *Cell Reports*. 37(2):109827. doi: 10.1016/j.celrep.2021.109827.
- Bailey, E.C.; Kobielski, S.; Park, J.; Losick, V.P. 2021. Polyploidy in Tissue Repair and Regeneration. *Cold Spring Harbor Perspectives in Biology*. doi: 10.1101/cshperspect.a040881.

SARAH K. MCMENAMIN

Associate Professor

Ph.D., Stanford University

RESEARCH INTERESTS

Zebrafish fin development and regeneration; hormonal requirements for skeletal patterning

FACULTY PROFILES

SELECTED PUBLICATIONS

- Harper, M.; Hu, Y.; Donahue, J.; Acosta, B.; Braes Dievenich, F.; Nguyen, S.; Zeng, J.; Barbaro, J.; Lee, H.; Bui, H.; McMenamin, S.K. 2023. Thyroid hormone regulates proximodistal patterning in fin rays. *Proceedings of the National Academy of Sciences*. 120(21):e2219770120. doi: 10.1073/pnas.2219770012.
- Nguyen, S.; Lanni, D.; Xu, Y.; Michaelson, J.; McMenamin, S.K. 2022. Dynamics of the zebrafish skeleton in three dimensions during juvenile and adult development. *Frontiers in Physiology*. doi: 10.3389/fphys.2022.875866.
- Hu, Y.; Mauri, A.; Donahue, J.; Singh, R.; Acosta, B.; McMenamin, S.K. 2019. Thyroid hormone coordinates developmental trajectories but does not underlie developmental truncation in danionins. *Developmental Dynamics*. 248(11):11144-54. doi: 10.1002/dvdy.76.

MICHELLE M. MEYER

Professor and Associate Chairperson

Ph.D., California Institute of Technology

RESEARCH INTERESTS

Computational biology, non-coding RNA discovery and validation, molecular evolution, RNA and protein structure

SELECTED PUBLICATIONS

- Warrier, I.; Perry, A.; Hubbel, S.M.; Eichelman, M.; van Opijnen, T.; Meyer, M.M. 2024. RNA cis-regulators are important for Streptococcus pneumoniae in vivo success. *PLOS Genetics*. 20(3):e10111188. doi: 10.1371/journal.pgen.10111188.
- Crum, M.; Ram-Mohan, N.; Meyer, M.M. 2019. Regulatory context drives conservation of glycine riboswitch aptamers. *PLOS Computational Biology*. 15(12):e1007564. doi: 10.1371/journal.pcbi.1007564.
- Warrier, I.; Ram-Mohan, N.; Zhu, Z.; Hazery, A.; Echlin, H.; Rosch, J.; Meyer, M.M.; van Opijnen, T. 2018. The transcriptional landscape of Streptococcus pneumoniae TIGR4 reveals a complex operon architecture and abundant riboregulation critical for growth and virulence. *PLOS Pathogens*. 14(12):e1007461. doi: 10.1371/journal.ppat.1007461.

BABAK MOMENI

Associate Professor

Ph.D., Georgia Institute of Technology

RESEARCH INTERESTS

Microbial communities, synthetic ecology, bioremediation, and mathematical modeling of biological systems

SELECTED PUBLICATIONS

- Dedrick, S.; Warrier, V.; Lemon, K.P.; Momeni, B. 2023. When does a Lotka-Volterra model represent microbial interactions? Insights from in vitro nasal bacterial communities. *mSystems*. doi: 10.1101/2022.08.08.503228.
- Sandlin, N.; Russell Kish, D.; Kim, J.; Zaccaria, M.; Momeni, B. 2022. Current and Emerging Tools of Computational Biology to Improve the Detoxification of Mycotoxins. *Applied and Environmental Microbiology*. 88:e0210221. doi: 10.1128/AEM.02102-21.
- Kurkjian, H.; Akbari, M.J.; Momeni, B. 2021. The impact of interactions on invasion and colonization resistance in microbial communities. *PLOS Computational Biology*. 17:e1008643. doi: 10.1371/journal.pcbi.1008643.

THOMAS N. SEYFRIED

Professor

Ph.D., University of Illinois

RESEARCH INTEREST

Cancer as a mitochondrial metabolic disease, ganglioside biochemistry, ketogenic metabolic therapy

SELECTED PUBLICATIONS

- Seyfried, T.N.; Ta, N.L.; Duraj, T.; Lee, D.C.; Kiebish, M.A.; Chinopoulos, C.; Arismendi-Morillo, G. 2024. Could cytoplasmic lipid droplets be linked to inefficient oxidative phosphorylation in cancer? *Current Tissue Microenvironment Reports*. doi: 10.1007/s43152-024-00057-2.
- Seyfried, T.; Arismendi-Morillo, G.; Zuccoli, G.; Lee, D.C.; Duraj, T.; Elsakka, A.M.; Maroon, J.C.; Mukherjee, P.; Ta, L.; Shelton, L.; D'Agostino, D.; Kiebish, M.; Chinopoulos, C. 2022. Metabolic management of microenvironment acidity in glioblastoma. *Frontiers in Oncology*. 12:968351. doi: 10.3389/fonc.2022.968351.
- Seyfried T.N.; Chinopoulos, C. 2021 Can the Mitochondrial Metabolic Theory Explain Better the Origin and Management of Cancer than Can the Somatic Mutation Theory? *Metabolites*. 11(9):572. doi: 10.3390/metabo11090572.

KENNETH C. WILLIAMS

Professor

Ph.D., McGill University

RESEARCH INTERESTS

Central nervous system macrophages, neuroAIDS, AIDS pathogenesis, monocyte/macrophage biology

SELECTED PUBLICATIONS

- Nowlin, B.T.; Wang, J.; Schafer, J.L.; Autissier, P.; Burdo, T.H.; Williams, K.C. 2018. Monocyte subsets exhibit transcriptional plasticity and a shared response to interferon in SIV-infected rhesus macaques. *Journal of Leukocyte Biology*. 103(1):141-55. doi: 10.1002/JLB.4A0217-047R.
- Walker, J.A.; Miller, A.D.; Burdo, T.H.; McGrath, M.S.; Williams, K.C. 2017. Direct Targeting of Macrophages with Methylglyoxal-Bis-Guanylhydrazone Decreases SIV-Associated Cardiovascular Inflammation and Pathology. *Journal of Acquired Immune Deficiency Syndrome*. 4(5):583-92. doi: 10.1097/QAI.0000000000001297.
- Mallard, J.; Papazian, E.; Soulas, C.; Nolan, D.J.; Salemi, M.; Williams, K.C. 2017. A method for obtaining simian immunodeficiency virus RNA sequences from laser capture microdissected and immune captured CD68+ and CD163+ macrophages from frozen tissue sections of bone marrow and brain. *Journal of Immunological Methods*. 442:59-63. doi: 10.1016/j.jim.2017.01.003.

COURSES

The combined and varied interests of the faculty, as indicated in the faculty profiles, ensure that the department offers a wide variety of graduate course electives. While the number and content of the graduate electives vary from year to year, the following list is illustrative of the range of courses offered.

FALL 2024

Contemporary Biological Questions and Critical Analysis I	Department
Experimental Methods and Design in Biology	Meyer and Losick
Graduate Research Experience (Lab Rotation)	By Arrangement
Viruses and Evolutionary Theory	Johnson
Advanced Lab in Cell Imaging	Judson

SPRING 2025

Contemporary Biological Questions and Critical Analysis II	Department
Molecular and Cellular Control Mechanisms	Annunziato
Graduate Research Experience (Lab Rotation)	By Arrangement
Recombinant DNA Technology	Hoffman
Immunity and Infectious Disease	Williams
Viruses, Genes and Evolution	Johnson
Scientific Proposal Writing	Gubbels/Das
Biomolecules	Clote
Advanced Lab in Cell Imaging	Judson

OUTCOMES

Recent Dissertations

Melody A. Autumn, "Thyroid hormone informed patterning and remembered positional identity direct zebrafish fin ray morphology"

Daniel Beringer, "Exploring the RNA-Binding Profiles of Ribosomal Protein S15 Through In Vitro Selection"

Suyen Espinoza Miranda, "Growth dynamics, genetics and disease outcome of Streptococcus pneumoniae biofilms"

Elizabeth C. Gray, "Development and Evaluation of a Fluorescent Activated Droplet Sorting Regulatory Assay for Ribosomal Cis-Regulatory RNAs"

Stephen Hummel, "digitalSELEX: A Novel Oligonucleotide Design Platform"

Stacy Vy Nguyen, "Roles of Thyroid Hormone in Postembryonic Craniofacial Development in Zebrafish and other Danioninae"

Natalie Sandlin, "Aflatoxin detoxification: From identifying degraders and mechanisms to their enhancement"

Bharathi Sundaresh, "Bacterial Multi-omics profiling reveals novel routes to immune evasion and disease outcome: Towards targeted therapeutic strategies"

Recent Placements

ACADEMIC PLACEMENTS

Baylor College of Medicine

Beth Israel Deaconess Medical Center

Boston University School of Medicine

Broad Institute of Harvard and MIT

Cleveland Clinic

Emmanuel College

Emory University School of Medicine

Freie Universität Berlin

Harvard Medical School

Harvard Medical School/Boston Children's Hospital

Icahn School of Medicine at Mount Sinai

Massachusetts General Hospital

Massachusetts Institute of Technology

Oglethorpe University

Stanford University

University of California, San Diego

University of California, San Francisco

University of Chicago

University of Oregon

University of Utah

University of Wisconsin-Madison

Uppsala University

Vanderbilt University

Wheaton College

NON-ACADEMIC PLACEMENTS

Article One Partners

AstraZeneca

BERG Health

Biogen

BIOMILQ

Cell Signaling Technology

Bristol Myers Squibb

Clark + Elbing, LLP

Day Zero Diagnostics

Dovetail Genomics

Excelimmune

Excerpta Medica BV

Facebook

Fenway Community Health

Google

Hamilton Storage Technologies

Human Metabolome Technologies

Illumina

Jackson Laboratories

Maine Medical Center

Momenta Pharmaceuticals

Nektar Therapeutics

New England Biolabs

Novartis

Perkin Elmer

Renovo Neural, Inc

Sanofi/Genzyme

Seven Bridges Genomics

Trinity Partners

MORRISSEY COLLEGE OF ARTS AND SCIENCES

The oldest and largest of the University's eight schools and colleges, the Morrissey College of Arts and Sciences offers graduate programs in the humanities, social sciences, and natural sciences, leading to the degrees of Doctor of Philosophy, Master of Arts, and Master of Science. In addition, numerous dual-degree options are offered in cooperation with the Carroll School of Management, the Boston College Law School, the Lynch School of Education and Human Development, and the School of Social Work.

With approximately 900 graduate students and more than 500 full-time faculty, the Morrissey College of Arts and Sciences is small enough to know you as a person, but large enough to serve you and prepare you for a rewarding life and satisfying career.

Research Facilities

The Department of Biology, located in Higgins Hall, is well-equipped for modern molecular, genomic, and proteomic research, biochemistry, imaging, and bioinformatics.

Departmental genomics infrastructure includes two new Illumina sequencers capable of sequencing over half a billion DNA molecules per day, DNA/RNA and protein quantification instruments, several qRT-PCR systems, 2D gel proteomic analysis, a multi-color analytical FACS, and FACS cell sorter (professionally staffed). Additionally, we possess state-of-the-art cell culture and animal facilities, a liquid handling robot, a Microplate fluorescence reader with robotic stacker, a 3-D printer, various imaging capabilities, including a Typhoon FLA9500 laser scanner, and protein purification systems, including HPLC, FPLC, and preparative isoelectric focusing.

In addition to lab-dedicated microscopes, we offer a professionally staffed imaging facility that includes a Zeiss super-resolution SIM and Airyscan platform, Leica laser scanning confocal microscope, a Nikon spinning disk confocal microscope, a Zeiss Axioplan microscope fit with an ApoTome, and wide-field fluorescence microscopes.

The departmental bioinformatics computing platform consists of a 132 CPU-core cluster. It is available free of charge to faculty, graduate students and other researchers. Additionally, faculty, students and staff have access to the University central computing cluster, and individual laboratories may have their own dedicated computing systems.

Academic Resources

BOSTON AREA CONSORTIUM

The Boston Area Consortium allows graduate students to cross-register for courses at Boston University, Brandeis University, and Tufts University.

BOSTON COLLEGE LIBRARIES

The University is home to eight libraries, containing nearly 3 million volumes; more than 700 manuscript collections, including music, photos, art, and artifacts; 625,000 e-books; and more than 600 electronic databases. O'Neill Library, Boston College's main library, offers subject-specialist librarians to help with research, to set up alerts to publications in areas of interest, and to answer any research- and library-related questions.

THE BOSTON LIBRARY CONSORTIUM

The Boston Library Consortium allows Boston College students access to millions of volumes and other services at 19 area institutions in addition to the world-class resources available through the Boston College Library System.

STUDENT LIFE AND CAMPUS RESOURCES

Boston College is located on the edge of one of the world's most vibrant cities. Just six miles from downtown Boston—an exciting and dynamic place to live and learn—Boston College is an easy car or "T" ride away from a booming center for trade, finance, research, and education.

Home to some of New England's most prestigious cultural landmarks, including the Museum of Fine Arts, the Isabella Stewart Gardner Museum, Boston Symphony Hall, and the Freedom Trail, Boston provides a rich environment for those passionate about art, music, and history. For sports fans, Boston hosts a number of the country's greatest sports teams: the Celtics, Patriots, Bruins, and, of course, Fenway Park's beloved Red Sox. Found within a short drive from Boston are some of New England's best recreational sites, from the excellent skiing in New Hampshire to the pristine beaches of Cape Cod.

Boston also offers a wide range of family friendly attractions, including the Children's Museum, New England Aquarium, Franklin Park Zoo, and the Museum of Science. There are roughly 50 universities located in the Boston area, and the large student population adds to the city's intellectually rich and diverse community. Events, lectures, and reading groups hosted by world-renowned scholars abound on area campuses, providing abundant opportunities to meet and network with other graduate students and faculty throughout the Boston area.

The University

Boston College is a Jesuit university with 15,000 students, 880 full-time faculty, and more than 190,000 active alumni. Since its founding in 1863, the University has known extraordinary growth and change. From its beginnings as a small Jesuit college intended to provide higher education for Boston's largely immigrant Catholic population, Boston College has grown into a national institution of higher learning that is consistently ranked among the top universities in the nation. Boston College is ranked 36th among national universities by *U.S. News & World Report*.

Today, Boston College attracts scholars from all 50 states and over 80 countries, and confers more than 4,300 degrees annually in more than 50 fields through its eight schools and colleges. Its faculty members are committed to both teaching and research and have set new marks for research grants in each of the last 10 years. The University is committed to academic excellence. As part of its most recent strategic plan, Boston College is in the process of adding 100 new faculty positions, expanding faculty and graduate research, increasing student financial aid, and widening opportunities in key undergraduate and graduate programs.

The University is comprised of the following colleges and schools: Morrissey College of Arts and Sciences, Carroll School of Management, Connell School of Nursing, Lynch School of Education and Human Development, Woods College of Advancing Studies, Boston College Law School, School of Social Work, and Clough School of Theology and Ministry.

General Resources

HOUSING

While on-campus housing is not available for graduate students, most choose to live in nearby apartments. The Office of Residential Life maintains an extensive database with available rental listings, roommate,s and helpful local real estate agents. The best time to look for fall semester housing is June through the end of August. For spring semester housing, the best time to look is late November through the beginning of the second semester. Additionally, some graduate students may live on campus as resident assistants. Interested students should contact the Office of Residential Life.

STUDENT LIFE AND CAMPUS RESOURCES

JOHN COURTNEY MURRAY, S.J., GRADUATE STUDENT CENTER

One of only a handful of graduate student centers around the country, the Murray Graduate Student Center is dedicated to the support and enrichment of graduate student life at Boston College. Its primary purpose is to build a sense of community among the entire graduate student population and cultivate a sense of belonging to the University as a whole. Its amenities include study rooms, a computer lab, two smart televisions, kitchen, deck, and patio space, complimentary coffee and tea, and more. Throughout the year, the center hosts programs organized by the Office of Graduate Student Life and graduate student groups. The Murray Graduate Student Center also maintains an active job board (available electronically), listing academic and non-academic opportunities for employment both on and off campus.

MCMULLEN MUSEUM OF ART

Serving as a dynamic educational resource for the national and international community, the McMullen Museum of Art showcases interdisciplinary exhibitions that ask innovative questions and break new ground in the display and scholarship of the works on view. The McMullen regularly offers exhibition-related programs, including musical and theatrical performances, films, gallery talks, symposia, lectures, readings, and receptions that draw students, faculty, alumni, and friends together for stimulating dialogue. Located on the Brighton campus, the McMullen Museum is free to all visitors.

CONNORS FAMILY LEARNING CENTER

Working closely with the Graduate School, the Connors Family Learning Center sponsors seminars, workshops, and discussions for graduate teaching assistants and teaching fellows on strategies for improving teaching effectiveness and student learning. Each fall, the Learning Center and the Graduate School hold a "Fall Teaching Orientation" workshop designed to help students prepare for teaching. The center also hosts ongoing seminars on college teaching, higher learning and academic life; assists graduate students in developing teaching portfolios; and provides class visits and teaching consultations, upon request. Through these and other activities, the Connors Family Learning Center plays an important role in enhancing the quality of academic life at Boston College.

MARGOT CONNELL RECREATION CENTER

The Margot Connell Recreation Center redefines the future of fitness and recreation at Boston College. The 244,000-square-foot, four-story structure offers our community an inspired space to play, pursue sports, gather with friends, and work out. This facility includes a fitness center, rock climbing wall, jogging track, aquatics center, wood-floor basketball courts, tennis courts, multi-activity courts, multi-purpose rooms for spin, yoga, and fitness classes, and so much more.

BOSTON COLLEGE CAREER CENTER

The Boston College Career Center works with graduate students at each step of their career development. Services include self-assessment, career counseling, various career development workshops, resume, and cover letter critiques, and practice interviews. In addition to extensive workshop offerings, Career Center staff members are available throughout the year for one-on-one advising about any aspect of the career path. The Career Resource Library offers a wealth of resources, including books, periodicals, and online databases.

ADMISSION AND FINANCIAL INFORMATION

Admission Requirements

The application deadline for fall admission is December 1. Please visit bc.edu/mcgs for detailed information on how to apply.

Application requirements include:

Application Form:	Submitted online, via the MCGS website.
Application Fee:	$75, non-refundable.
Abstract of Courses Form:	A concise overview of background and related courses completed in an intended field or proposed area of study.
Official Transcripts:	Demonstrating coursework completed/degree conferral from all post-secondary institutions attended.
Three Letters of Recommendation:	From professors or supervisors. It is highly advisable that at least one letter be from an academic source.
Statement of Purpose:	A brief (1-2 page) discussion of an applicant's preparation, motivation, and goals for their proposed course of study.
Proof of English Proficiency: (*international only*)	Official TOEFL/IELTS score reports accepted.

Financial Assistance

DEPARTMENT FUNDING

Full funding is available for qualified Ph.D. students. Students function as either teaching assistants or research assistants and receive a stipend in exchange for their services. In addition, they receive a full-tuition scholarship for all coursework relative to their program of study.

FEDERAL FINANCIAL AID

Graduate students can apply for federal financial aid using the FAFSA. The loans that may be available to graduate students are the Federal Direct Unsubsidized Stafford Loan and Perkins Loan, based on eligibility. If additional funds are needed, student may apply for a Grad Plus Loan. For more information, see the Graduate Financial Aid website at bc.edu/gradaid or contact the Graduate Financial Aid Office at 617-552-3300 or 800-294-0294.

OFFICE FOR SPONSORED PROGRAMS

The Office for Sponsored Programs (OSP) assists both faculty and graduate students in finding sources of external funding for their projects and provides advice in the development of proposals. OSP maintains a reference library of publications from both the public and private sectors listing funding sources for sponsored projects. In the recent past, graduate students have received research support from prominent agencies, corporations and organizations such as the Fulbright Commission, the Guggenheim Foundation, the National Science Foundation, the American Political Science Association, the American Chemical Society, and the American Association of University Women.

BOSTON COLLEGE
Morrissey College of Arts and Sciences

Department of Biology
Higgins Hall 355
140 Commonwealth Avenue
Chestnut Hill, MA 02467
617-552-3540
E-Mail: gradbio@bc.edu
bc.edu/biology