GRADUATE STUDIES
at MDI Biological Laboratory

Improving human health and well-being through basic research, education, and development ventures that transform discoveries into cures.
About the Program

At the MDI Biological Laboratory in Bar Harbor, Maine, Ph.D. students pursue their thesis research in faculty laboratories as a part of the University of Maine Graduate School of Biomedical Science and Engineering (GSBSE). Areas of study include:

**What do we offer?**

- Lab sponsored lunchtime monthly journal club meetings in which graduate students and post-docs hone their peer review skills.
- The option to invite a speaker to campus.
- Participation in one course at no cost while you are here, with the possibility to audit other courses.
- Potential to gain course planning and teaching experience.
- Housing for GSBSE graduate students on rotation.
- World-class research facilities.
- Monthly on-campus seminars and workshops.

mdibl.org/education • 207.288.9880 x 102 • education@mdibl.org
Meet our Faculty

Why do different species have different levels of tissue regeneration capacity?
**Sam Beck, Ph.D., Assistant Professor**
Learning to effectively extract useful information from large and complex datasets holds the potential to dramatically accelerate the pace of scientific discovery. The Beck lab uses computational biology to understand the biology of aging, as well as the biology of cancer stem cells. The lab also studies Hutchinson-Gilford progeria syndrome, a rare, fatal, genetic condition characterized by accelerated aging in children, with the aim of gaining new insight into the genetic mechanisms underlying aging in adults.

How do stress, aging and health interrelate?
**James A. Coffman, Ph.D., Associate Professor**
When individuals experience chronic stress early in their lives, they tend to age more rapidly and develop more illnesses. The Coffman lab investigates the biological mechanisms connecting stress, aging and health, focusing on the stress hormone cortisol. Coffman is also the Principal Investigator of the Maine INBRE (IDeA Network of Biomedical Research Excellence) program.

What can salamanders teach us about regeneration in humans?
**James Godwin, Ph.D., Assistant Professor**
In dramatic contrast to the poor repair outcomes for mammals, salamanders are able to completely regenerate heart tissue, whole limbs and many other tissues at any life stage. This astounding capacity for repair provides a template for understanding the process of natural regeneration and developing strategies to improve human repair. The Godwin lab explores immune cell signals that promote scar-free repair and regeneration.

How can we analyze and manage big biological datasets?
**Joel Graber, Ph.D., Director of Computational Biology and Bioinformatics Core**
The need to extract useful information from data puts bioinformatics at the forefront of scientific discovery. Graber works with scientists at the institution as well as throughout the Maine INBRE network, analyzing complex biological datasets in a rigorous and reproducible way. He also leads the development of the Comparative Models of Regeneration Database (RegenDbase), a novel bioinformatics resource supported by the National Institutes of Health.

How does science make a new kidney?
**Hermann Haller, M.D., President; Professor and Director, Department of Nephrology and Hypertension, Hannover Medical School, Hanover, Germany**
With the aging of the population, chronic kidney failure is a major – and growing – problem. The laboratory of Hermann Haller, M.D., an internationally acclaimed expert in kidney disease, hypertension and renal transplantation, is seeking to understand the molecular mechanisms of kidney regeneration. His lab is using this knowledge to work with stems cells and organoids in the hope of creating new kidneys in humans.
How do wounds heal?
Vicki P. Losick, Ph.D., Assistant Professor
The body typically replaces tissues lost to injury, degenerative disease or aging through cell division, or making more cells. The Losick lab has discovered that healing also occurs through the enlargement of existing cells, opening the way to the identification of new therapeutic agents to promote healing.

How do certain genes help us live longer?
Aric Rogers, Ph.D., Assistant Professor
Activating or suppressing particular genes can lengthen an organism’s lifespan. The Rogers lab studies these genes to determine how they work, with the ultimate goal of finding new therapies that slow aging and prevent or delay age-related degenerative diseases in humans.

How are longevity genes regulated by the ribosome?
Jarod Rollins, Ph.D., Assistant Professor
Ribosomes are the molecular machines responsible for translating our genetic code into functional proteins. The Rollins lab is investigating why the composition of ribosomes change with age and how they regulate the expression of genes necessary for healthy aging.

Some cells never age. What can they teach us?
Dustin Updike, Ph.D., Assistant Professor
Most cells die, but some are ageless – they never lose their ability to divide and reproduce. These cells eventually become sperm and eggs and develop into the next generation of any given organism. The Updike lab is gaining insights into the mechanisms of cancer by studying structures found only in these immortal cells.

Can we learn to repair or replace our damaged tissues?
Voot P. Yin, Ph.D., Assistant Professor
When we suffer a heart attack, our damaged hearts form scar tissue instead of new heart muscle. But many animals can grow new, functional heart muscle and replace damaged limbs and other organs as well. The Yin lab is studying the genetic mechanisms behind regeneration and has identified a potential drug therapy to improve healing in humans.