James B. Flanegan
Department Chair

Linda Bloom
Associate Chair

Jörg Bungert
Graduate Coordinator
BMS/BMB
CGRC-361
352-273-8098
jbungert@ufl.edu

Matthew Merritt
Associate Graduate Coordinator
BMS/BMB
CGRC 392C
352-2948397
matthewmerritt@ufl.edu

http://biochem.med.ufl.edu/

https://biomed.med.ufl.edu/about/biochemistry-and-molecular-biology/
Biochemistry and Molecular Biology Concentration

Undeclared, Declared, and Fast-Track Students

Entering first-year students who are recruited by BMB but who plan to rotate with faculty in both BMB as well as other concentrations, will enroll in the GMS 6001 core course during the Fall semester of their first year. This will allow “undeclared students” to select either a BMB faculty mentor or a mentor in a different concentration after completing their three first-year rotation projects.

Entering first-year students who “declare” BMB as their Advanced Concentration, will have the option of taking a menu of BMB graduate courses instead of GMS 6001 during the Fall semester of their first year. This option will also apply to “declared BMB students” who are committed to work with a specific BMB faculty mentor (e.g., Fast Track students).
## Biochemistry and Molecular Biology Concentration

### First Year

#### Fall – “Undeclared” students
- “Core Course” (GMS 6001) – 5 credits
- Lab Rotation (GMS 6090) – 2 credits
- Essentials of Graduate Research & Professional Development (GMS 6003) – 1 credit
- Journal Club (BCH 6936) – 1 credit

#### Fall – “Declared” BMB students
- Eukaryotic Molecular Biology and Genetics (BCH 5413) – 3 credits
- Graduate Course (Elective) – 3 credits
- Essentials of Graduate Research & Professional Development (GMS 6003) – 1 credit

#### Fall – All BMB Students
- Lab Rotations (GMS 6090) – 1 credit
- Responsible Conduct of Biomedical Research (GMS 7003) – 1 credit
- Journal Club (BCH 6936) – 1 credit

### Spring – All BMB Students
- Advanced Courses – 6 credits
- Lab Rotations (GMS 6090) – 1 credit
- Responsible Conduct of Biomedical Research (GMS 7003) – 1 credit
- Journal Club (BCH 6936) – 1 credit

[https://biomed.med.ufl.edu/about/biochemistry-and-molecular-biology/](https://biomed.med.ufl.edu/about/biochemistry-and-molecular-biology/)
Biochemistry and Molecular Biology Concentration

Requirements After the First Year:

Formal coursework:
1. After completing the courses required in the Fall semester of the first year, a total of 12 credits of graduate courses at the 6000 level and above must be taken.
2. Typically, 6 of those 12 credits are taken in the Spring semester of the first year, and the remaining 6 credits are taken in the second year.
3. At least 4 of the 12 credits must be BMB Advanced Courses (BCH prefix), and at least 3 credits must be from another concentration.

BMB Journal Club (BCH 6936) – 1 credit each Fall and Spring semester
Biochemistry Research Discussion (BCH 6040) – 1 credit each Fall and Spring semester

Qualifying Exam will be taken by November 1st of the third year.

Supervised Research—Successful completion of a Ph.D. degree requires students to carry out an independent research project, write a dissertation describing this work and defend the work in a public presentation.

Supervisory Committee—By the end of the first year, students must form a supervisory committee composed of 5 faculty members including the research mentor who serves as chair of the committee. In addition to the chair/research mentor, the committee must include 2 faculty members from the BMB concentration and an external member from outside the BMB concentration.

Supervisory Committee Meetings – After passing the qualifying exam, students have regular meetings (twice a year) with members of their supervisory committees.
Biochemistry and Molecular Biology Concentration

Three Curriculum Tracks:
1. Metabolism and Metabolomics
2. Molecular Biology
3. Structural Biology

You can design your own course of study by mixing courses from the different tracks
Biochemistry and Molecular Biology Concentration

Metabolism Labs

Dr. Robert Cousins – Zinc metabolism
Dr. Susan Frost – Cancer microenvironment (CA IX)
Dr. Tim Garrett – Clinical applications in mass spectrometry
Dr. Michael Kilberg – Nutrient stress response
Dr. Joanna Long – Membrane structure and function
Dr. Jianrong Lu – Hypoxia and Warburg effect in cancer
Dr. Matthew Merritt – Metabolism, stable isotope tracing, magnetic resonance, and hyperpolarization
Biochemistry and Molecular Biology Concentration

Metabolism Labs
Metabolism Courses offered within the BMB Concentration

**BCH6206** Metabolic Control Analysis, *Fall semester*

**BCH6207** Adv. Metabolism: Role of Membranes in Signal Transduction and Metabolic Control

**BCH6208** Adv. Metabolism: Regulation of Key Reactions in Carbohydrate and Lipid Metabolism

**BCH6209** Adv. Metabolism: Regulation of Key Reactions in Amino Acid and Nucleotide Metabolism

**Others:**

**BCH6107** Biophysical Techniques in Proteomics, *Spring semester*

EM(cryo), Metabolomics etc

**BCH6876** Recent Advances in Membrane Biology Journal Club
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Molecular Biology Labs

Dr. Bert Flanegan – RNA virus replication
Dr. Mingyi Xie – Gene expression regulation by non-coding RNAs; microRNA biogenesis
Dr. Melike Caglayan - Genome integrity, DNA damage repair
Dr. Linda Bloom – DNA replication, DNA damage repair
Dr. Michael Kilberg – Nutrient stress response
Dr. Thomas Yang – Epigenetic alterations in fetal alcohol syndrome
Dr. Susan Frost – Cancer microenvironment (CA IX)
Dr. John Dame - Molecular biology of the malaria parasite
Dr. Jorg Bungert – Transcriptional control of the globin locus
Dr. Kevin Brown – Signaling controlling genome stability
Dr. Michael Kladde - Regulation of transcription by chromatin
Dr. Jianrong Lu – Transcriptional and epigenetic control of EMT
Dr. Michelle Gumz – Circadian clock function (kidney)
Dr. Gregory Schultz – Ocular wound healing
Dr. Jon Licht – Aberrant gene regulation during hematopoiesis
Dr. Brian Cain – Membrane ATPases and endothelin gene regulation
Molecular Biology Courses offered within the BMB Concentration

**BCH5413**  Eukaryotic Molecular Biology and Genetics
**BCH6415**  Advanced Molecular and Cell Biology
**BCH7410**  Advanced Gene Regulation
**BCH7412**  Epigenetics of Human Disease and Development
**BCH7414**  Advanced Chromatin Structure

*Epigenetics Journal Club*
Biochemistry and Molecular Biology Concentration

Structural Biology Labs

Dr. Mavis Agbandje-McKenna – ssDNA viruses

Dr. Linda Bloom – DNA repair/replication

Dr. Mathew Merritt - Metabolism, stable isotope tracing, magnetic resonance, and hyperpolarization

Dr. Joanna Long – Membrane proteins

Dr. Thomas Mareci – Mapping central nervous system

Dr. Robert McKenna – Proteins/enzyme structures

Collaborative studies
Biochemistry and Molecular Biology Concentration
Structural Biology Labs
X-ray, EM, CRYO-EM, NMR, BIC, and National Facilities:
Structural Biology Courses offered within the BMB Concentration

**BCH6740** Structural Biochemistry, *Spring semester*

**BCH6744** Molecular Structure Determination by X-Ray Crystallography

**BCH6741** Magnetic Resonance Imaging in Living Systems

**BCH6745** Molecular Structure and Dynamics by NMR Spectroscopy

Others:

**BCH6749** Numerical Methods in Structural Biology, *Summer semester*

**BCH6107** Biophysical Techniques in Proteomics, *Spring semester*

EM(cryo), Metabolomics etc

Center of Structural Biology Seminar Series

Crystallography and cryo-electron microscopy Journal Club
Courses offered within the BMB Concentration

Biochemistry Journal Club
(Tues 11:45am) – research and current literature – student invited speaker

Faculty Research Presentations
(Wed 4:00pm) – B&MB and invited Faculty

Qualifying exam

Proposal – in the form of an NRSA predoctoral fellowship application (6 pages).

Several of our students have successfully obtained competitive external fellowships (NIH, NSF, AHA and private foundations). Proposal writing course – Dr. Bloom.
Dicer cleaves 5'-extended microRNA precursors originating from RNA polymerase II transcription start sites.
A novel inhibitor of pyruvate dehydrogenase kinase stimulates myocardial carbohydrate oxidation in diet-induced obesity.


Biochemistry and Molecular Biology Concentration

BMB faculty who might take students next year

Linda Bloom, PhD
Professor and Associate Chair

Mechanism of opening a sliding clamp.
Douma, L.G., Yu, K.K., England, J.K., Levitus, M. and
Biochemistry and Molecular Biology Concentration

BMB faculty who might take students next year

Robert McKenna, PhD
Professor

"To Be or Not to Be" Protonated: Atomic Details of Human Carbonic Anhydrase-Clinical Drug Complexes by Neutron Crystallography and Simulation

(March 2018) Structure 26, 383–390
Biochemistry and Molecular Biology Concentration

BMB faculty who might take students next year

Joanna Long, PhD
Professor

Entropic Anomaly Observed in Lipid Polymorphisms Induced by Surfactant Peptide SP-B(1–25)
Tran, N., Kurian, J., Bhatt, A., McKenna, R. and Long, J.R.
Biochemistry and Molecular Biology Concentration

Previous Students

Kristen Solocinski, Post-doctoral Fellow at the National Cancer Institute

Brian Mahon, Post-doctoral Fellow at Princeton University

Shweta Kailasan, Integrated Biotherapeutics
Biochemistry and Molecular Biology Concentration

Previous Students

Farzaneh Tondenevis, Automation Scientist at Advanced Cell Diagnostics-Biotechne

Bala Venkatakrishman
Syngene International Limited, Contract Research Organization
Bangalore, India

Dr. Karen Vieira
CEO of The Med Writers & Make A Supplement

Karen Vieira, CEO of The Med Writers
Alumni Spotlight: Joeva Barrow

“I look forward to the next generation of brilliant scientists the Biochemistry Department will produce in the future.”

This month’s featured alumni is Dr. Joeva Barrow, a 2013 graduate of Dr. Jörg Bungert’s laboratory, who is an assistant professor of Molecular Nutrition and Biochemistry at Cornell University. Her primary responsibilities are to maintain a successful extramurally-funded research program as well as to teach graduate level courses in Nutrition and Biochemistry.

Dr. Barrow’s research program centers around mitochondrial biology with a specific focus on mitochondrial disease and associated metabolic disorders such as obesity. We use unbiased high throughput discovery platforms such as small molecule and genome-wide CRISPR editing screens to identify and characterize novel regulatory factors that can be leveraged towards the treatment of metabolic disease.

Joeva describes her educational experience within the Department of Biochemistry and Molecular Biology at UF as being “paramount to my success. The combination of rigorous coursework, in addition to the advanced laboratory techniques and mentoring that I received from the laboratory of Dr. Jörg Bungert, has shaped me into the scientist that I am today. Ever since receiving the Boyce Research Competition award from the Biochemistry department in 2012, I have strived to achieve the level of excellence that is expected from our Biochemistry alumni. Now many years later, I am still very proud to have come from arguably the best department (!!) in the BMS program.”

Joeva says she lives “happily in Ithaca, New York, with my husband (also a UF alum) and our two children. We miss and think of UF often, especially when it is cold and snowing here! I look forward to the next generation of brilliant scientists the Biochemistry Department will produce in the future.”
Alumni Spotlight: Mayank Aggarwal

Dr. Mayank Aggarwal is a 2013 UF Department of Biochemistry and Molecular Biology graduate of Dr. Rob McKenna’s lab where his primary research focused on the structure-based drug design towards carbonic anhydrase inhibition.

Dr. Aggarwal is currently employed as a product manager and application scientist at Formulatrix, Inc. in Bedford, Massachusetts. Here at Formulatrix, Mayank manages two separate teams, each developing two different software systems, Rock Maker and Rock Imager, which are used in research labs that utilize their company’s protein crystallization automation solutions. Regarding his responsibilities, Mayank states, “My major responsibilities entail collecting customer feedback, prioritizing various new features, defining specific requirements for development by the software engineers, and ensuring their implementation in both software systems. I’ve been releasing at least two newer versions for each of the systems every year. In addition, I also provide online and on-site trainings to customers within and outside the United States.”

Upon graduation in 2013, Mayank received the Shull Fellow award and went to work as an independent scientist at the Oak Ridge National Laboratory in Oak Ridge, Tennessee. In June of 2017, he made the transition from the Oak Ridge National Laboratory to Formulatrix, Inc.

With regards to the impact of the Department’s contribution to preparing Mayank for his career path, he states, “The beauty of the BMB department is not that it helps you achieve your desired path, but it prepares you to achieve whatever you may desire at whichever phase of your life. I say that because most students don’t know what the future holds for them, they just like to go with the flow and take up the usual Ph.D. academic postdoc path, hoping to one day become an assistant professor. But with experience and maturity, as one’s mind becomes more informed, desires change.”
Dr. Aggarwal also says that his career path has taken him from a Ph.D. student to a non-postdoc position of an independent scientist at a national lab (which he ways was amazing and scary at the same time), to a non-research position in industry. He says...

“It wouldn’t be incorrect to say that I had the opportunity to taste different waters. The knowledge and exposure provided by various highly qualified and helpful professors, journal clubs, seminars, and symposiums at the BMB has helped in an enormous way to develop character within me. It’s hard to quantify how much it has helped me, but it is impossible to imagine my present without my past in the BMB.”

Mayank grew up in the city of Delhi, India. He reflects that “I was always a city boy but 10 years of living in small towns in the US changed me completely. Even though it’s been a year since I moved to the Boston area, I’m still not used to the traffic and fast-paced life. My wife, Malvika, and I have a 3.5-year-old son, Parth, and he’s as naughty as a boy of his age could be; however, I’m told he did NOT get this from me.”
Alumni Spotlight: Zoë Fisher

Dr. Zoë Fisher is currently the group leader for the Deuteration and Macromolecular Crystallization (DEMAX) platform at the European Spallation Source (ESS). Since 2016, she has held an adjunct position as Senior Lecturer at Lund University (Department of Biology) and since 2017 has also served as Deputy Division Leader for the Scientific Activities Division at ESS. DEMAX is a user support lab that focuses on chemical and biological deuteration, as well as support for large crystal growth. Prior to ESS Dr. Fisher was a Research Scientist II in the Bioscience Division of Los Alamos National Laboratory. During this time, she served as the instrument scientist and also coordinated the user program for both the Protein Crystallography Station (PCS) instrument and user support labs at Los Alamos National Laboratory. Outside of her core duties related to the ESS, she is also engaged in collaborative research on the structure-function of carbonic anhydrases, biodeuteration strategies, neutron-based drug design, and large crystal growth for neutron studies.

Zoë grew up in South Africa and in 2000 completed her bachelor’s degree in Animal Physiology and Biochemistry at the University of Stellenbosch. At that time she traveled to the US and joined the lab of Prof. Chris West in the Anatomy and Cell Biology Department at UF. Here is how she describes her experience at UF: “It was to be a life changing decision as Prof. West encouraged me to take the GRE and apply for the IPD program at UF. In the first year I rotated through the lab of Prof. Robert McKenna and loved the lab atmosphere and learned a lot about protein structure-function through X-ray crystallography. The course work, lab work, and how the PhD program is structured in the Biochemistry Department taught me critical thinking skills, how to present my own and other’s research, and how to design experiments to answer fundamental questions about how enzymes work.”

“Five years ago my family and I decided to make the giant leap from the USA to Sweden so that I could join the European Spallation Source (ESS). At the heart of the ESS is a multi-country collaboration that is working together to build the world’s brightest neutron source. The ESS is being constructed in Lund, Sweden and will support research in a wide range of scientific areas, from energy materials to drug design. Our DEMAX support lab is an integral part of user support and we provide a range of deuterated materials, from small...
organic molecules to large proteins, and support for large protein crystal growth. Our users come from all over the world from the neutron research areas in chemistry, materials, life sciences, and soft matter.”

Regarding their transition from the USA to Sweden, Zoë states, “life is very different in Sweden than in my native South Africa and adopted home, the USA. I am married to a wonderful and supportive guy and we have a 10-year-old son, Owen. He was only 5 years old when we moved to Sweden and was a real trouper – adapting to a new school system and learning Swedish in a few months. My husband also took the dramatic move in stride and was very fortunate to find an excellent job close to home. We love life in the far north and the proximity to the rest of Europe. We travel a lot and that is probably our biggest hobby! This year we will visited a lot of new (and old) places, including spending the midsummer holiday above the arctic circle in Tromsø, Norway. We will also trek significantly further south and spend both Easter and Christmas in L’Agulhas – the southern tip of the African continent.”

In summary, Dr. Fisher states…

“the experiences and opportunities that UF and the Biochemistry Department gave me have set me up with right training and tools for my current adventure and whatever else life may bring in the future.”
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