

BCMB INDEPENDENT RESEARCH PROJECTS (BCMB 4960R, BCMB 4970R, BCMB 4980R)

Course Description for SPRING and SUMMER, 2024

Overview

All students who major in Biochemistry & Molecular Biology are required to complete **eight credit hours** (typically two semesters) of hands-on, in-person independent research. No previous lab experience is required. This requirement is usually met by enrollment in BCMB 4960R and BCMB 4970R for 4 hrs credit each. For more than eight credits of research, BCMB 4970R can be repeated and/or students can take up to two semesters of BCMB 4980R for a total of five semesters of research. Honors students who have completed at least two semesters of research can complete an Honors Thesis course in a final semester (BCMB 4990R). During all of these courses, students become part of a dynamic research environment, gain experience in conducting scientific research, and learn about the culture of a research laboratory in the biochemical and molecular life sciences. Students in these courses have presented their research at local and national meetings, and many have co-authored research papers published in peer-reviewed scientific literature. ***It is highly recommended that students consider taking these classes in their junior year or earlier. Many faculty welcome students into their labs as early as their first or second year. There is no formal pre-requisite for BCMB 4960R.***

Course objectives

The objectives of these research courses are for students to

- Develop research questions and/or hypotheses;
- Design and conduct appropriate experiments or investigations;
- Analyze and interpret data using appropriate tools and approaches;
- Contextualize the research they are doing within the primary literature and/or databases;
- Present scientific results in an appropriate context and in a variety of ways (e.g., group meetings, final report), including via visual representations of data (figures, graphs, tables), orally and in writing; and
- Develop awareness of the ethical dimensions of science and responsible conduct of research (see academic honesty and research conduct policy below).

Getting Started

How to find a Laboratory: These courses are unusual in that students are expected to find a Faculty mentor whose laboratory they will join. This approach makes it possible for students to choose particular topics and/or mentors for their research experience. A list of BCMB Faculty mentors and their research interests is given below. Prospective students should start by reviewing this list to identify Faculty doing research that is of interest. Then students should contact prospective Faculty mentors to ask about openings for undergraduate researchers and learn more about their research. Students typically choose laboratories based on personal research interests, their knowledge of the Faculty mentor, recommendations from other students, etc. Although it is possible for students to complete the required 8-credits of research in different laboratories, they are usually carried out in the same laboratory.

Laboratories outside of BCMB: Students can complete BCMB 4960R and/or 4970R with Faculty mentors outside of BCMB; a list of non-BCMB mentors is included below. It is also possible to carry out research with Faculty mentors not on that list as long as the research is biochemistry or molecular biology-related and it is pre-approved the prior semester by the BCMB undergraduate committee. To obtain approval, please submit to Dr. Adams (adamsm@uga.edu) a one-paragraph description of the proposed research project along with the name and email address of the Faculty mentor.

When to find a Laboratory: Enrollment in research courses must be arranged at least the semester **prior** to when the student will begin the course. It is never too early to talk to prospective Faculty mentors about their research and about the possibility of doing research with them. It is highly recommended that arrangements are made before the mid-point of the prior semester.

Registration: Permission of the Department is required to register for these courses. **REGISTRATION FORMS** for spring and summer 2024 are provided at the end of this document. The form can also be downloaded from the BMB website (<https://www.bmb.uga.edu/undergraduate-research>) or obtained from the BMB Undergraduate Advisor, Tashia Caughran (tashia.caughran@uga.edu), or from Dr. Adams (adamsm@uga.edu). Students should complete and sign

the form, which should then be signed by the Faculty mentor and submitted to Angie Stockton in the Biochemistry Office either in person (Davison Life Sci., room B122) or by email (angie1@uga.edu); she will provide clearance to register.

Course Information

Time Requirement: BCMB 4960R and BCMB 4970R are taken for 4 hr credit each. Students should expect to be in the laboratory for 12 hr/week (for 15 weeks) in the spring/fall or 24 hr/week (for 7.5 weeks) in the summer. The exact schedule is to be determined by the Faculty mentor and the student. Meeting and research locations are also to be determined by the Faculty mentor.

Examinations and Grades: The final grade is determined by the Faculty mentor. This is based on:

- a) Performance in the research (75%). This does not mean the amount of the data or accuracy of the results! It reflects the aptitude, effort, reliability, teamwork, perseverance, and meticulousness of the student in the research setting.
- b) Written Presentation of Research (25%). Each student must write a **Research Report**, which describes what has been accomplished in the laboratory. The report should resemble a brief scientific paper and be of at least 8 pages in length (double spaced, 1" margins), including figures, tables, and references. The report should be sub-divided into a) Abstract (200-300 words), b) Introduction, c) Experimental Methods, d) Results, e) Discussion, f) Figures, Images, and Tables, and g) References. The rubric for writing the Research Report can be found below.

All undergraduate researchers are expected to submit a research report at the end of each semester. Reports are due by 11:59 pm on the last day of classes: Monday, April 29 (spring) or Wednesday, July 31 (summer). Reports submitted after this deadline will result in a C grade.

The Research Report should be sent by email as a single word.docx or pdf file attachment to Dr. Adams (adamsm@uga.edu), cc'ing the Faculty mentor. See the research report rubric below. In extraordinary circumstances, a short extension of the research report due date may be possible. If such circumstances arise, they should be discussed with the faculty mentor, who then can request the extension from Dr. Adams on behalf of the student.

Academic Honesty, the Honor Code, and Responsible Conduct of Research

As a University of Georgia student, you have agreed to abide by the University's academic honesty policy, "A Culture of Honesty," and the Student Honor Code. All academic work, which includes all of the work done in research, must meet the standards described in "[A Culture of Honesty](http://www.uga.edu/honesty)" found at: www.uga.edu/honesty. Examples of academic dishonesty include but are not limited to plagiarism, unauthorized assistance, lying and tampering with academic work (including lab work), and theft.

Authorized assistance from the Faculty mentor or other research group members includes feedback and light editing of the final paper, but the paper should be written by the student in their own words without the use of artificial intelligence (AI) or word mixing software. AI can be used to generate and refine computer programming code, but students are fully responsible for any AI-generated code used in research. If AI-generated code is used, it should be cited like any other reference material. Students are responsible for verifying the accuracy and attributing the source(s) of all code used during research.

All of the following are examples of academic dishonesty and will be reported:

1. Posting any research work on a public website (Course Hero, Koofers, etc.), through unauthorized electronic media, or in an unauthorized physical space.
2. Copying someone else's work and submitting it as your own.
3. Completing someone else's work for them.
4. Using AI to generate or revise any part of the research paper except for computer code.

The University of Georgia maintains the highest standards of integrity in research. All research must meet the standards described in the university's "[Research Misconduct Policy](https://research.uga.edu/misconduct/)" found at: <https://research.uga.edu/misconduct/>. Examples of research misconduct include, but are not limited to, fabrication, falsification, or plagiarism in proposing, performing, or reviewing research or in reporting research results. Students enrolled in all of the research courses offered by BMB are doing research that must be conducted with the highest ethical standards. Lack of knowledge of the academic honesty or research misconduct policies is not a reasonable explanation for a violation. Please direct any questions to the Faculty mentor or to Dr. Adams (adamsm@uga.edu).

FAQs and OTHER POLICIES

What should you do if you can't make your research hours? You are part of a research group and your active participation is necessary for the group to be successful and for your research to progress. There may be a time you need to prioritize other important things, such as studying for exams or other personal, academic, or professional commitments. If this is the case, please let your Faculty mentor know in advance if possible or as soon as you can, and then make plans with them about how you will make up the missed hours.

What should you do if you miss a meeting? There may be a time you will have to miss a meeting because of an emergency or other professional or educational commitment. If this is the case, please let your Faculty mentor know as soon as you can. Then make plans to catch up on anything you missed.

What is expected student conduct in the laboratory? Laboratories are professional environments, and students are expected to conduct themselves accordingly. This means being prepared before arriving to the laboratory and treating all people in the building with respect. Students are expected to complete all lab safety training required for their specific research setting. You should consult with your Faculty mentor about the appropriate training modules. Students are also expected to follow instruction carefully, for their own safety and the safety of others in the laboratory. This includes taking accurate notes and following procedures as described. Deviations from procedures should be approved by the Faculty mentor or someone they designate before starting.

What if I am having a difficult time with my research or my mentor? If you have significant concerns about how your undergraduate research experience is going, please contact the Biochemistry Advisor, Tashia Caughran (tashia.caughran@uga.edu), or Dr. Adams (adamsm@uga.edu).

Well-being, mental health, and student support

If you or someone you know needs assistance, you are encouraged to contact Student Care & Outreach in the Division of Student Affairs at 706-542-7774 or visit <https://sco.uga.edu/>. They will help you navigate any difficult circumstances you may be facing by connecting you with the appropriate resources or services. UGA has several resources to support your well-being and mental health: <https://well-being.uga.edu/>

Counseling and Psychiatric Services (CAPS) is your go-to, on-campus resource for emotional, social and behavioral-health support: <https://caps.uga.edu/>, TAO Online Support (<https://caps.uga.edu/tao/>), 24/7 support at 706-542-2273. For crisis support: <https://healthcenter.uga.edu/emergencies/>.

The University Health Center offers FREE workshops, classes, mentoring and health coaching led by licensed clinicians or health educators: <https://healthcenter.uga.edu/bewelluga/>

Disability Accommodations

Accommodations are available for students who have a disability. The Disability Resource Center in the Division of Student Affairs (<https://drc.uga.edu/>; 114 Clark Howell Hall; 706-542-8719 voice; 706-542-7719 fax; 706-542-8778 tty) coordinates accommodations and services for students with disabilities. Please let your Faculty mentor know of any accommodations you need to be successful in collaborating on and contributing to our research.

(11/20/23)

Rubric for Research Performance (75% of overall grade)

This rubric will be used by your faculty mentor to evaluate your engagement in research. This rubric is holistic, meaning that all of the criteria will be considered together to generate a final grade. How faculty mentors used the rubric will depend on students' experience level. For example, a first-semester student likely would not exceed expectation in all areas, but a second or third should be able to. We encourage you to refer to it as you do your research this semester and periodically ask your mentor for feedback on how to improve.

| | | | |
|---|------------------------------|------------------------|--------------------------|
| Aptitude: Able to perform general research procedures, experiments, and/or investigations. | | | |
| 1 – Does not meet expectations | 2 – Approaching expectations | 3 – Meets expectations | 4 – Exceeds expectations |
| Effort: Plans ahead, makes effective use of time, asks for guidance when needed, works independently when appropriate. | | | |
| 1 – Does not meet expectations | 2 – Approaching expectations | 3 – Meets expectations | 4 – Exceeds expectations |
| Reliability: Conducts research skills and work consistently, follows basic safety and research group rules, is punctual. | | | |
| 1 – Does not meet expectations | 2 – Approaching expectations | 3 – Meets expectations | 4 – Exceeds expectations |
| Teamwork: Communicates effectively works well with others, contributes to the functioning of the group by being a good lab citizen (e.g., helps with common laboratory duties). | | | |
| 1 – Does not meet expectations | 2 – Approaching expectations | 3 – Meets expectations | 4 – Exceeds expectations |
| Perseverance: Able to work through research challenges, including troubleshooting and problem solving. | | | |
| 1 – Does not meet expectations | 2 – Approaching expectations | 3 – Meets expectations | 4 – Exceeds expectations |
| Meticulousness: Keeps clear and replicable records of work (e.g., accurate and current lab notebook, annotated computer code), cleans up after self, keeps work space organized. | | | |
| 1 – Does not meet expectations | 2 – Approaching expectations | 3 – Meets expectations | 4 – Exceeds expectations |
| Comments: | | | |

Rubric for BCMB 4960R/4970R/4980R Research Reports (25% of overall grade)

This rubric will be used by your faculty mentor to evaluate your research report. This rubric is holistic, meaning that all of the criteria will be considered together to generate a final grade. We encourage you to refer to it as you do your research this semester, especially while you are writing and revising your paper.

| Criteria | Definition |
|---|--|
| Abstract | The abstract gives a short summary of the paper, including elements of all of the other sections. What is the gist of the paper, its major supporting evidence, and its conclusions? |
| Introduction | |
| Context | Demonstrates a clear understanding of the big picture; Why is this question important/interesting in the field of biochemistry and molecular biology? |
| Accuracy | Content knowledge is accurate, relevant and provides appropriate background including defining critical terms. |
| Hypotheses / Research Directions | |
| Testable | For hypothesis-driven research, hypotheses are clearly stated, testable and consider plausible alternative explanations. |
| Scientific Merit | The hypotheses or research directions are novel, insightful, and have the potential to contribute useful knowledge to the field. |
| Methods | |
| Controls and replication | Appropriate controls (including appropriate replication) are present and explained. |
| Study design | The study design is likely to produce salient and fruitful results (actually tests the hypotheses posed and/or directly addresses the research direction). |
| Results | |
| Data selection | Data chosen are comprehensive, accurate and relevant. |
| Data presentation | Data are summarized in a logical format. Table or graph types are appropriate. Data are properly labelled including units. Graph axes are appropriately labelled and scaled and captions are informative and complete. |
| Statistical analysis | Any statistical analysis is appropriate for hypotheses tested and appears correctly performed and interpreted with relevant values reported and explained. |
| Discussion | |
| Conclusions based on data | Conclusion is clearly and logically drawn from data provided. A logical chain of reasoning from hypothesis to data to conclusions is clearly and persuasively explained. Conflicting data, if present, are adequately addressed. |
| Alternative explanations | Alternative explanations (hypotheses) are considered and clearly eliminated by data in a persuasive discussion. |
| Limitations of design | Limitations of the data and/or study design and corresponding implications for data interpretation are discussed. |
| Significance of research | Paper gives a clear indication of the significance and direction of the research in the future. |
| Primary literature | Writer provides a relevant and reasonably complete discussion of how this research project relates to others' work in the field (scientific context provided) using primary literature. |
| Writing quality | Grammar, word usage, and organization facilitate the reader's understanding of the paper. |

Adapted from the Rubric for Science Writing, Timmerman, Strickland, Johnson, & Payne. (2011) Development of a 'Universal' Rubric for Assessing Undergraduates' Scientific Reasoning Skills Using Scientific Writing. *Assessment & Evaluation in Higher Education* 36, 509–47. <https://doi.org/10.1080/02602930903540991>.

**BMB FACULTY MENTORS FOR INDEPENDENT RESEARCH PROJECTS
(BCMB 4960R, BCMB 4970R, BCMB 4980R)**

Potential Projects for SPRING and SUMMER, 2024

Dr. Michael W.W. Adams (Life Sciences, Rm. B218. Tel: 706-542-2060. adamsm@uga.edu). 1. Physiology, metabolism and enzymology of microorganisms growing near 100°C from marine volcanic vents. 2. Microbial metabolic engineering for conversion of plant biomass to biofuels at extreme temperatures. 3. Characterization of human gut microbes that utilize the metal tungsten. All three projects involve biochemical, genetic and genomic based approaches

Dr. Tessa Andrews (Life Sciences, Rm C208A, Tel: 706-542-3340, tandrews@uga.edu) 1. Teacher expertise for active-learning instruction in large undergraduate courses; 2. Sources of support and barriers to investing in improving teaching among college science faculty; 3. How beliefs, attitudes, and identity shape college teachers. Research methods include interviews, surveys, video analysis and classroom observation.

Dr. Adam Barb (Life Sciences, Rm. B302A, abarb@uga.edu). 1) Linking structure and function in immune system glycoproteins 2) Characterizing the composition of immune receptors from primary human tissue.

Dr. Timothy Bolger (Life Sciences, Rm. A108B, tbolger@uga.edu). 1. Identifying interactions between the protein synthesis machinery and other cellular processes during stress conditions. 2. Exploring mechanisms of translation regulation. 3. Examining aberrant functioning of an RNA helicase in medulloblastoma.

Dr. Maor Bar-Peled (Complex Carbohydrate Research Center, 315 Riverbend Road; Tel: 706 542-4496. peled@ccrc.uga.edu). 1. Characterization of recombinant enzymes that control synthesis of glycan in plant and human fungal pathogens and in pathogenic bacteria that impact animals. 2. Molecular mechanism for localization of membrane bound proteins to ER and Golgi. 3. Analyses of mutants affecting polysaccharide synthesis in fungi and in bacteria, 4. Study of biofilm formation and bacteria colonization.

Dr. Belen Cassera (Life Sciences, Rm. A220A, maria.cassera@uga.edu). 1. Characterization of isoprenoid biosynthesis (metabolites and proteins) in eukaryotic pathogens. 2. Antimalarial drug discovery from natural products and synthetic sources.

Dr. Erin Dolan (Life Sciences, B210B. Tel: 540-250-3073. eldolan@uga.edu) 1. Undergraduate access to research experiences. 2. How research training environments influence students' academic and career decisions. Research methods include surveys, classroom observations, interviews, focus groups, and qualitative content analysis as well as statistical analyses such as linear regression and multi-level modeling. Accepts students enrolled in BCMB 4965R in addition to 4960R/4970R.

Dr. Diana M. Downs (361A Biological Sciences, 706-542-9573. dmdowns@uga.edu). 1. Biochemical and genetic analysis of metabolic integration in bacteria. 2. Enzyme purification and analysis.

Dr. Art Edison (Complex Carbohydrate Research Center, 315 Riverbend Road, Rm. 1040, aedison@uga.edu). 1. NMR metabolomics applications, metabolomics technology development, NMR probe development. 2. Nematode chemical ecology, *Caenorhabditis elegans* metabolomics and chemical signaling, *C. elegans* systems biology. Accepts students enrolled in BCMB 4965R in addition to 4960R/4970R.

Dr. Kosuke Funato (Center for Molecular Medicine, 325 Riverbend Rd., Rm 2210 Tel: 706-542-0814. kosuke.funato@uga.edu). 1. Modeling malignant brain tumors using human pluripotent stem cells. 2. Developing tailor-made therapies for malignant brain tumors. 3. Dissecting the role of human specific genes in malignant brain tumors.

Dr. David J. Garfinkel (Life Sciences, Rm. A130. Tel: 706 542-9403. djgarf@uga.edu). 1. Understanding the mechanism of Ty1 retrotransposon copy number control in *Saccharomyces cerevisiae* and closely related species. 2. Understanding the variation and evolution of Ty1 copy number control. 3. Generating and characterizing Ty1 elimination strains using Cas9 editing.

Dr. Robert S. Haltiwanger (Complex Carbohydrate Research Center, 315 Riverbend Road, Tel: 706 542-4151, rhalti@uga.edu). 1. Regulation of the Notch signaling pathway by glycosylation. 2. Effects of glycosylation on protein

folding. 3. Involvement of glycosylation in development and disease.

Dr. Gerald W. Hart (Complex Carbohydrate Research Center, 315 Riverbend Road, Rm. 3034, Tel: 706-583-5550. gerald.hart@uga.edu). 1. Nutrient Regulation of Signaling & Transcription. 2. O-GlcNAc & diabetes. 3. O-GlcNAc & Alzheimer's disease. 4. O-GlcNAc regulation of RNA Polymerase II. 5. O-GlcNAc regulation of translation.

Dr. Natalia Ivanova (Center for Molecular Medicine, Rm. 1212, Tel: 706-542-6052, natalia.ivanova@uga.edu) (1) Non-canonical Polycomb repressive complexes as regulators of cell fate, (2) Metabolic control of transcription in development and disease, (3) Development and application of computational approaches for analyzing single-cell RNA sequencing data.

Dr. Natarajan Kannan (Life Sciences, A318. Tel: 706 542-7326. nkannan@uga.edu). 1. Cell signaling and kinase-substrate interactions in normal and disease states. 2. Cancer genomics and bioinformatics. 3. Glycoinformatics and proteomics.

Dr. Eileen J. Kennedy (Pharmacy South, Rm 342. Tel: 706 542-6497. ekennedy@rx.uga.edu). Chemical biology projects focusing on kinase signal transduction and regulation in breast, prostate, and lung cancer.

Dr. Natalie Krahn (Life Sciences, Rm. A128B, Tel: 706-542-2375, natalie.krahn@uga.edu). 1. tRNA engineering to develop translational machinery for selenocysteine insertion 2. Overexpression of novel selenoproteins in bacteria with industrial applications. 3. Natural selenoprotein production in bacteria to understand their biological function.

Dr. William N. Lanzilotta (Life Sciences, A130. Tel: 706 542-1573. wlanzilo@bmb.uga.edu). 1. Structure/function investigation into the mechanism of heme uptake and transport by enteric pathogens. 2. The role of iron-sulfur clusters in radical chemistry: biochemical and structural analysis of the 1,3-propanediol pathway from *Clostridium acetobutylicum*.

Dr. Paula Lemons (Life Sciences, Rm. C116. Tel: 706 542-9616. plemons@uga.edu). (1) Undergraduate problem solving about biochemistry, particularly in the area of molecular structure and function and metabolic pathway dynamics and regulation; (2) College science faculty teaching attitudes and practices and how to support faculty through professional development. Data collection methods include tests, interviews, classroom observations, focus groups. Data analysis methods include qualitative content analysis and statistics.

Dr. Amy E. Medlock (Coverdell Building. Tel: 706 542-7843. medlock@uga.edu) . 1. Heme synthesis and intracellular trafficking. 2. Organismal heme homeostasis.

Dr. Debra Mohnen (Complex Carbohydrate Research Center, 315 Riverbend Road. Tel: 706 542-4458. dmohnen@ccrc.uga.edu). 1. Characterization of glycosyltransferases involved in pectin biosynthesis, a plant cell wall polysaccharide required for plant growth with beneficial effects on human health and importance in the food, biofuel, agricultural and materials industries. 2. Structure/function relationships and mechanisms of biosynthesis of cell wall matrix polysaccharides and novel cell wall proteoglycans/polymers with emphasis on the *GAUT1*-related gene family. 3. Modification of plants to improve plant growth and cell wall polymer synthesis, to enhance biomass for biofuel, biopolymer and materials production, and to provide a knowledgebase for sustainable development.

Dr. Kelley Moremen (Complex Carbohydrate Research Center, 315 Riverbend Rd., Rm 3055; Tel: 706 542-1705. moremen@uga.edu). 1. Expression and characterization of mammalian enzymes and lectins involved in glycoprotein biosynthesis and degradation. 2. Structure-function studies on glycoprotein processing enzymes. 3. Transcript analysis and gene regulation of glycan-related genes.

Dr. Artur Muszynski (Complex Carbohydrate Research Center, 315 Riverbend Rd, Rm 2029; Tel: 706 542-4479. muszynski@ccrc.uga.edu). Structure of lipopolysaccharides, glycolipids and cell surface polysaccharides of human pathogenic and plant symbiotic bacteria and their biological role in host interaction. a) introduction to cultivation of bacteria and basic microbial techniques in glycobiology; b) techniques for characterization of microbial polysaccharides and glycolipids including extraction of biologically significant microbial cell polysaccharides and lipids, methods of purification, size exclusion, liquid and gas chromatography, glycosyl and fatty acid composition, gel electrophoresis, mass spectroscopy and spectrometry, colorimetry.

Dr. Ron Orlando (Complex Carbohydrate Research Center, 315 Riverbend Road. Tel: 706 542-4429. orlando@ccrc.uga.edu). 1. Proteomics. 2. Mass Spectrometry. 3. Identifying post-translational modifications on proteins

Dr. Robert Phillips (Chemistry, Room 313. Tel: 706 542-1996. rsphillips@chem.uga.edu). 1. Isolation of wild-type and mutant enzymes and comparison of kinetic properties, and site-directed mutagenesis to prepare new mutant enzymes.

Dr. John Rose (Life Sciences, Rm. B204B. Tel: 706 542-1750. rose@bcl4.bmb.uga.edu). Structural biology, structure function studies of the augments of liver regeneration and its cellular partners; structure function studies of the oxytocin receptor; structure function studies of HIV/host protein complexes; soft x-ray phasing of macromolecular structures

Dr. Robert Sabatini (Life Sciences, Rm A128B. Tel: 706 542-9806. rsabatini@bmb.uga.edu). 1. Characterization of enzymes involved in the glucosylation of telomeric DNA in kinetoplastids. 2. Investigate the biological role of DNA glucosylation in telomeric gene expression/recombination in African trypanosomes.

Dr. Walter K. Schmidt (Life Sciences, Rm. A416. Tel : 706 583-8241. wschmidt@bmb.uga.edu). Characterization of Rce1p, a regulatory protease in cellular transformation/cancer and of Ste23p, the yeast ortholog of a protease involved in Alzheimer's.

Dr. Michael Terns (Life Sciences, Rm. A326. Tel: 706 542-1896. mterns@uga.edu). CRISPR-based prokaryotic immune systems, host-viral interactions and development of biotechnological tools.

Dr. Michael Tiemeyer (Complex Carbohydrate Research Center, 315 Riverbend Road, 706 542-2740, mtiemeyer@ccrc.uga.edu) 1. Structure and function of carbohydrates that direct cell-cell interactions during nervous system development in Drosophila. 2. Genetic control of tissue-specific glycan expression, 3. Comparative glycomics and proteomics of model organisms.

Dr. Breeanna Urbanowicz (Complex Carbohydrate Research Center, 315 Riverbend Road, Rm. 2029. Tel: 706 542 4479. breeanna@uga.edu). 1) Structure and function of carbohydrate active enzymes. 2) Production of renewable, biobased plastics from plant biomass. 3) Developing tools for pectin analysis.

Dr. Ian Wallace (Complex Carbohydrate Research Center, 315 Riverbend Road, Rm. 2063. Tel: 706-542-7146, ian.wallace@uga.edu). 1) Regulation of plant cell wall synthesis and deposition, 2) understanding the cell-cell communication and cell adhesion events underlying pollen-pistil interactions, 3) new antifungal discovery.

Dr. Ryan Weiss (Complex Carbohydrate Research Center, 315 Riverbend Road, Rm. 3005. Tel: 706 542 6445. ryan.weiss@uga.edu). 1) Investigating the regulatory mechanisms of glycosylation using functional genomics. 2) Epigenetic and transcriptional regulation of glycosaminoglycan biosynthesis. 3) Drug discovery for rare human genetic disorders.

Dr. Lance Wells (Complex Carbohydrate Research Center, 315 Riverbend Road, Rm 3018, Tel: 706 542 7806) 1. Role of glycoproteins/glycoenzymes in Congenital Muscular Dystrophy, 2. Role of Intracellular protein O-glycans in X-linked intellectual disability. 3. N-linked glycosylation synthesis and role in viral entry.

Dr. Chris West (Life Sciences, Rm. A310. Tel: 706 542-8486/4259. westcm@uga.edu). 1. Cellular mechanisms of O₂ sensing in protists including the social amoeba Dictyostelium and the agent for human toxoplasmosis Toxoplasma gondii. 2. Structural biology of E3(SCF)ubiquitin ligase complexes. 3. Glycogene editing in eukaryotic pathogens Trypanosoma cruzi and Toxoplasma gondii. 4. Structure/function studies on non-heme dioxygenases and glycosyltransferases.

Dr. Zachary Wood (Life Sciences, RM A428, Tel: 706 583-0304, zac@bmb.uga.edu). 1. Structural and biochemical studies of enzymes involved in nucleotide sugar metabolism. 2. Allosteric control of enzyme activity.

Dr. Robert J. Woods (Complex Carbohydrate Research Center, 220 Riverbend Road, 706 542-4454. rwoods@ccrc.uga.edu). Molecular simulations of proteins and carbohydrate-protein complexes of immunological relevance.

Dr. Hang Yin (Complex Carbohydrate Research Center, 220 Riverbend Road, Rm. 2058, Tel: 706 583-0655.

hyin@uga.edu). 1. Muscle stem cell biology, the self-renewal, differentiation and lineage determination of skeletal muscle stem cells and applications in curing muscle atrophy and sarcopenia. 2. Biology of brown adipose tissue, determination of adipose stem/progenitor cells, regulation of adipose functions and applications in preventing disease. 3. Metabolic controls of stem cell and cancer cell behaviors.

Dr. Nadja Zeltner (Center for Molecular Medicine, Riverbend Road, Room 2212, nadja.zeltner@uga.edu). 1. Generation of various cell types of the peripheral nervous system from human pluripotent stem cells. 2. Disease modeling of Familial Dysautonomia. 3. Generation of adrenal gland tissues from human pluripotent stem cells. Accepts students enrolled in BCMB 4965R in addition to 4960R/4970R.

Dr. Shaying Zhao (Life Sciences, Rm. B316. Tel: 706 542-9147. szhao@bmb.uga.edu). 1. Microsatellite instability detection in cancer samples. 2. Gene expression alternation in cancer development and progression. 3. Gene expression alternation due to genomic rearrangements during evolution.

(11/20/23)

NON-BMB FACULTY MENTORS FOR INDEPENDENT RESEARCH PROJECTS

(BCMB 4960R, BCMB 4970R, BCMB 4980R)

Potential Mentors for SPRING and SUMMER, 2024

The following faculty members are outside of the Department of Biochemistry & Molecular Biology but have served as mentors for BCMB 4960R courses in the past. Please see their respective laboratory or Departmental web sites for further information on their research. For these faculty members, pre-approval of proposed research projects is NOT required.

| Faculty Member | Email | Department/College |
|------------------------|---------------------|--------------------------------------|
| Honxiang Liu | lhx@uga.edu | Animal & Dairy Science |
| John Peroni | jperoni@uga.edu | Animal & Dairy Science |
| Lohitash Karumbaiah | lohitash@uga.edu | Animal & Dairy Science |
| Edward Kipreos | ekipreos@uga.edu | Cellular Biology |
| Vasant Muralidharan | vasant@uga.edu | Cellular Biology |
| Ramaraja Ramasamy | rama@uga.edu | Chemistry |
| Richard Morrison | rwm@uga.edu | Chemistry |
| Vladimir Popik | vpopik@uga.edu | Chemistry |
| Eric Freeman | ecfreema@uga.edu | Engineering |
| Hitesh Handa | hhanda@uga.edu | Engineering |
| Kerry Oliver | kmoliver@uga.edu | Entomology |
| Charles Easley | cae25@uga.edu | Environmental Health Science |
| Derek Dee | ddee@uga.edu | Food Science |
| Chung-Jui Tsai | cjtsai@uga.edu | Genetics |
| Jessica Kissinger | jkissing@uga.edu | Genetics |
| Jill Anderson | jta24@uga.edu | Genetics |
| Jonathan Eggenschwiler | jeggensc@uga.edu | Genetics |
| Sidney Kushner | skushner@uga.edu | Genetics |
| Anish Malladi | malladi@uga.edu | Horticulture |
| David Peterson | dspete@uga.edu | Infectious Disease |
| Donald Harn | dharn@uga.edu | Infectious Disease |
| Melinda Brindley | mbrindle@uga.edu | Infectious Disease |
| Ralph Tripp | ratripp@uga.edu | Infectious Disease |
| Mandy Joye | mjoye@uga.edu | Marine Sciences |
| Ellen Neidle | eneidle@uga.edu | Microbiology |
| Mike Adang | adang@uga.edu | Microbiology |
| Vincent Starai | vjstarai@uga.edu | Microbiology |
| Brian Cummings | bsc@rx.uga.edu | Pharmaceutical & Biomedical Sciences |
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| Faculty Member | Email | Department/College |
|-----------------------|-----------------|---------------------------|
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| Jesse Shank | jschank@uga.edu | Veterinary Medicine |
| Kyrstoff Czaja | czajak@uga.edu | Veterinary Medicine |
| Naola Ferguson-Noel | naolaf@uga.edu | Veterinary Medicine |
| Balázs Rada | radab@uga.edu | Veterinary Medicine |
| Jaroslava Halper | jhalper@uga.edu | Veterinary Medicine |
| Sheba MohanKumar | shebank@uga.edu | Veterinary Medicine |

(11/20/23)

BCMB INDEPENDENT RESEARCH
(BCMB 4960R, BCMB 4970R, BCMB 4980R)

REGISTRATION FORM FOR SPRING 2024

NAME: _____

ADDRESS: _____

TEL. NUM. _____ UGA ID: _____

E-MAIL: _____

COURSE (circle one): BCMB 4960R BCMB 4970R BCMB 4980R

CREDIT HOURS: 4 (these courses can only be taken for 4 hr credit)

NAME OF PROFESSOR _____

SIGNATURE OF PROFESSOR _____

Date: _____

SIGNATURE OF STUDENT _____

Date: _____

PROVIDE COMPLETED COPIES OF THIS FORM (prior to Monday, January 8th) TO:

- Your professor/faculty mentor
- Angie Stockton in the Biochemistry Office, either in person (Davison Life Sciences, room B122) or by email (angie1@uga.edu). You will then be cleared to register.

NOTE: By 11:59 pm on the last day of classes, Monday, April 29th:

Please send your complete Research Report by email to Dr. Adams (adamsm@uga.edu)

Send the Report as an email attachment as a single word.docx or pdf file

(11/20/23)

BCMB INDEPENDENT RESEARCH
(BCMB 4960R, BCMB 4970R, BCMB 4980R)

REGISTRATION FORM FOR SUMMER 2024

NAME: _____

ADDRESS: _____

TEL. NUM. _____ UGA ID: _____

E-MAIL: _____

COURSE (circle one): BCMB 4960R BCMB 4970R BCMB 4980R

CREDIT HOURS: 4 (these courses can only be taken for 4 hr credit)

NAME OF PROFESSOR _____

SIGNATURE OF PROFESSOR _____

Date: _____

SIGNATURE OF STUDENT _____

Date: _____

PROVIDE COMPLETED COPIES OF THIS FORM (prior to Thursday, June 6th) TO:

- Your professor/faculty mentor
- Angie Stockton in the Biochemistry Office, either in person (Davison Life Sciences, room B122) or by email (angie1@uga.edu). You will then be cleared to register.

NOTE: By 11:59 pm on the last day of classes, Wednesday, July 31st:

Please send your complete Research Report by email to Dr. Adams (adamsm@uga.edu)

Send the Report as an email attachment as a single word.docx or pdf file

(11/20/23)

BCMB TEAM-BASED RESEARCH
(BCMB 4965R)

NAME: _____

ADDRESS: _____

TEL. NUM. _____ UGA ID: _____

E-MAIL: _____

COURSE (circle one): BCMB 4965 – 1 credit (3 hrs/wk) BCMB 4965 – 2 credits (6 hrs/wk)

NAME OF PROFESSOR _____

SIGNATURE OF PROFESSOR _____

Date: _____

SIGNATURE OF STUDENT _____

Date: _____

Please complete the top part of this form and then email it to the Faculty mentor leading your team, who can then sign the form and forward it to Ms. Angie Stockton in the Biochemistry office, who will register you.

NOTE: By 11:59 pm on the last day of classes for the term:

Students who complete the 8-credit research requirement for BCMB by completing 4965R are expected to submit the BCMB Research Report by email to Dr. Adams (adamsm@uga.edu) after completing 4 credits and 8 credits.

Send the Report as an email attachment as a single word.docx or pdf file

(11/20/23)