Microbiology and Cell Science PhD Program

Meet Dr. Eric Triplett

Chair
Department of Microbiology and Cell Science

ewt@ufl.edu

Graduate Studies Coordinator
Academic Advisor II

Graduate Studies Coordinator
Academic Advisor II

tromeo@ufl.edu
jlee9@ufl.edu

Benefits of the program

• $30,000 – $40,000 annual stipend plus tuition waiver
• Health insurance
• Opportunity to teach
• Opportunity to rotate in three labs with a variety of topics to find the best fit for you
• Opportunity to join research stations throughout Florida (Gainesville, Kennedy Space Center, Lake Alfred, Fort Lauderdale)

How To Apply

• Apply at https://www.applyweb.com/uflgrad/index.ftl
• The following materials are required:
  – Transcripts
  – Personal Statement
  – CV or resume
  – Three letters of recommendation

What happens after I Apply?

• We will review all applications after the December 15 deadline
• Top applicants will be invited to interview in early January
• We will host a virtual campus visit in February
• Decisions are sent out in March
• Students have until April 15 to give us their decision
First year in the Program

- Annual Graduate Research Symposium
- Three rotations in the first semester
- Teaching
- Coursework

Example of the first semester

- MCB6930 –Seminar –(1 credit)
- MCB7922 –Journal Colloquy –(1 credit)
- BSC6459 –Fundamentals in Bioinformatics –(3 credits)
- MCB6317 –Molecular Biology of Gene Expression –(1 credit)
- MCB6417 –Microbial Metabolism and Energetics –(1 credit)
- MCB6940 –Supervised Teaching –(1 credit): Teaching MCB 2000L, 3020L, or 3023L
- MCB6905 –Experimental Microbiology –(1 credits): Three rotations through approved faculty labs: 5 or 6-weeks per rotation

Other required classes

- BCH6740 –Structural Biochemistry –(3 credits)
- MCB6355 –Microbial/Host Defense –(1 credit)
- MCB6457 –Metabolic Regulation –(1 credit)
- MCB6318 –Comparative Microbial Genomics –(2 credit)
- MCB6772 –Advanced Topics in Cell Biology –(1 credit)
- MCB6940 –Supervised Teaching –(1 credit): Teaching MCB 2000L, 3020L, or 3023L
- MCB 7979 –Advanced Research

Meet our faculty

- Functional genomics, Bioinformatics, AI: Conesa, de Crecy, Kolaczkowski
- Host Microbe interactions: Czyz, Edelmann, Gonzalez, Lorca, Triplett, Larkin
- Microbial physiology and Biochemistry: Maupin-Furlow, Romeo, Reich
- Environmental Microbiology: Christner, Martens-Habbema, Stingl
- Host pathogen interactions: Keyhani, Kima, Rice
- Virology: Doore, Jones
- Plant biology: Mou, Gurley, Vermerris, Wang
- Astrobiology: Nicholson, Foster

Meet our faculty

**Functional genomics, Bioinformatics, AI**

Ana Conesa
University of Florida Genetics Institute

Integration of multi-omics data and Systems Biology
- Developing algorithms and software tools to integrate multiple types of sequencing and omics data, such as RNA-seq, ChIP-seq, Methyl-seq, and metabolomics to create & visualize systems biology models
- Using third-generation long reads technologies to analyze alternative splicing and the complexity of transcriptomes
- Understanding the metabolic control of chromatin state and gene expression and its relationship to disease, i.e. obesity
- Using single-cell genomics technologies to understand cell differentiation and development

aconesa@ufl.edu
Valerie de Crecy-Lagard  
University of Florida Microbiology and Cell Science

Utilizing the power of microbial genetics to make efficient use of currently available genomic information
Combining comparative genomics approaches with experimental verification to identify novel enzymes, pathways, and chemistries
Currently Investigating:
• The study of RNA modification genes and functions
• The discovery of novel DNA modifications,
• The study of B vitamin related enzymes
• The exploration of novel enzymes in the field of metabolite repair

vcrecy@ufl.edu
https://bryanksci.me

Meet our faculty

Host Microbe interactions

Bryan Kolaczkowski  
University of Florida Microbiology and Cell Science

Research Themes:  
evolution  
computational biology  
artificial intelligence

https://bryanksci.me  
own your research. challenge yourself. in-person and virtual training programs available

Mariola J. Edelmann  
University of Florida Microbiology and Cell Science

I specialize in the function of exosomes in infectious diseases and exosome-based therapies. I also investigate the host-pathogen interactions and host-directed therapies against bacterial infections. I have an interest in omics technologies, immunology, host-pathogen interactions and cell biology.
Currently Investigating:
• Function of exosomes in the innate and adaptive immune responses to bacterial infections
• Host-directed therapies against multi-drug resistant bacteria
• Exosome-based therapeutics for neuroinflammatory diseases
• Function of eicosanoids and endocannabinoids in inflammatory conditions associated with infections
medelmann@ufl.edu

Daniel Czyz  
University of Florida Microbiology and Cell Science

We utilize C. elegans as a model to study the effect of the human microbiome on protein conformational diseases
We are employing non-traditional approaches to combat antimicrobial resistance

Protein conformational diseases:
• Deciphering the effect of bacteria on host proteostasis
• Identifying bacterial genes that influence host proteostasis
Antimicrobial resistance:
• Host-targeted approaches: modulators of host-mediated bacterial uptake and killing
• Bacteria-targeted: bacteriophages and efflux pump inhibitors
dczyz@ufl.edu

Claudio F Gonzalez  
University of Florida Genetics Institute

• Assessment of molecular strategies mediating host bacteria interactions.
• Discovering new mechanisms facilitating host specific responses to bacterial lipids.
• Studying the biochemistry of hydrolytic enzymes using quick screening methods to discover new enzyme substrates – products and inhibitory compounds.
• Investigating enzymatic synthesis and modification of microbial bio-signals associated to their impacts in complex microbial communities.
cfgonzalez@ufl.edu
**Joseph Larkin**  
University of Florida Microbiology and Cell Science  
Studying the development and treatment of autoimmune diseases  
Tolerance  
- Immune system activation must be tightly regulated in order to prevent immune responses which could result in autoimmune disease  
- Investigating the contribution of T lymphocyte subsets and functions in maintaining tolerance with an emphasis on regulatory T cells (Tregs)  
- Investigating whether changes in gut flora can modulate the onset of the autoimmune disease type 1 diabetes

**Eric Triplett**  
University of Florida Microbiology and Cell Science  
Human Microbiome Studies  
- Saliva microbiome associations with human genetics, diet, and depression.  
- Association of gut bacteria with autoimmune diseases and autism.  
- The gut microbiome of celiac disease.  
- Citrus greening disease: therapies and pathogen culturing.  
- Epigenetics of the rhizobial-legume symbiosis.  
- Covid-19 analyses  
- Covid-19 binding to human enteroids of different HLA genotypes.  
- Covid-19 antibody prevalence in UF populations.

**Julie Maupin-Furlow**  
University of Florida Microbiology and Cell Science  
- Microbial biochemistry, physiology, genetics, proteomics, bioinformatics, and systems biology  
- Archaea/Extremophiles  
- Ubiquitin-proteasome systems  
- Advance human health, renewable fuels and chemicals, and understanding the limits of life through study of microbial systems  
- Integration of post-translational, translational, RNA modification, metabolic, transcriptome, proteome, and bioinformatic approaches into a systems biology understanding of life  
- Archaeal extremophiles as model systems

**Graciela Lorca**  
University of Florida Genetics Institute  
- Characterization of a novel probiotic strain to prevent type 1 diabetes  
- Functional genomics of transcription factors  
- Identification of small molecules to inhibit virulence determinants  
- Drug repurposing: discovery of "new" antibiotics  
- Identifying new targets for old drugs  
- Use of a novel probiotic strain to prevent type 1 diabetes  
- Clinical trials to determine safety and mechanism of disease mitigation  
- Elucidation of bacterial components or molecules involved Functional genomics  
- Identification of chemicals that modulate the activity of transcription factors  
- Elucidation of function for uncharacterized genes

**Meet our faculty**

**Microbial physiology and Biochemistry**

**Christopher Reisch**  
University of Florida Microbiology and Cell Science  
Research Theme:  
Development and utilization of synthetic biology tools to study bacterial physiology and metabolism  
Current Projects:  
- Development of CRISPR/Cas tools for genome editing and transcripional control in bacteria  
- Construction of high-throughput mutant libraries in environmentally important bacteria  
- Identification of genetic mechanisms that enable extreme stress resistance in bacteria  
- Directed evolution of proteins with improved function
Tony Romeo*
University of Florida Microbiology and Cell Science

Molecular genetics and regulation
• Global regulatory circuitry
• Regulatory RNAs & RNA binding proteins
• Translation & transcription control
• Bacterial virulence, biofilm formation, metabolism, motility
• Studying regulatory mechanisms by which microbes sense changes in the environment and respond by modifying their behavior and metabolism
• Global regulatory systems that coordinate expression of numerous genes throughout the bacterial genome
• Novel global regulatory system in Csr systems, based on an mRNA binding protein, CsrA, and noncoding regulatory RNAs that sequester and antagonize CsrA

*No longer accepting new graduate students

Meet our faculty

Environmental Microbiology

Brent Christner
University of Florida Microbiology and Cell Science

Environmental microbiology, microbial physiology and ecology, biogeochemistry, and polar science.

Currently Investigating:
• Chemosynthetic ecosystems of subglacial aquatic environments.
• Biosignatures and life detection in Ocean World analogs.
• Microbiology of glacial landscapes affected by ice sheet retreat.
• Genetic determinants of survival in space-like environments.
• Bioaerosol-meteorological interactions.
• Diversity and biogeochemistry of the Upper Floridan Aquifer.

Meet our faculty

Willm Martens-Habbena
Fort Lauderdale Research and Education Center

Microbial Ecology, Physiology, Biogeochemistry
• Examining how microbial activities shape nutrient and element cycles and greenhouse gas emissions in terrestrial and marine environments.

Physiology and metabolism of nitrifying archaea
• Using culture-based physiology and –omic approaches to understand the biology and nitrogen metabolism including nitric oxide and nitrous oxide in ammonia-oxidizing archaea.
• Long-term strategies to sustainable nitrogen management
• Interrogation of microbial nitrogen turnover using meta-omics analyses and activity measurements to identify strategies for reducing nitrogen loss and greenhouse gas emissions.

Meet our faculty

Astrobiology

Uli Stingl
Fort Lauderdale Research and Education Center

Environmental microbiology, microbial physiology and ecology, symbioses

Currently Investigating:
• Microbial communities in The Everglades.
• Structure and function of microbiomes of local seagrasses.
• Genomics, ecology, and physiology of SAR11, the most abundant group of organisms on Earth.
• Genomics, ecology, and physiology of Polynucleobacter, the most abundant organism in The Everglades.
• Early events in symbioses: microbe-host interactions in ciliates.
Jamie Foster
Space Life Sciences Lab

- Environmental Microbiology
  - Examining microbial communities and their surrounding environments to improve our understanding of the molecular mechanisms that microbes use to adapt and respond to changes in the environment
  - Examine how microbial biofilms sequester and precipitate carbonate using meta-omics
  - Assess the impact of microgravity on host-microbe interactions
    - Examine the effects of microgravity on the normal developmental interactions between an animal host and a bacterial symbiont
  - Modern marine microbiologies
    - Microbialites represent modern analogues to ancient Earth ecosystems. By studying these communities we can gain an understanding of the origins and evolution of life on Earth

Wayne Nicholson*
Space Life Sciences Lab

- Astrobiology
  - Interplanetary transport of spores
  - Survival/growth/evolution in space, on Mars
  - Planetary Protection
- Microbiology of the human spaceflight environment
  - Nucleoid architecture, DNA conformation
  - Bacterial gene expression and stress responses
  - RNA Polymerase Structure/Function
    - Rifampicin resistance mutations in rpoB
    - Global phenotype/transcriptome alterations
    - Evolutionary fitness

Meet our faculty

Host pathogen interactions

Nemat Keyhani
University of Florida Microbiology and Cell Science

- Fungal host-pathogen interactions; molecular mechanisms of fungal pathogens of insects & fungal pathogens of plants
  - Fungal-insect (beetle) symbioses
  - Chemical communication in insects within a framework of the biochemistry and evolution of insect social behavior:
    - Investigating the molecular basis for entomopathogenic fungi (Beauveria bassiana) and phytopathogenic fungi (Raffaelea lauricola).
    - Investigating the biochemical, molecular, and evolutionary mechanisms involved in insect chemical communication with a particular interest in social insects

Peter Kima
University of Florida Microbiology and Cell Science

- Host-Pathogen Interactions
  - Cell Biology/Immunology
    - Preferred parasitic organism: Leishmania spp.
    - Infection of macrophages in mammalian hosts.
- Novel approaches to control parasites
  - Studies to elucidate the molecular characteristics of parasitophorous vacuoles in which Leishmania parasites reside and replicate; identification of new targets for control of infection.
  - PI3Kase signaling in Leishmania-infected cells, Characterization of parasite-derived kinases
  - Macrophage Biology
    - Identifying host and parasite molecules in Extracellular Vesicles (EVs) from infected cells. Assessment of role of EVs in lesion development, including in changes in lesion vascularization.

Kelly Rice
University of Florida Microbiology and Cell Science

- Streptococcus mutans
  - Causative agent of dental caries
  - Contribution of cid/lrg genes and vitamin transport to physiology and stress resistance
  - Effects of simulated microgravity on physiology and biofilm
- Staphylococcus aureus
  - Can infect almost all human tissue/organs, antibiotic resistance, acquired in community and healthcare settings
  - Endogenous Nitric Oxide (NO) production, effects on physiology, antibiotic tolerance and virulence factor expression
  - Effects of simulated microgravity and space flight environment on quorum sensing, biofilm, and physiology

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Meet our faculty

Plant biology

Transcription in plants: mechanisms of gene activation and repression
- Identifying protein binding partners that control many aspects of development and environmental responsiveness
- General transcription factors from plants
- Cloning & characterization of TFIIB & subunits of Mediator

Heat Shock
- Mechanisms of Gene activation in response to abiotic stress such as those resulting from exposure to high temperature
- Developing screens for disease resistance
- Studying changes in gene expression in bacteria and plants during early stages of transfer of the Liberibacter from the psyllid to the plant phloem.

Optical sensing for early detection of Citrus Greening
- Developing screens for disease resistance
- Studying changes in gene expression in plants during early stages of transfer of the Liberibacter from the psyllid to the plant phloem.

William Gurley
University of Florida Microbiology and Cell Science
- Optical sensing for early detection of Citrus Greening
- Developing screens for disease resistance
- Studying changes in gene expression in bacteria and plants during early stages of transfer of the Liberibacter from the psyllid to the plant phloem.

Zhonglin Mou
University of Florida Microbiology and Cell Science
- Genetic, molecular, biochemical, & genomic approaches to investigate the fundamental aspects of plant defense responses
- Study the mechanisms plants evolved to defend against microbial pathogens
- Perform genetic screens in Arabidopsis thaliana to identify new components in defense signaling pathways
- Investigating signal transduction pathways and their activation mechanisms using the model plant Arabidopsis.
- Function of extracellular pyridine nucleotides in plant immunity.
- Regulation of salicylic acid accumulation during pathogen infection.
- Epigenetic regulation of plant immunity.
- Engineering disease resistance in crop plants.

Wilfred Vermerris
University of Florida Genetics Institute
- Genetic improvement of sorghum as a feedstock for the production of renewable fuels and chemicals
- Implementation of genome editing using CRISPR/Cas9
- Elucidating the genetic basis of synergistic and antagonistic plant-microbe interactions

Bio-nanotechnology:
- Lignin-based nanomaterials as delivery vehicles in gene therapy
- Lignin as an antimicrobial adjuvant to treat Staphylococcus aureus infections

Nian Wang
University of Florida Microbiology and Cell Science
- Virulence mechanism of Candidatus Liberibacter asiaticus (Citrus Greening)
- Xanthomonas citri (Citrus Canker)

Molecular genetics and functional genomics of plant-bacteria interactions and methods to control citrus bacterial diseases
- Candidatus Liberibacter asiaticus (Citrus Greening)
- Xanthomonas citri (Citrus Canker)

Current Projects
- Virulence mechanism of Candidatus Liberibacter asiaticus (Las) and control of HLB by nullifying the virulence mechanism of Las.
- The interactions between citrus and Xanthomonas citri
- Genome editing of citrus
- Citrus microbiome

Meet our faculty

Virology
Let’s answer your questions!

- If transitioning from the Online MS program, how many more classes do you have to take, and about how long to complete the Ph.D. program on average?
- I am particularly interested in the opportunities to be a teaching assistant. Could you elaborate on those opportunities?
- Is there an age limit for admission?
- How are lab rotations determined?
- At the end of the first year, how are students matched with an advisor?
- What are living options for graduate students?
- If I and a professor already want to work together when starting my PhD, do I need to do any rotations?
- If for some reason I leave the PhD program before completion, at what point might I quality for an MS?
- Is there a minimum number of papers published required for completion of the program?
- What are the pre-eminent graduate fellowship awards and how are they awarded? Is there a limit on how many fellowships a PhD student can have? For example, what happens if you apply for a NSF graduate fellowship and a NIH fellowship...does the program and university enable you to have both?

Let’s answer your questions!

- Phage-Host Interactions:
  - Prior to infection, how phages recognize a suitable host cell
  - During early/middle infection, how phages regulate translation of their genes
  - During late infection, how phage particles assemble

  Identification of Novel Viruses:
  - Environmental sampling to identify phages for Cronobacter and Serratia and subsequent characterization (host range, genome, phylogeny, morphology)

Let’s answer your questions!

- What do opportunities look like for students without extensive laboratory experience? My undergraduate degree was not in a science and completing the master in microbiology online has not created a lot of opportunity to develop that skill.
- What kind of experience do you recommend I have before applying?
- How competitive is the program in terms of students applying (masters students vs undergraduates)?
- What are some of the most important characteristics you are looking for in an applicant?
Meet our PhD Students

More questions??

Apply at
https://www.applyweb.com/uflgrad/index.ftl

For more information
http://microcell.ufl.edu/graduate-program/

Microbiology and Cell Science PhD Program

Apply!
Applications Due December 15

Information Sessions
Apply at
https://www.applyweb.com/uflgrad/index.ftl