

**University of Florida  
Department of Microbiology and Cell Science**

**Microbial Defense/Host-Microbe Interactions  
MCB 6355 (1 credit)**

**SPRING SEMESTER 2023  
March 20 and end on April 26, 2023**

**COURSE DESCRIPTION:**

**MCB6355.** Microbial Defense/Host-Microbe Interactions Credits: 1. Principles of bacterial virulence, host defense to microbial invasion and host-microbe interactions will be examined in a context of molecular and cellular biology.

**COURSE INSTRUCTORS**

Dr. Joseph Larkin III

Appointment: Rm.1253 or zoom

Phone: 352-392-6884

E-mail: [jlarkin3@ufl.edu](mailto:jlarkin3@ufl.edu)

Webpage: <https://microcell.ufl.edu/people/joseph-larkin-iii/>

Dr. Nian Wang

Appointment: Classroom or zoom

Phone: 863-956-8828

E-mail: [nianwang@ufl.edu](mailto:nianwang@ufl.edu)

Webpage: <https://crec.ifas.ufl.edu/people/faculty/nian-wang/>

For each Zoom appointment we recommend 15-20 min.

**WEB PAGE:** The Course can be found in Canvas

**LECTURES:** Dates: Please see Table 1 Schedule of topics for details. Time: 8:30 AM - 10 AM, on Tuesday and Thursday.

For Ph.D. students, attendance in person is required if the students are located in Gainesville.

Zoom attendance will be provided for Ph.D. students in locations outside of Gainesville.

Online MS students are welcome to attend the live lectures but are not required. Zoom recording will be posted at the course site.

Lecture room: MCB building, room 1054

**COURSE OBJECTIVES:**

- **This class assumes that students possess a limited understanding of immunology. As such, a foundational immunological background will be developed**
- To develop the concepts and understand the principles of bacterial virulence, host defense to microbial invasion and host-bacteria interactions.

- To develop the concepts and skills required to understand and critically evaluate research that addresses molecular and cellular biology events involved in host defense to microbial pathogens and virulence mechanism of bacterial pathogens.

## **STUDENT RESPONSIBILITIES:**

Students are required to take class online or watch the recorded lectures. Students need to complete the assignments on canvas. Students will be responsible for reading literature referenced in class. Students need to take the final exam. Final exam will consist of materials in lectures and assigned readings.

### **Grade:**

Grades will be assigned based on completion of one assignments worth 100 pts of the grade (50% of grade), and a final exam worth 100 pts (50% of grade).

Final grades will be based on the following performance standard:

90 - 100 %	=	<b>A</b>
85 - 90 %	=	<b>B+</b>
80 - 84.9 %	=	<b>B</b>
75 - 79.9 %	=	<b>C+</b>
70 - 74.9 %	=	<b>C</b>
60 - 69.9 %	=	<b>D</b>
Less than 60 %	=	<b>E</b>

### **Assignments:**

Grading of the presentations will be peer evaluated using the presentation evaluation form (Table 3).

### **Ph.D. students:**

will make group oral presentations for the assigned papers by Drs. Larkin and Wang (Please see Table 2).

### **Online MS students:**

Option 1. Presentation of the papers as a member of a group. Right now, 2-3 Ph.D. students are assigned to the presentation team of each paper (Table 2). Up to 4 people can be assigned to each paper. Online MS students are welcome to join the team in Table 2 or form your own group with up to 4 online MS students. If online MS students join the team in Table 2, they could then present their portion by Zoom, or they could record a presentation in advance that would be played in conjunction with the live presentation.

If online MS students form your own group with up to 4 students, they also need to select one paper from Table 2. Please contact Drs. Larkin and Wang in advance to make sure the papers will not be overlapped with another online group with the team members and the selected paper from table 2. Their presentations could be uploaded in the class and students are required to view it. The class could then watch two presentations for one paper and our lecture/class

discussion afterwards could be comparing the two presentations and then filling in gaps that may have been missed.

Each group is responsible for providing enough background for the class to understand the paper. 40-50 min is recommended for each paper.

Option 2 (Grading of assignments by online MS students will be done by Drs. Larkin and Wang). Assignment based on papers. The assignment will cover all or selected papers by Drs. Larkin and Wang. Assignments are open resource. Assignments will be located within Canvas under the tab “Assignments.” The Due date is below for MS students:

April 6<sup>th</sup> @6pm EST (Larkin)

April 21<sup>th</sup> @ 6pm EST (Dr. Wang)

**Course Final Exam:** April 25, 2023 (6 am-10 pm)

The final exam will be administered through Canvas with proctored through Honor-lock. Exam questions will be short essays, multiple choice, and true-false and focused on lectures and main topics covered in this course. The duration of the final exam will be 2 hours. Please familiarize yourself with Honor-lock by conducting practice assignment.

### **TEACHER EVALUATION:**

Please conduct on-line teacher evaluation and provide feedbacks and suggestions for the course on April 13. 10-15 minutes are sufficient for the evaluation. The website for the online teacher evaluation is: **[evaluations.ufl.edu](https://evaluations.ufl.edu)**

**COURSE SCHEDULE:**

**Table 1 Schedule of topics (Each class consists of a short lecture by Dr. Larkin or Dr. Wang, followed by oral presentations of papers (related to the concepts covered in the lecture) by Ph.D. students)**

Date	Topic
March 21, Tuesday (Larkin and Wang)	<p>10-15 min Class introduction and how to prepare for the class including assignments, and exams</p> <p>Lecture: Immune system overview</p>
March 23, Thursday (Larkin)	<p><b>Lecture: Lactobacillus modulation of mammalian immune responses</b></p> <p>Marcial et al (2017) Lactobacillus N6.2 Modulates the host immune responses: a double-blind, randomized trial in healthy adults. <i>Front Immunol.</i> DOI:10.3389/fimmu.2017.00655</p>
March 28, Tuesday (Larkin)	<p><b>Lecture: Association of HLA and commensal bacteria to autoimmunity</b></p> <p>Paun et al (2019) Association of HLA-dependent islet autoimmunity with systemic antibody responses to intestinal commensal bacteria in children. <i>Sci Immunol.</i> DOI:10.1126/sciimmunol.aau8125</p>
March 30, Thursday (Larkin)	<p><b>Lecture: antimicrobial peptide modulation of gut microbiota and relationship to autoimmunity</b></p> <p>Liang et al (2022) Intestinal cathelicidin antimicrobial peptide shapes a protective neonatal gut microbiota against pancreatic autoimmunity. <i>Gastroenterology.</i> 162:1288-1302</p>
April 4, Tuesday (Wang)	<p><b>Lecture: bacterial pathogens, virulence mechanism, virulence factors, and immunity</b></p> <p>Related papers:</p> <p>Lu Y, Zheng Y, Coyaud É, Zhang C, Selvabaskaran A, Yu Y, Xu Z, Weng X, Chen JS, Meng Y, Warner N, Cheng X, Liu Y, Yao B, Hu H, Xia Z, Muise AM, Klip A, Brumell JH, Girardin SE, Ying S, Fairn GD, Raught B, Sun Q, Neculai D. Palmitoylation of NOD1 and NOD2 is required for bacterial sensing. <i>Science.</i> 2019 Oct 25;366(6464):460-467.</p>
April 6, Thursday (Wang)	<p><b>Lecture: bacterial pathogens, virulence mechanism, virulence factors, and immunity (continue)</b></p> <p>Related paper:</p>

	Tenthorey JL, Haloupek N, López-Blanco JR, Grob P, Adamson E, Hartenian E, Lind NA, Bourgeois NM, Chacón P, Nogales E, Vance RE. The structural basis of flagellin detection by NAIP5: A strategy to limit pathogen immune evasion. <i>Science</i> . 2017 Nov 17;358(6365):888-893.
April 11, Tuesday (Wang)	<b>Lecture: Bacterial secretion systems, effectors, and immunity</b> Related paper: Ruano-Gallego D, Sanchez-Garrido J, Kozik Z, Núñez-Berruenco E, Cepeda-Molero M, Mullineaux-Sanders C, Naemi-Baghshomali Clark J, Slater SL, Wagner N, Glegola-Madejska I, Roumeliotis TI, Pupko T, Fernández LÁ, Rodríguez-Patón A, Choudhary JS, Frankel G. Type III secretion system effectors form robust and flexible intracellular virulence networks. <i>Science</i> . 2021 Mar 12;371(6534):eabc9531.
April 13, Thursday (Wang)	<b>Lecture: Bacterial secretion systems, effectors, and immunity</b> Related paper: Horsefield S, Burdett H, Zhang X, Manik MK, Shi Y, Chen J, Qi T, Gilley J, Lai JS, Rank MX, Casey LW, Gu W, Ericsson DJ, Foley G, Hughes RO, Bosanac T, von Itzstein M, Rathjen JP, Nanson JD, Boden M, Dry IB, Williams SJ, Staskawicz BJ, Coleman MP, Ve T, Dodds PN, Kobe B. NAD <sup>+</sup> cleavage activity by animal and plant TIR domains in cell death pathways. <i>Science</i> . 2019 Aug 23;365(6455):793-799.
Week of April 17 to 21	Study week to prepare for the final exam
April 25	Final exam

Table 2. Assigned paper for presentation

Last Name	First Name	Email	Assigned paper for presentation
Bhimani	Saloni Hitesh	sbhimani1@ufl.edu	Marcial et al (2017) Lactobacillus N6.2 Modulates the host immune responses: a double-blind, randomized trial in healthy adults. <i>Front Immunol.</i> DOI:10.3389/fimmu.2017.00655
Cediel-Becerra	José D.D	jcedielbecerra@ufl.edu	Marcial et al (2017) Lactobacillus N6.2 Modulates the host immune responses: a double-blind, randomized trial in healthy adults. <i>Front Immunol.</i> DOI:10.3389/fimmu.2017.00655
Enslow	Samantha Maria	samanthaenslow@ufl.edu	Paun et al (2019) Association of HLA-dependent islet autoimmunity with systemic antibody responses to intestinal commensal bacteria in children. <i>Sci Immunol.</i> DOI:10.1126/sciimmunol.aau8125
Hasan	Mahmood	m.hasan1@ufl.edu	Paun et al (2019) Association of HLA-dependent islet autoimmunity with systemic antibody responses to intestinal commensal bacteria in children. <i>Sci Immunol.</i> DOI:10.1126/sciimmunol.aau8125
Hourihan	Jacob M	jhourihan@ufl.edu	Liang et al (2022) Intestinal cathelicidin antimicrobial peptide shapes a protective neonatal gut microbiota against pancreatic autoimmunity. <i>Gastroenterology.</i> 162:1288-1302
Islam	Zia Ul	islamz@ufl.edu	Liang et al (2022) Intestinal cathelicidin antimicrobial peptide shapes a protective neonatal gut microbiota against pancreatic autoimmunity. <i>Gastroenterology.</i> 162:1288-1302
Ivester	Rachel Grace	rachel.ivester@ufl.edu	Liang et al (2022) Intestinal cathelicidin antimicrobial peptide shapes a protective neonatal gut microbiota against pancreatic autoimmunity. <i>Gastroenterology.</i> 162:1288-1302
Jimenez	Carlos Eduardo	cjimenezjr@ufl.edu	Lu Y, Zheng Y, Coyaud É, Zhang C, Selvabaskaran A, Yu Y, Xu Z, Weng X, Chen JS, Meng Y, Warner N, Cheng X, Liu Y, Yao B, Hu H, Xia Z, Muise AM, Klip A, Brumell JH, Girardin SE, Ying S, Fairn GD, Raught B, Sun Q, Neculai D. Palmitoylation of NOD1 and NOD2 is required for bacterial sensing. <i>Science.</i> 2019 Oct 25;366(6464):460-467.
Johnson	Timothy Robert	timothy.johnson@ufl.edu	Lu Y, Zheng Y, Coyaud É, Zhang C, Selvabaskaran A, Yu Y, Xu Z, Weng X, Chen JS, Meng Y, Warner N, Cheng X, Liu Y, Yao B, Hu H, Xia Z, Muise AM, Klip A, Brumell JH, Girardin SE, Ying S, Fairn GD, Raught B, Sun Q, Neculai D. Palmitoylation of NOD1 and NOD2 is required for bacterial sensing. <i>Science.</i> 2019 Oct 25;366(6464):460-467.
Kerns	Hailey	hailey.kerns@ufl.edu	Tenthorey JL, Haloupek N, López-Blanco JR, Grob P, Adamson E, Hartenian E, Lind NA, Bourgeois NM, Chacón P, Nogales E, Vance RE. The structural basis of flagellin detection by NAIP5: A strategy to limit pathogen immune evasion. <i>Science.</i> 2017 Nov 17;358(6365):888-893.
Merritt	Benjamin A	b.merritt@ufl.edu	Tenthorey JL, Haloupek N, López-Blanco JR, Grob P, Adamson E, Hartenian E, Lind NA, Bourgeois NM, Chacón P, Nogales E, Vance RE. The structural basis of flagellin detection by NAIP5: A strategy to limit pathogen immune evasion. <i>Science.</i> 2017 Nov 17;358(6365):888-893.
Ojeda	Amanda E	ao12345@ufl.edu	Tenthorey JL, Haloupek N, López-Blanco JR, Grob P, Adamson E, Hartenian E, Lind NA, Bourgeois NM, Chacón P, Nogales E, Vance RE. The structural basis of flagellin detection by NAIP5: A strategy to limit pathogen immune evasion. <i>Science.</i> 2017 Nov 17;358(6365):888-893.
Ritchie	Brooke	brookeritchie@ufl.edu	Ruano-Gallego D, Sanchez-Garrido J, Kozik Z, Núñez-Berruero E, Cepeda-Molero M,

	Adrian		Mullineaux-Sanders C, Naemi-Baghshomali Clark J, Slater SL, Wagner N, Glegola-Madejska I, Roumeliotis TI, Pupko T, Fernández LÁ, Rodríguez-Patón A, Choudhary JS, Frankel G. Type III secretion system effectors form robust and flexible intracellular virulence networks. <i>Science</i> . 2021 Mar 12;371(6534):eabc9531.
Rosero	Javier	jrosero@ufl.edu	Ruano-Gallego D, Sanchez-Garrido J, Kozik Z, Núñez-Berruero E, Cepeda-Molero M, Mullineaux-Sanders C, Naemi-Baghshomali Clark J, Slater SL, Wagner N, Glegola-Madejska I, Roumeliotis TI, Pupko T, Fernández LÁ, Rodríguez-Patón A, Choudhary JS, Frankel G. Type III secretion system effectors form robust and flexible intracellular virulence networks. <i>Science</i> . 2021 Mar 12;371(6534):eabc9531.
Wen	Jiawen	wen.jiawen@ufl.edu	Horsefield S, Burdett H, Zhang X, Manik MK, Shi Y, Chen J, Qi T, Gilley J, Lai JS, Rank MX, Casey LW, Gu W, Ericsson DJ, Foley G, Hughes RO, Bosanac T, von Itzstein M, Rathjen JP, Nanson JD, Boden M, Dry IB, Williams SJ, Staskawicz BJ, Coleman MP, Ve T, Dodds PN, Kobe B. NAD+ cleavage activity by animal and plant TIR domains in cell death pathways. <i>Science</i> . 2019 Aug 23;365(6455):793-799.
Yeboah	Akwasi	akwasiyeboah@ufl.edu	Horsefield S, Burdett H, Zhang X, Manik MK, Shi Y, Chen J, Qi T, Gilley J, Lai JS, Rank MX, Casey LW, Gu W, Ericsson DJ, Foley G, Hughes RO, Bosanac T, von Itzstein M, Rathjen JP, Nanson JD, Boden M, Dry IB, Williams SJ, Staskawicz BJ, Coleman MP, Ve T, Dodds PN, Kobe B. NAD+ cleavage activity by animal and plant TIR domains in cell death pathways. <i>Science</i> . 2019 Aug 23;365(6455):793-799.
Feng	Yu	yufeng1@ufl.edu	Horsefield S, Burdett H, Zhang X, Manik MK, Shi Y, Chen J, Qi T, Gilley J, Lai JS, Rank MX, Casey LW, Gu W, Ericsson DJ, Foley G, Hughes RO, Bosanac T, von Itzstein M, Rathjen JP, Nanson JD, Boden M, Dry IB, Williams SJ, Staskawicz BJ, Coleman MP, Ve T, Dodds PN, Kobe B. NAD+ cleavage activity by animal and plant TIR domains in cell death pathways. <i>Science</i> . 2019 Aug 23;365(6455):793-799.
Infantado	Nina Charissa Aguilar	ninfantado@ufl.edu	Ruano-Gallego D, Sanchez-Garrido J, Kozik Z, Núñez-Berruero E, Cepeda-Molero M, Mullineaux-Sanders C, Naemi-Baghshomali Clark J, Slater SL, Wagner N, Glegola-Madejska I, Roumeliotis TI, Pupko T, Fernández LÁ, Rodríguez-Patón A, Choudhary JS, Frankel G. Type III secretion system effectors form robust and flexible intracellular virulence networks. <i>Science</i> . 2021 Mar 12;371(6534):eabc9531.

Table 3. Presentation evaluation form

Name of the peer reviewer:

<b>Speaker:</b>	Score (100 total)
<b>Title of the paper:</b>	
Has the speaker done through research and has a good understanding about the topic? 20 points	
Did the speaker tell a story? The story should have four parts: introduction, method, results, and conclusion/summary. 50 points	
Did this speaker prepare material carefully and logically? 15 points	
Did the speaker present well about the story or the topic? 15 points	
Total	

**REFERENCE TEXTBOOKS:**

Abbas A.K. and Lichtman A.H. 2007. *Cellular and Molecular Immunology*. Sixth Edition. Saunders, Philadelphia, PA. ISBN- 978-1-4160-3122-2.

Virulence Mechanisms of Bacterial Pathogens 4th Edition by Kim A. Brogden, F. Chris Minion, Nancy Cornick, Thaddeus B. Stanton ASM Press; 4 edition (August 15, 2007) ISBN-13: 978-1555814694

Virulence Mechanisms of Plant-Pathogenic Bacteria Edited by Nian Wang, Jeffrey B. Jones, George W. Sundin, Frank White, Saskia Hogenhout, Caroline Roper, Leonardo De La Fuente, and Jong Hyun Ham APS Press; 1<sup>st</sup> edition (2015) ISBN 978-0-89054-444-0.



## **Academic Honesty, Software Use, UF Counseling Services, Services for Students with Disabilities**

### **Privacy Statement**

Our class sessions may be audio visually recorded for students in the class to refer back and for enrolled students who are unable to attend live. Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live. The chat will not be recorded or shared. As in all courses, unauthorized recording and unauthorized sharing of recorded materials is prohibited.

### **The university's honesty policy regarding cheating, plagiarism, etc.**

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code specifies a number of behaviors that are in violation of this code and the possible sanctions. [Click here to read the Honor Code](#). Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

### **Campus Resources:**

#### Health and Wellness

*U Matter, We Care:* If you or someone you know is in distress, please contact [umatter@ufl.edu](mailto:umatter@ufl.edu), 352-392-1575, or visit [U Matter, We Care website](#) to refer or report a concern and a team member will reach out to the student in distress.

*Counseling and Wellness Center:* [Visit the Counseling and Wellness Center website](#) or call 352-392-1575 for information on crisis services as well as non-crisis services.

*Student Health Care Center:* Call 352-392-1161 for 24/7 information to help you find the care you need, or [visit the Student Health Care Center website](#).

*University Police Department:* [Visit UF Police Department website](#) or call 352-392-1111 (or 9-1-1 for emergencies).

*UF Health Shands Emergency Room / Trauma Center:* For immediate medical care call 352-733-0111 or go to the emergency room at 1515 SW Archer Road,

Gainesville, FL 32608; [Visit the UF Health Emergency Room and Trauma Center website](#) Academic Resources

*E-learning technical support:* Contact the [UF Computing Help Desk](#) at 352-392-4357 or via e-mail at [helpdesk@ufl.edu](mailto:helpdesk@ufl.edu).

*Career Connections Center:* Reitz Union Suite 1300, 352-392-1601. Career assistance and counseling services.

*Library Support:* Various ways to receive assistance with respect to using the libraries or finding resources.

*Teaching Center:* Broward Hall, 352-392-2010 or to make an appointment 352- 392-6420. General study skills and tutoring.

*Writing Studio:* 2215 Turlington Hall, 352-846-1138. Help brainstorming, formatting, and writing papers.

*Student Complaints On-Campus:* [Visit the Student Honor Code and Student Conduct Code webpage for more information.](#)

*On-Line Students Complaints:* [View the Distance Learning Student Complaint Process.](#)

### **Software Use:**

All faculty, staff and students of the university are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against university policies and rules, disciplinary action will be taken as appropriate.

### **Students with Disabilities**

The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services and mediating faculty-student disability related issues.

0001 Reid Hall, 392-8565, [www.dso.ufl.edu/drc/](http://www.dso.ufl.edu/drc/)