

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

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

**SPRING SEMESTER 2022
March 14 through April 20, 2022**

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 involving both plants and animals.

**COURSE
INSTRUCTORS**

Dr. Joseph Larkin III
Rm.1253

Dr. Nian Wang
Classroom

Phone: 352-392-6884
E-mail: jlarkin3@ufl.edu

Phone: 863-956-8828
E-mail: nianwang@ufl.edu

For each Zoom appointment we recommend 15-20 min.

WEB PAGE: The Course can be found in Canvas

LECTURES: Dates: Tuesday, March 15 through Thursday April 7, 2022. The lectures will be delivered via zoom (live) (Time: 8:30 AM - 10 AM). Zoom link: <https://ufl.zoom.us/j/99225364465?pwd=Rms1NDhhNXZTT2R4anRGdERFUDJaQT09>. In addition, lectures will be recorded and available at Canvas for students who could not attend in person. Ph.D. students are encouraged to attend the class in person. In the evening (6-7 pm) of Tuesday in the 2nd week (March 22) or 4th week (April 5), there will be an open discussion period (one hour) led by Dr. Larkin and Dr. Wang, respectively, to facilitate the learning. The open discussion section will be recorded for students who cannot attend in person.

COURSE OBJECTIVES:

- **This class makes the assumption 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 2 assignments each worth 100 pts of the grade for a total of 200 pts (67% of grade), and a final exam worth 100 pts (33% of grade).

Final grades will be based on the following performance standard:

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

Assignments:

Two assignments will be assigned for this course: One each by Drs. Larkin (Assignment 1) and Wang (Assignment 2). Assignments will be located within Canvas under the tab “Assignments.” The Due dates are below:

March 23th @ 6pm EST (Dr. Larkin)
April 4th @ 6pm EST (Dr. Wang)

Course Final Exam: April 7, 2022 (6 am-10 pm)

The final exam will be administered through Canvas with proctored through Honor-lock. Exam questions will be short essays 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 6. 10-15 minutes are sufficient for the evaluation. The website for the online teacher evaluation is: evaluations.ufl.edu

COURSE SCHEDULE:

Table 1 Schedule of topics

Date	Topic
<p>March 15 (Wang and Larkin) Larkin</p>	<p>Class introduction Immunology Primer Pathogen recognition by the innate immune system Kiyono H and Kunisawa J (2011) Peaceful mutualism in the gut: Revealing key commensal bacteria for the creation and maintenance of immunological homeostasis. <i>Cell Host and Microbe</i>. 83-84. Schnupf, Gaboriau-Routhiau, and Cerf-Bensussan (2018) Modulation of the gut microbiota to improve innate resistance. <i>Curr Opin Immunol</i>. 54; 137-144.</p>
<p>March 17 (Larkin)</p>	<p>Mammalian Host Microbe Interaction: Th 17 cells Related papers: M. Kleinewietfeld et al., (2013) Sodium Chloride drives autoimmune disease by the induction of pathogenic TH17 cells. <i>Nature</i>, doi:10.1038/nature11868. Curtis M and Way SS. (2009) Interleukin 17 in host defence against bacterial, mycobacterial, and fungal pathogens. <i>Immunology</i> 126:177-185.</p>
<p>March 22 (Larkin)</p>	<p>Mammalian Host Microbe Interaction: Tolerance Related papers: Atarashi K et al. (2011) Induction of Colonic regulatory T cells by Indigenous Clostridium Species. <i>Science</i>. 331. Doi: 10.1126/science. 1198469. Sakaguchi et al. (2010) Foxp3+ regulatory T cells in the human immune system. <i>Nature reviews Immunology</i>. 10: 490-500.</p>
<p>March 24 (Wang)</p>	<p>Lecture: bacterial pathogens, virulence mechanism, virulence factors, and immunity Related papers: Hayashi et al. The innate immune response to bacterial flagellin is mediated by Toll-like receptor 5. <i>Nature</i>. 2001 Apr 26;410(6832):1099-103. doi: 10.1038/35074106. Willmann et al. <i>Arabidopsis</i> lysin-motif proteins LYM1 LYM3 CERK1 mediate bacterial peptidoglycan sensing and immunity to bacterial infection. <i>Proceedings of the National Academy of Sciences</i> Dec 2011, 108 (49) 19824-19829; DOI: 10.1073/pnas.1112862108.</p>
<p>March 29 (Wang)</p>	<p>Lecture: bacterial pathogens, virulence mechanism, virulence factors, and immunity (continue) Related papers: Aliprantis et al. Cell activation and apoptosis by bacterial lipoproteins through toll-like</p>

	<p>receptor-2. <i>Science</i>. 1999 Jul 30;285(5428):736-9. doi: 10.1126/science.285.5428.736.</p> <p>Ranf et al. A lectin S-domain receptor kinase mediates lipopolysaccharide sensing in <i>Arabidopsis thaliana</i>. <i>Nat Immunol</i> 16, 426–433 (2015).</p>
March 31 (Wang)	<p>Lecture: Bacterial secretion systems, effectors, and immunity</p> <p>Related papers:</p> <p>Feng F, Yang F, Rong W, Wu X, Zhang J, Chen S, He C, Zhou JM. A <i>Xanthomonas</i> uridine 5'-monophosphate transferase inhibits plant immune kinases. <i>Nature</i>. 2012 Apr 15;485(7396):114-8. doi: 10.1038/nature10962. PMID: 22504181.</p> <p>Axtell MJ, Staskawicz BJ. Initiation of RPS2-specified disease resistance in <i>Arabidopsis</i> is coupled to the AvrRpt2-directed elimination of RIN4. <i>Cell</i>. 2003 Feb 7;112(3):369-77. doi: 10.1016/s0092-8674(03)00036-9. PMID: 12581526.</p>
April 5 (Wang)	<p>Lecture: Plant immunity</p> <p>Related papers:</p> <p>Bi G, Su M, Li N, Liang Y, Dang S, Xu J, Hu M, Wang J, Zou M, Deng Y, Li Q, Huang S, Li J, Chai J, He K, Chen YH, Zhou JM. The ZAR1 resistosome is a calcium-permeable channel triggering plant immune signaling. <i>Cell</i>. 2021 Jun 24;184(13):3528-3541.</p> <p>Wan L, Essuman K, Anderson RG, Sasaki Y, Monteiro F, Chung EH, Osborne Nishimura E, DiAntonio A, Milbrandt J, Dangl JL, Nishimura MT. TIR domains of plant immune receptors are NAD⁺-cleaving enzymes that promote cell death. <i>Science</i>. 2019 Aug 23;365(6455):799-803.</p>
April 7	Final exam

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; 1st 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, 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.

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/