

**COURSE TITLE:** Molecular Pathogenesis of Bacteria

**COURSE DIRECTOR:** Samantha Bell

**TRACK:** Immunity, Infection & Inflammation

**MEETING TIME:** Tues & Thurs 10am – 12pm (Block 4: Feb 27 – Apr 21)

**MEETING LOCATION:** TBD

**COURSE DESCRIPTION:**

An advanced elective focused on 1) the molecular mechanisms of how bacteria establish infection and cause disease and 2) the modern and historical experimental strategies for understanding how bacterial pathogens interact with the host. The course will include lectures, critical readings of relevant papers, and student presentations. Students will complete three projects to demonstrate their mastery of the course material: 1) a detailed characterization of a chosen pathogen's virulence and pathogenesis strategies; 2) an essay summarizing and contextualizing a recent high-impact, pathogenesis paper; and 3) an experimental plan that uses methods and concepts from the course to study a novel pathogenesis question.

**COURSE OBJECTIVES:**

- Define the molecular strategies used by bacterial pathogens to establish infection and cause disease
- Describe how bacterial pathogens evade immune detection and block immune responses
- Evaluate the use of modern and historical approaches to discover and characterize virulence mechanisms

**COURSE FORMAT:**

Classes will be primarily discussion-based blocks; the lecturer will present the pathogen of interest and/or the theme of pathogenesis (~20 min) and facilitate the discussion of a related research article (~40 min). Select classes will have student presentations of their projects.

**FACULTY AND STAFF:**

FACULTY	DEPARTMENT	OFFICE	PHONE	E-MAIL ADDRESS
Samantha Bell, <i>director</i>	Micro, Biochem & Molecular Genetics	ICPH W450F	4-3366	sb2118@njms.rutgers.edu
Nick Bessman	Medicine	Cancer Center F-1206	2-1510	n.j.bessman@rutgers.edu
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Dane Parker	Pathology, Immunology & Laboratory Medicine	Cancer Center G-1208	2-3047	dp964@njms.rutgers.edu
Darin Weisner	Medicine	Cancer Center F-1210	2-3412	dw667@njms.rutgers.edu
Yingda (Linda) Xie	Medicine	ICPH E250D	2-2246	ylx1@njms.rutgers.edu

**COURSE TEXTBOOKS**

No textbook; course will use primary scientific literature and relevant literature reviews.

**EVALUATION METHODS & COURSE GRADING****Assessment/Evaluation:**

*Attendance.* The course is discussion-based, and as such, attendance at all classes is mandatory. Excused absences (illness, extenuating circumstances) must be approved by the course director and remediated as outlined by the course director. Unexcused absences will result in a lower letter grade.

*Participation.* All students are expected to actively participate in each class by presenting figures, asking questions, contributing ideas, and providing feedback.

*Projects.* Students will complete three projects that will enable them to put into practice material from the course and build their science communication, literature review, critical thinking, and experimental design skills.

- Project #1 will require students to perform research on a pathogen of their choosing, describing how each virulence/pathogenesis theme discussed in the course applies to it. Students will periodically present their findings.
- Project #2 will require students to choose a recent paper on bacterial pathogenesis, write a 2-page summary/analysis, and create their own graphical abstract/model. The format of this essay will resemble a “News & Views” or “Preview” type article.
- Project #3 will require students to prepare an experimental plan for exploring a novel pathogenesis question. This plan will require identifying a gap in knowledge, designing a screen to address it, and designing follow-up studies to validate hits from a screen. Students will describe their experimental plans in a modified Specific Aims page and in an oral presentation.

**Estimated Weights Course Components:**

Component	Weight (%)
Attendance & Participation	40
Project #1	10
Project #2	15
Project #3	35
<b>Total</b>	<b>100%</b>

**Course Grading:**

A – 90-100%  
 B – 75-89%  
 C – 60-74%  
 F – < 60%

**CLASS SCHEDULE:**

Date	Topic
Tues, Feb 28	Introduction to course

	Introduction to virulence & pathogenesis
Thurs, Mar 2	Methods – Genetics
	Methods – Proteomics
Tues, Mar 7	Lifestyles – Intracellular (Chlamydia/Rickettsia)
	Lifestyles – Extracellular (Streptococcus)
Thurs, Mar 9	Type III Secretion Systems & Effectors (Yersinia)
	Type IV Secretion Systems & Effectors (Legionella)
Tues, Mar 14	Toxins (Vibrio)
	<i>Student Presentations</i>
Thurs, Mar 16	Toxins (Staphylococcus)
	Biofilms (Pseudomonas)
Tues, Mar 21	Adhesion (Neisseria)
	Capsule (Klebsiella)
Thurs, Mar 23	Antigenic variation (Borrelia)
	Exocytosis (UPEC)
Tues, Mar 28	Quorum sensing (Pseudomonas)
	<i>Student presentations</i>
Thurs, Mar 30	Membrane ruffles/endocytosis (Salmonella)
	Actin tails (Listeria/Shigella)
Tues, Apr 4	Host cell survival (Mycobacterium)
	Maladaptive immune responses (Mycobacterium)
Thurs, Apr 6	Subclinical disease & latency (Mycobacterium)
	<i>Student presentations</i>
Tues, Apr 11	Microbiome & bacterial communities
	Dysbiosis
Thurs, Apr 13	Fungal pathogenesis (Cryptococcus)
	<i>Student presentations</i>
Tues, Apr 18	<b>Final Student Presentations</b>
Thurs, Apr 21	<b>Final Student Presentations</b>

**EDUCATION PORTAL AND CANVAS COURSE ACCESS:**

The CANVAS course website is an essential part of the Molecular Pathogenesis of Bacteria course. CANVAS can be accessed using the Educational Portal website at <https://ep.njms.rutgers.edu>. The Education Portal provides single sign-on and “one stop shopping” site for various academic systems such as CANVAS, Education Management

System, Digital Media Portal, Virtual Microscopy, SOCRATES, etc. If the Education Portal is unavailable, the direct link for CANVAS is: <https://canvas.rutgers.edu/>.

### **CODE OF PROFESSIONAL CONDUCT:**

All students have a fundamental responsibility for maintaining academic integrity and intellectual honesty in their academic and professional endeavors. They are expected to observe generally accepted principles of scholarly work, to submit their own rather than another's work, to refrain from falsifying data, to acknowledge the published work of others in an appropriate manner, and to refrain from receiving or giving aid during examinations or other work requiring independent effort. When submitting written material, students take full responsibility for the originality of all work not otherwise identified by appropriate acknowledgments and imply that both the ideas and words used are their own. All students are expected to respect the property of faculty and other students, and not use research equipment or laboratory supplies of others without permission.

The following general examples are designed to clarify what is not permissible. The list is not all-inclusive but intends to establish that no form of academic dishonesty will be tolerated by the school, its faculty, or its students.

- Providing false information in any academic document or academic exercise
- Forging, plagiarizing, or altering any academic document
- Intentionally impeding or interfering with the ability of fellow students to use academic materials or to complete academic work
- Taking another student's personal belongings or taking University equipment for personal use.
- Knowingly assisting a fellow student in any of the above activities.

To view the full policy for the Code of Professional Conduct in the School of Graduate studies regarding examinations, research and oral presentations follow this link:

[http://njms.rutgers.edu/sqs/current\\_students/ac\\_integ.php](http://njms.rutgers.edu/sqs/current_students/ac_integ.php)

### **ACADEMIC WARNING POLICY:**

[http://njms.rutgers.edu/sqs/documents/policys/SGS\\_Academic\\_Warning\\_Policy.pdf](http://njms.rutgers.edu/sqs/documents/policys/SGS_Academic_Warning_Policy.pdf)

Each program shall clearly inform students of the criteria for satisfactory academic performance. Academic standing will be reviewed each semester by the Program's Academic Standing Committee. Students who receive less than an average grade of "B" in the designated Core course(s) or have a GPA less than 3.0 will receive an academic warning notice. Students performing below satisfactory levels of proficiency as outlined by the program may also receive a written warning notice. The written warning states the problem(s), outlines those measures needed for improvement and sets a deadline for compliance. Letters informing students of an academic warning will be sent within 30 calendar days of the end of the semester. A request will be made to students receiving academic warning letters to meet with the Program Director and/or the Academic Standing Committee.

### **COURSE ADD/DROP POLICY:**

#### **Policy for the Addition of a Course:**

Students may add courses with the approval of the instructor (when required) and the program director. A student wishing to add a course after the general registration period has closed, must complete the “Add/Drop/Withdraw” form and have appropriate approval of the course instructor (when required) and program director prior to the start of the course. Registration will not be permitted beyond the first week of a course. Credit will not be given for courses in which the student was not registered.

**Add Course Form Link:**

<https://na2.docusign.net/Member/PowerFormSigning.aspx?PowerFormId=96fcae95-bc67-45fb-8da3-11300ded2e99>

**Policy for Dropping a Course:**

Students may drop courses with approval of the instructor (when required) and the program director. Students submitting a completed “Add/Drop/withdraw” form to the SGS Registrar’s office within 10 academic days of the start of the course will receive a full tuition refund and the course will not appear on their official transcript. The drop period of 1-10 \*academic days, is distinguishable from the withdrawal period in that the drop period is without penalty. A completed and approved Add/Drop/Withdraw” form(s) must be received by the Registrar’s office within the time periods set forth above in order for a course(s) to be “dropped”.

**Drop Course Form Link:**

<https://na2.docusign.net/Member/PowerFormSigning.aspx?PowerFormId=c45635ca-6a1e-4936-b436-337b211b8433>

\*An academic day is defined as a day that the SGS campus at which the student is enrolled is open for business.

**REASONABLE ACCOMMODATIONS AT RUTGERS SCHOOL OF GRADUATE STUDIES:**

Rutgers School of Graduate Studies is committed to providing equitable access to learning opportunities to students with documented disabilities (e.g. mental health, attentional, learning, chronic health, sensory, or physical). To ensure access to this please contact Student Affairs, to engage in a confidential conversation about the process for requesting reasonable accommodations in the classroom setting. Students are encouraged to register with the Office of Student Affairs as soon as they begin their program. Accommodations are not provided retroactively. Rutgers School of Graduate Studies encourages students to access all resources available through the School for consistent support and access to their program.

More information can be found online at

[http://njms.rutgers.edu/education/student\\_affairs/student\\_support/disability\\_services.cfm](http://njms.rutgers.edu/education/student_affairs/student_support/disability_services.cfm).

Rutgers University welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must complete the ODS registration form: <https://webapps.rutgers.edu/student-ods/forms/registration> and contact the RBHS Office of Disability Services at 973-972-5396 or [cindy.poorepariseau@rutgers.edu](mailto:cindy.poorepariseau@rutgers.edu) to make an appointment for an intake interview. You will also be asked to provide documentation of your disability:

<https://ods.rutgers.edu/students/documentation-guidelines>. If the documentation supports your request for reasonable accommodations, the Office of Disability Services will provide you with a Letter of Accommodations. This Letter will be used to notify appropriate school personnel about the accommodations you are qualified to receive. To begin this process, please complete the

Registration form on the ODS web site at: <https://webapps.rutgers.edu/student-ods/forms/registration>.

**TEACHER-LEARNER POLICY RUTGERS SCHOOL OF GRADUATE STUDIES:**

The Rutgers SGS Newark Health Science Campus strongly believes that teaching and learning should take place in a climate of mutual respect where students and faculty are equally responsible for maintaining a professional and collegial environment. An environment where students are evaluated based upon accomplishment, professionalism, and academic performance. We are committed to maintaining a positive learning environment and the highest standards of behavior in the teacher-student relationship.

To view the full Teacher-Learner policy for the School of Graduate studies, please follow this link: [https://njms.rutgers.edu/sgs/current\\_students/docs/Teacher%20Learner%20Policy.pdf](https://njms.rutgers.edu/sgs/current_students/docs/Teacher%20Learner%20Policy.pdf)