

Covid-19 Course Mode Information: This laboratory course meets in person and has required attendance. *Students in quarantine or isolation will be accommodated via synchronous virtual meetings. Students in quarantine are expected to participate fully via synchronous remote meeting.* All communication about contingencies will occur via Canvas.

Section A2: **Wednesdays 12:30-3:15pm**; Boggs 1-59; <https://bluejeans.com/255256639/6435> for students in quarantine/isolation*

Section A3: **Wednesdays 3:30-6:15pm**; Boggs 1-59 <https://bluejeans.com/886122842/9943> for students in quarantine/isolation*

*email request to Dr. Kerr and you TAs is required

<u>Instructor</u>	<u>Email</u>	<u>Drop-in hours</u>	<u>Location</u>
Shana Kerr, PhD	shana.kerr@biosci.gatech.edu	Thurs 9-10am	https://bluejeans.com/122172577/8508

<u>TAs</u>	<u>Email</u>	<u>Drop-in hours</u>	<u>Location</u>
John (Jack) Berman	jackberman123@gatech.edu	Mon 11am-12pm	https://bluejeans.com/3874921747
Celina Zhang	celina.zhang@gatech.edu	Tues 10-11am	https://bluejeans.com/4547640501

This syllabus and schedule are subject to change.

Covid-19 Information: This course meets in person and has required attendance. While we expect each student to attend every lab and to be present for the entire lab period, the reality is that we are in a pandemic. If you are sick, in isolation for covid, or in quarantine for possible covid exposure, we ask that you not come to class. Instead, email your two TAs and Dr. Kerr immediately to communicate that you will not be in class and plan to participate remotely in a virtual session with your teammates unless you are not well enough to do so. ***Students in quarantine are expected to participate fully via synchronous virtual meeting.*** While far from ideal, this is the safest solution we can implement in the current circumstances.

In the event of a transition to hybrid or fully remote instruction, required in-person activities will be replaced with hybrid touchpoints or remote activities of equivalent point value. Should the course instructor fall sick, another instructor will take over the course. All communication about contingencies will happen via Canvas Announcements.

Covid-19 Mitigation: This is an unprecedented time. We all agree that the best way for you to learn is face-to-face. If we are required to move to an online format because of a covid outbreak, we are able to help you learn the course content remotely. Whether we meet in-person versus remotely could change depending upon health status of individuals in classroom. You have a definite stake in your personal health and the community's health.

Our expectation is that everyone who is eligible will be vaccinated; vaccination significantly reduces likelihood of severe disease, including from the delta and omicron variants of SARS-CoV-2. Because the delta and omicron variants can be spread by vaccinated individuals, we also expect that everyone who is able to should wear a mask, correctly covering mouth and nose, when indoors and throughout the entire course meeting time. Both of these expectations are based on current CDC guidance. As that guidance is updated, we will communicate any new expectations.

Weekly asymptomatic surveillance testing should be part of everyone's regular routine, regardless of vaccination status. Details are here: <https://health.gatech.edu/coronavirus/testing>.

We encourage all members of our class community to use the NOVID app to provide anonymous notification of any potential exposure to Covid-19. From the GT News Center: "Developed by researchers at Carnegie Mellon University, NOVID captures no personally identifiable information from people using it. Instead, smartphones running the app exchange synthetic codes with other smartphones that are nearby for more than a brief period of time. If the owner of one of the phones tests positive for the virus, they can notify other app users with whom they have been in contact without identifying themselves or sharing any personal information."

We encourage you to download the app (<https://covid-central.gatech.edu/app/novid>), ensure that it is active before you come to lab, and then notify the app if you test positive.

Overview and objectives: You will use current methods in cell and molecular biology to explore fundamental aspects of cell biology with the mouse macrophage cell line, J774, as a model system. We will perform a series of experiments to examine changes in cell morphology, viability, and gene expression in these cells in response to treatment with an immunomodulatory compound.

By the end of this course, you should be able to:

- Perform specific modern cell and molecular biological techniques
- Differentiate between scientific hypotheses and predictions
- Recognize and apply elements of experimental design
- Graphically and statistically analyze and represent data to support or reject a hypothesis
- Convincingly and accurately communicate your hypothesis, experimental tests of that hypothesis, and analysis and interpretations of results

Course Canvas site: All class resources will be posted to our course Canvas site, and all assignments will be due via Canvas. It is your responsibility to check this site regularly to ensure you are keeping up with required material and assignments. Course-related questions should be directed to our Piazza site, accessible via Canvas. Piazza should be used for all general (not personal) course-related questions. You can access the Piazza site via Canvas.

Covid-19 Surveillance testing: To protect everyone on campus, we encourage and request that all members of this class community engage in frequent Covid-19 surveillance testing. Information on GT's Covid-19 testing can be found here: <https://health.gatech.edu/coronavirus/testing>. Please ensure that you update your list of classes to include this course following all in-person weeks:

1. Go to mytest.gatech.edu
2. Click the "Get Tested on Dashboard" button
3. Click the "retake the survey" hyperlink in the "Get Tested" box
4. Select the Boggs Building as your primary or one of your secondary workplaces
5. Enter "BIOS 3451" when prompted to list classes you have attended in the past 2 weeks

Lab safety: Safety policies are mandated by federal, state, and institutional rules. The following policies are **non-negotiable during in-person experimental weeks:**

- **Special protections for Covid-19**
 - **Safety glasses or goggles are required at all times. Students must provide their own safety glasses or goggles.** Safety glasses or goggles must offer side splash protection in order to comply with lab safety requirements; regular eye-glasses are NOT sufficient, and safety glasses or goggles must be worn over regular prescription glasses. Compliant safety glasses or goggles can be purchased from the Georgia Tech Bookstore.
 - **Masks are highly encouraged at all.** Disposable masks will be provided.
 - **Symptom self-check:** Prior to coming to any in-person labs, we ask that you first complete a Covid-19 symptom self-check. Follow the checklist here: <https://health.gatech.edu/coronavirus/daily-checklist>
- **Attire**
 - Shoes that cover your feet entirely (no sandals, etc.)
 - Long pants to the ankle
 - Long hair tied back
 - Lab coat (purchased by student)
 - Safety glasses with side-splash protection (purchased by student)
 - Gloves (provided)
 - Masks (provided)
- **Behavior**
 - No food or drinks, including water bottles.
 - No cell phone use, including texting.
 - Clean up your bench at the end of lab and report any mess left from previous lab section.
 - Properly dispose of trash, glassware, and biohazard waste.
 - Follow additional safety procedures for specific lab activities as indicated by your TA/instructor.
- **Report all injuries or accidents to the instructors immediately.**

Failure to bring the required PPE for in-person labs will result in denial of admission to labs with grade penalties associated with an unexcused absence for missing lab. Refusal to comply with proper PPE usage or any direct safety-related instructions from the TAs will result in an unexcused absence and grade penalty.

Absences: 100% attendance is expected for each lab, for the entire lab period. *Each unexcused absence will lower your final grade by half a letter grade.* Excused absences require appropriate documentation within 24 hours of missing class. If you miss a lab, you are still responsible for completing assignments. Requests for extensions on assignments or makeup assignments must be made ahead of time and require appropriate documentation as described above for excused absences.

Attendance and participation: Participation in each laboratory session is worth 3 points per lab. During in-person weeks, we expect that you will be fully prepared to carry out the experiment independently and safely, including having a fully prepared lab notebook and that you have carefully reviewed the protocol and asked any questions about it online prior to the start of class. All students are expected to actively participate in bench-work and class/group discussions, and you will be assessed by the extent to which you participate in class discussions (by asking questions, answering questions, and offering ideas). You are expected to ask a question or offer a comment at least once every class. Attendance scores will be available in Canvas via the PostEm tool.

Pre-lab assignments cover the necessary background for you to perform and understand each experiment, and will be based on both material discussed in class as well as material posted on our Canvas site. Pre-labs are based on participation, not accuracy; you will not be penalized for an incorrect answer as long as it is clear you have thoughtfully considered your answer and your words and ideas are your own (not plagiarized). These assignments are due online via Canvas.

Protocol quizzes assess your preparedness to carry out each in-person experiments independently. Protocol quizzes are timed and are open-note based on any information you include in your *lab notebook*.

Lab notebooks will be maintained in spiral-bound composition notebooks. Prior to each experiment, you must complete a lab notebook entry describing the general *experimental question, specific hypothesis/es, experimental design, data analysis plan, and experimental predictions* in your lab notebook. Your notebook must also include either printed or hand-written copies of *experimental protocols* that will be used for the experiment. Printed protocols should be taped into your notebook. You will need to have your up-to-date lab notebook with you for each experimental week, and lab notebooks will be checked each experimental week.

Project Updates: After each experiment, you will prepare a Project Update that describes the results and interpretations from the experiment. Project Updates are informal reports for communicating the results of your experiment to another researcher in the same field (*it is NOT a formal lab report*). Projects Updates are individual assignments, and every aspect of the analysis should be generated individually *with the exception that you are encouraged to discuss how to construct your figures and figure legends with your peers*. The data analysis should convincingly and accurately communicate your hypothesis, experimental tests of that hypothesis, analysis of the results, and interpretations of those results.

Research Project: Each individual experiment conducted over the course of the experiment is related to larger overall research question. You will synthesize these individual experiments into a final research paper.

- **Annotated Bibliography:** You will conduct a search of the scientific literature and create an annotated bibliography of resources related to the overall, semester-long research question. This assignment is to help you become familiar with the background information on the lab research.
- **Review Article:** After completing the annotated bibliography, you will compose a one-to-three page summary, synthesis, and review of the information based on the annotated bibliography and other sources. This review paper will ultimately form the background and introduction for your final research paper. Drafts may be peer-reviewed in class (required for full credit).
- **Final Research Paper:** At the end of the semester, you will synthesize the **literature review** and **data analyses** for each of individual experiments into a coherent research article. Drafts may be peer-reviewed during class (required for full credit)

Detailed information and rubrics for all assignments will be posted to Canvas.

Late assignments: Unless otherwise specified, all assignments are due by the start of lab and must be submitted through Canvas. Late assignments will be subject to a one-letter grade penalty per 24-hour period that it is late, and will not be accepted more than 3 days after the due date. *You are responsible for ensuring that your assignment was properly uploaded to Canvas; any assignment emailed directly to the instructors will be considered late.*

Re-grade policy: Requests for re-grading must be made in writing (email), explain the rationale for the re-grade request, and be made within one week of the assignment's return.

Plagiarism and academic integrity: Academic dishonesty in any form will not be tolerated. Be aware of your obligations and expectations associated with the Georgia Tech Academic Honor Code and Student Code of Conduct (<http://www.honor.gatech.edu>). Academic dishonesty includes cheating, lying about course matters, plagiarism, submitting someone else’s work as your own, stealing classroom materials, or helping others commit a violation of the Honor Code. Consistent with the [Georgia Tech Coronavirus Campus Guidelines](https://health.gatech.edu/coronavirus/campus-guidelines) (<https://health.gatech.edu/coronavirus/campus-guidelines>), refusal to comply with any safety requirements, including wearing masks, wearing safety glasses, and/or maintaining social distancing, will be considered a violation of the Non-Academic Misconduct Policy. Plagiarism includes representing the words or ideas of others as your own. **Written assignments in this class will be reviewed by Turnitin. Sharing and discussing information is permitted and encouraged (this is how science is really done!), but submission of someone else’s work as your own is not permitted.** This includes any form of student work. *When in doubt, ask your instructors for help.*

Grading:

- Attendance and participation and in-class assignments 10%
- Lab notebooks (equally weighted) 15%
- Pre-lab assignments & protocol quizzes (equally weighted) 10%
- Project updates (equally weighted) 30%
- Annotated bibliography 10%
- Literature review 10%
- Final Research Paper 20%

The grading scheme includes 5% extra credit (105% possible). Final scores will be rounded to the nearest whole number, and grades will be assigned according to the following scale: 90.0-100% A; 80.0-89% B; 70.0-79% C; 60.0-69% D; <60% F

LAB SCHEDULE (subject to change)

Unless otherwise specified, all assignments are due by the start of class time

Week	Date	Assignments Due by the start of class time unless otherwise noted	Discussion Topics and Class Activities	Notes
1	1/12		No lab during first week of classes	
2	1/19		Course overview and structure Introduction to Macrophage Biology Lab/cell culture safety; <i>sign safety forms (Canvas)</i> Read and discuss assigned research paper and work on Figure Analysis	<i>Bring laptops</i>
3	1/26	Pre-lab 1: Macrophage Biology Background, including research article, figure analysis assignment and pre-lab questions	Student-led discussion of research article Workshop: Hypotheses, predictions, & experimental design Discussion: How and why we cite Discussion: Annotated Bibliography expectations	<i>Bring laptops</i>
4	2/2	Pre-lab 2: Statistics, pipettes, and citations; including citation and plagiarism online tutorial Confirm access to virtual machine on mycloud.gatech.edu or download JMP to personal computer	Pipetting and statistics activity Workshop: using JMP for graphing and statistical analysis	<i>Bring laptops; Lab coats required.</i>
5	2/9	Pre-lab 3: Measuring cell viability and macrophage activation, and BioSafety/BSCs	Using BSCs activity Discussion: Broad question vs focused hypotheses/experiments HPED Workshop: Cell viability and macrophage activation	<i>Bring laptops; Lab coats required.</i>
6	2/16	Lab Notebook 1: Activation and Viability: Griess and propidium iodide assays	Protocol quiz 1: Griess and propidium iodide (open notebook) Experiment: Griess and Propidium Iodide Data analysis <i>preview</i> : Cell viability and activation experiments	<i>Bring laptops; Lab coats required.</i>
7	2/23	Pre-lab 4: Principles of microscopy & flow cytometry Annotated Bibliography (5 research articles)	HPED Workshop: Morphological assays for activity Workshop: Scientific Writing (Figure Legends and Methods) Discussion: Project Update expectations Data analysis <i>review</i> : Cell viability and activation experiments Work on Project Update during class	<i>Bring laptops</i>
8	3/2	Lab Notebook 2: Morphology and activation: microscopy and flow cytometry assay	Protocol quiz 2: Microscopy (open notebook) Practice cell collection practice Experiment: Microscopy Data analysis <i>preview</i> : microscopy	<i>Bring laptops; Lab coats required.</i>
9	3/9	Project Update 1: Cell viability and activation	Protocol quiz 3: Flow cytometry (open notebook) Experiment: Flow cytometry Data analysis <i>preview</i> : flow cytometry Work on Project Update during class	<i>Bring laptops; Lab coats required.</i>
10	3/16	Pre-lab 5: Changes in gene expression during macrophage activation	HPED Workshop: Gene expression Discussion: Literature Review expectations Data analysis <i>review</i> : Phagocytic activity experiments Work on Project Update during class	<i>Bring laptops</i>
	3/23		Spring break – no lab	
11	3/30	Lab notebook 3: Gene expression: RNA Isolation, cDNA Synthesis, and qPCR Project Update 2: Morphology and activation – <i>due Friday 4/1 at 11:59pm</i>	Protocol quiz 4: RNA isolation, cDNA synthesis, and qPCR (open notebook) Experiment: RNA isolation & cDNA synthesis Data analysis <i>preview</i> : qPCR and gene expression	<i>Bring laptops; Lab coats required.</i>
12	4/6	Review Article	Data analysis <i>review</i> : Gene expression/activation experiment Discussion: Final Research Paper expectations Work on Project Update during class	<i>Bring laptops</i>
13	4/13	Project Update 3: Gene expression	Discussion: Broad question vs focused hypotheses/experiments Work on Final Research Paper during class	<i>Bring laptops</i>
14	4/20	Final Research Paper draft and peer review	3451 End of Semester Survey and CIOS Peer review (due during class): Final Research Paper	<i>Bring laptops</i>
15	4/26	<i>Final Research Paper due 4/26 at 11:59pm via Canvas</i>		