

## **MBIO 621 Advanced Immunology: Innate and Adaptive Immunity Spring 2023**

14 sessions per semester, 2 hrs per session  
Wednesdays 3:00-5:00pm, Rm 601

### **Instructors:**

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### **Pre-requisites**

MBIO 602 Introductory Immunology or similar course. Each student will need to have a good understanding of basic Immunology. Sufficient background coursework in immunological methods is also highly recommended. Contact the course director if more information about this is needed.

### **Purpose of the Course & Course Objectives**

Our goal is to deepen your knowledge of immunology and scientific curiosity and help you become expert at analyzing scientific articles and designing experiments. We anticipate that our diverse backgrounds and experiences will generate fruitful discussion and exchange of opinion.

Each lesson will begin with a short introduction, which build from the information presented in Introductory Immunology up to the current state of knowledge, providing substantial depth in the subject. An assigned article about the current research literature will be discussed in class. You will be asked to explain and/or comment on various aspects of the chosen article during class and submit answers to a brief questionnaire directed toward analysis of the assigned scientific article at the beginning of the class. Moreover, you will submit a short writing about the main methodologies utilized in the analyzed articles, and practice designing experiments to test a hypothesis.

Upon completion of this course, you will be able to:

- 1) Describe approaches used to address various immunological research questions
- 2) Associate your new knowledge about the topics taught to comprehension of current literature
- 3) Analyze a scientific article and evaluate critically the data
- 4) Design experiments based on the current literature
- 5) Communicate your ideas clearly
- 6) Become a self-directed learner

## Feedback and Grading

The course grade will be based on two open-note take-home exams, three methodology toolboxes and on participation in the class discussions (see % distribution below), and a letter grade will be attributed according to the grade scale shown below. You are, therefore, expected to attend class, read the assigned scientific article prior to class and actively engage in class discussions (if unable to attend a class, students should let the instructor and course director know and arrange a meeting with the instructor to remediate).

The assignments will be graded as shown below:

Assignments	Contribution
Methodology Toolbox (4)	5%
Draft exams questions (3)	5%
Oral Participation	40%
Take home exams (2)	50%

Course grade	Approximate percent score
A+	98-100
A	90-97.9
A-	86-89.9
B+	83-85.9
B	79--82.9
B-	74-78.9
C+	69-73.9
C	64-68.9
C-	59-63.9
D	55-58.9
F	<55

You will receive weekly feedback on your participation and the submitted methodology toolbox, as well as on experimental design practice in class. In addition, formative feedback will be provided on the first 3 exam questions given at the end of sessions 2-4, in order for you to master how to design experiments. The others exam questions will be corrected in an anonymous way. Additional feedback will be provided during the last review session and for each exam question.

## Assignments

### 1. Take home exams

You will be asked to design hypothesis-driven experiments related to each topic/article. The rationale behind your hypothesis or your approach should be based on the current literature, and the experimental design should address your hypothesis. Your design should also include appropriate controls and proposed expected results based on the current literature. Consulting with other students, lab mates, or mentors on exam questions is not permitted.

## Rubric

	0-2	3-5	6-7	8-10
Rationale	none	Not based on the current literature	Based on the current literature but inaccuracy	Based accurately on the current literature
Design	Does not address hypothesis No good controls	Address somewhat hypothesis & no good controls	Address somewhat hypothesis & fair controls	Address hypothesis & good controls
Expected results	none	Not well developed and not based on the current literature	Well developed but not based on the current literature	Well developed and based on the current literature

### 2. Methodology toolbox

You will submit a 1-paragraph summary about the main methodologies used in the scientific articles analyzed in sessions 1-4 (and possibly other sessions depending on the instructors), following the example posted on Blackboard.

Level of clarity and content understanding will be evaluated using a 0-5 scale (1 poor, 2 fair, 3 good, 4 very good, 5 excellent).

### 3. Oral participation

Your participation will be assessed based on your ability to knowledgeably discuss the assigned scientific article. Level of preparation, content understanding, level of engagement and communication skills will be evaluated. This would include your ability to 1) describe the question asked by the authors for each figure and the methodology/approach used to address the questions, 2) analyze the data and interpret the results.

A maximum of 8 points will be given for your explanation of a figure. Additional participation in the overall discussion will also be considered for 2 additional points.

### Diversity and Inclusion Statement

University of Louisville strives to foster and sustain an environment of inclusiveness that empowers us all to achieve our highest potential without fear of prejudice or bias. We commit ourselves to building an exemplary educational community that offers a nurturing and challenging intellectual climate, a respect for the spectrum of human diversity, and a genuine understanding of the many differences-including race, ethnicity, gender, socio-economic status, national origin, sexual orientation, disability, and religion that enrich a vibrant metropolitan

research university. We expect every member of our academic family to embrace the underlying values of this vision and to demonstrate a strong commitment to attracting, retaining, and supporting students, faculty, and staff who reflect the diversity of our larger society.

### **Students with disabilities**

"The University of Louisville is committed to providing access to programs and services for qualified students with disabilities. If you are a student with a disability and require accommodation to participate and complete requirements for this class, notify me immediately and contact the Disability Resource Center (Stevenson Hall 119, 502-852-6938, [askdrc@louisville.edu](mailto:askdrc@louisville.edu)) for verification of eligibility and determination of specific accommodations."

### **Policy on Instructional Modifications**

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### **Plagiarism**

Any plagiarism, or using whole sentences or intact phrases written by others will be verified, resulting in failing grades followed by University disciplinary action.

### **Title IX/Clery Act Notification**

Sexual misconduct (including sexual harassment, sexual assault, and any other nonconsensual behavior of a sexual nature) and sex discrimination violate University policies. Students experiencing such behavior may obtain **confidential** support from the PEACC Program (852-2663), Counseling Center (852-6585), and Campus Health Services (852-6479). To report sexual misconduct or sex discrimination, contact the Dean of Students (852-5787) or University of Louisville Police (852-6111).

Disclosure to **University faculty or instructors** of sexual misconduct, domestic violence, dating violence, or sex discrimination occurring on campus, in a University-sponsored program, or involving a campus visitor or University student or employee (whether current or former) is **not confidential** under Title IX. Faculty and instructors must forward such reports, including names and circumstances, to the University's Title IX officer.

For more information, see the Sexual Misconduct Resource Guide

(<http://louisville.edu/hr/employeerelations/sexual-misconduct-brochure>).

## SCHEDULE Spring 2023

Wednesday 3-5:00 PM  
Rm 601

Course Introduction/paper analysis/experimental design (Alard)	1/11
Function of dendritic cells (Alard)	1/18
NK cells and cross-talk (Alard)	1/25
Innate lymphoid cells (Alard)	2/1
Differentiation and function of macrophages (Yaddanapudi)	2/8
Neutrophil and pathogen interactions (Uriarte)	2/15
Inflammasome (Salter)	2/22
Chemokines and chemokine receptors (Bodduluri)	3/1
<b>TAKE HOME EXAM 1</b>	<b>2/22-3/5</b>
T cell development and thymic function (Kosiewicz)	3/8
<b>No class (Spring Break)</b>	<b>3/15</b>
T cell activation (Shao)	3/22
B cells in health and disease (Watson)	3/29
Treg (Kosiewicz)	4/5
T cell memory (Kosiewicz)	4/12
Exam Review/questions (Alard)	4/19
<b>TAKE HOME EXAM 2</b>	<b>4/12-4/26</b>