

**ADVANCED TOPICS IN CELL BIOLOGY**  
**MCB6772 Section MMB1, Spring – 2025**  
**1 credit**

**Time: Tuesdays and Thursdays; 8:00 AM to 10:00 AM EST**  
**(In-person meetings in MCS room 1044)**

**Instructors:** Peter Kima (pkima@ufl.edu) & Zhonglin Mou (zhlmou@ufl.edu)

**Course Description:** Specific topics about cell structure and function published in recent journal articles with microbiological interest animal and plant systems will be studied. The specific topic for this semester will be organelle targeting in the context of infection. We will discuss how pathogens target or regulate the biology of organelles in animal and plant cells.

**Course Objectives:**

- To develop an understanding of current advances and approaches in the study of the cell biology of eukaryotes.
- To gain insight on differences between plants and animals pertaining particularly to their susceptibility or capacity to resist or to be exploited by microbial pathogens.

**Student Responsibilities:**

You are expected to read the research papers and upload questions and/or comments under Assignments in Canvas (do not send to the instructor) for each class. At least 3 questions or comments on each paper are required. You are encouraged to watch the videos of the in-person class discussion, which will discuss the review and research articles. The links to the videos will be posted in Canvas. You can also attend the in-person class if possible.

There will be one quiz on each article (8 in total) and quiz questions will be extracted from the assigned research articles.

A written paper of 1-2 pages (11 point) will be expected from each student no more than 1 week after the end of the course. The paper will be in response to questions that will be made available before the end of the course. You will also be expected to prepare about 20 Powerpoint slides for a 30-min presentation on the first plant research paper or the first animal research paper you will learn in the course.

**Student Evaluation:**

Quizzes will be worth 40% of grade; final paper will be worth 30% of grade; participation (submission of questions and/or comments) will be worth 10% of grade; Powerpoint presentation will be worth 20% of the grade.

Final grades will be based on the following performance standard (100 points total):

|                |   |           |
|----------------|---|-----------|
| 92 - 100 %     | = | <b>A</b>  |
| 85 - 91.9 %    | = | <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>  |

**Course Schedule:**

(Quiz questions will be from the papers **highlighted in bold**)

|   |
|---|
| <p>2/4<br/>                 Topic: <i>Introduction to the course &amp; organelle targeting in animal immunity and pathogenesis I</i><br/>                 Presenters:<br/>                 Articles:<br/>                 1. <b>Hein et al. 2024. Global organelle profiling reveals subcellular localization and remodeling at proteome scale. Cell 188, 1-19.</b></p>   |
| <p>2/6<br/>                 Topic: <i>organelle targeting in animal immunity and pathogenesis II</i><br/>                 Presenters:<br/>                 Articles:<br/>                 1. Okumoto et al. 2020. Peroxisome: Metabolic functions and biogenesis. <i>Advances in Experimental Medicine and Biology</i> 1299, 3-17 (Review).<br/>                 2. <b>Raj et al. 2024. Salmonella Typhimurium effector SseI regulates host peroxisomal dynamics to acquire lysosomal cholesterol. EMBO Reports</b></p>   |
| <p>2/11<br/>                 Topic: <i>organelle targeting in animal immunity and pathogenesis III</i><br/>                 Presenters:<br/>                 Articles:<br/>                 1. Delgado and Pernas 2024. Mitochondria as sensors of intracellular pathogens. <i>Trends in Endocrinology &amp; Metabolism</i> (Review).<br/>                 2. <b>Zmuda M, et al, 2024. The Bordetella effector protein BteA induces host cell death by disruption of calcium homeostasis. mBio 15, e0192524.</b></p>  |
| <p>2/13<br/>                 Topic: <i>organelle targeting in animal immunity and pathogenesis IV</i><br/>                 Presenters:<br/>                 Articles:<br/>                 1. Masone et al. 2019. Illuminating the membrane contact sites between the endoplasmic reticulum and the trans-Golgi network. <i>FEBS Letters</i> 593, 3135-3148 (Review).<br/>                 2. <b>Wang et al. 2024. Anaplasma phagocytophilum effector EgeA facilitates infection by hijacking TANGO1 and SCFD1 from ER-Golgi exit sites to pathogen-occupied inclusions. PNAS 121, e2405209121.</b></p> |
| <p>2/18<br/>                 Topic: <i>organelle targeting in plant immunity and pathogenesis I</i><br/>                 Presenters:<br/>                 Articles:<br/>                 1. Liu et al. 2024. Chloroplast immunity: A cornerstone of plant defense. <i>Molecular Plant</i> 17, 686-688 (Review).<br/>                 2. <b>Qi et al. 2024. Chloroplast elongation factors break the growth-immunity trade-off by simultaneously promoting yield and defence. Nature Plants 10, 1576-1591.</b></p>   |
| <p>2/20<br/>                 Topic: <i>organelle targeting in plant immunity and pathogenesis II</i><br/>                 Presenters:</p>   |

Articles:

1. Liu. 2025. Endoplasmic reticulum homeostasis in plant-pathogen interactions: new scenarios for an old story. *Journal of Experimental Botany* 76, 277-284 (Review).
2. **Breeze. 2021. A tell tail signa: a conserved C-terminal tail-anchor domain targets a subset of pathogen effectors to the plant endoplasmic reticulum. *Journal of Experimental Botany* 74, 3188-3202.**

2/25

Topic: *organelle targeting in plant immunity and pathogenesis III*

Presenters:

Articles:

1. Wang et al. 2022. Mitochondrial functions in plant immunity. *Trends in Plant Science* 27, 1063-1076 (Review).
2. **Pan et al. 2024. The *Puccinia striiformis* effector Pst11215 manipulates mitochondria to suppress host immunity by promoting TaVDIP1-mediated ubiquitination of TaVDAC1. *New Phytologist* 244, 1961-1978.**

2/27

Topic: *organelle targeting in plant immunity and pathogenesis IV*

Presenters:

Articles:

1. Su et al. 2019. Dynamics of peroxisome homeostasis and its role in stress response and signaling in plants. *Frontiers in Plant Science* 10, 705 (Review).
2. **Cao et al. 2024. The RXLR effector PpE18 of *Phytophthora parasitica* is a virulence factor and suppresses peroxisome membrane-associated ascorbate peroxidase NbAPX3-1-mediated plant immunity. *New Phytologist* 243, 1472-1489.**