

MCBA 740
Biological Microscopic Imaging I
Fall 2024

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Description

Histology to confocal microscopy. Through the combination of lecture and laboratory learning, students will leave this class understanding the scientific principles underlying the techniques as well as hands-on training for sample preparation, histology, confocal microscopy, and image analysis.

Prerequisites

There is no prerequisites for this course.

Learning Outcomes

After successful completion of this course, you will be able to:

1. process sample tissue, including fixing, sectioning, and staining.
2. image samples on a light microscope.
3. image samples on a confocal microscope.
4. use basic image analysis software.

Required Texts

All required course materials and laboratory manuals will be provided on the first day of class.

Course Assignments and Grading

Laboratory Reports

Students will be expected to submit a total of 2 laboratory reports during the semester. The first topic will be based on light microscopy and digital imaging, due around the middle of the semester. The second topic will be based on confocal microscopy, due at the end of the semester.

Evaluation and Grading Scale

All graded materials will be promptly graded and returned. All grades will be posted on Blackboard. You are strongly encouraged to check your scores in Blackboard regularly. A final letter grade will be assigned based on percentages.

Assignment Weights	Percent
Lab Participation	26%
Light Microscopy Report	37%
Confocal Microscopy Report	37%
Total	100%

Lab Participation (14 labs @ 10 points) = 140 points

Light Microscopy Report = 200 points

Confocal Microscopy Report = 200 points

Total Points - 540 points

Grading Scale

89.5% - 100% = A

84.5% - 89.4% = B+

79.5% - 84.4% = B

74.5% - 79.4% = C+

69.5% - 74.4% = C

64.5% - 69.4% = D+

59.5% - 64.4% = D

0% - 59.4% = F

Course Policies and Procedures

All graduate students are subject to the academic policies, regulations, and academic standards of both The Graduate School and the department, school and/or college in which enrolled.

[USC graduate bulletin](https://academicbulletins.sc.edu/graduate/policies-regulations/graduate-academic-regulations) (<https://academicbulletins.sc.edu/graduate/policies-regulations/graduate-academic-regulations>)

Attendance Policy

When you miss class, you miss important information. If you are absent, you are responsible for learning material covered in class. If you have an [excused absence](https://academicbulletins.sc.edu/undergraduate/policies-regulations/undergraduate-academic-regulations) (<https://academicbulletins.sc.edu/undergraduate/policies-regulations/undergraduate-academic-regulations>), you will be permitted to make up coursework or complete an equivalent assignment agreed upon with me.

To arrange excuses for absences that can be anticipated at the start of the term, you should:

- Submit a request in writing (email is acceptable) stating the dates of the anticipated absence no later than the end of the second week of the course.
- Explain the reason for absence. In some cases, documentation may be required. Please [consult the policy](https://academicbulletins.sc.edu/undergraduate/policies-regulations/undergraduate-academic-regulations) (<https://academicbulletins.sc.edu/undergraduate/policies-regulations/undergraduate-academic-regulations>) for additional information.
- Include any request for make-up work.

To arrange excuses for absences that cannot be anticipated at the start of the term, (e.g. legal proceedings or illness), you should, at the first opportunity, submit in writing a request stating:

- The date of absence
- The reason for absence. In some cases, documentation may be required. Please [consult the policy](#) for additional information.
- Any request for make-up work as soon as reasonably possible after you become aware of the need to be absent.

Academic Integrity

As a partner in your learning, it is important to both of us that any assignment submission is a pure reflection of your work and understanding. The introduction of artificial intelligence options to complete academic work jeopardizes my ability to evaluate your understanding of our course content and robs you of the ability to master the subject matter.

Suspensions of use of artificial intelligence aids will be referred to the Office of Academic Integrity as alleged violations of Cheating, defined as “unauthorized assistance in connection with any academic work” and/or Falsification, which includes “Misrepresenting or misleading others with respect to academic work or misrepresenting facts for an academic advantage”.

You are expected to practice the highest possible standards of academic integrity. Any deviation from this expectation will result in a minimum academic penalty of your failing the assignment, and will result in additional disciplinary measures. This includes improper citation of sources, using another student's work, and any other form of academic misrepresentation.

The first tenet of the Carolinian Creed is, "I will practice personal and academic integrity."

Below are some websites for you to visit to learn more about University policies:

- [Carolinian Creed](http://www.sa.sc.edu/creed) (<http://www.sa.sc.edu/creed>)
- [Academic Responsibility](http://www.sc.edu/policies/staf625.pdf) (<http://www.sc.edu/policies/staf625.pdf>)

- [Office of Student Conduct and Academic Integrity](https://www.sa.sc.edu/academicintegrity/)
(<https://www.sa.sc.edu/academicintegrity/>)
- [Information Security Policy and Standards](https://sc.edu/about/offices_and_divisions/division_of_information_technology/security/policy/universitypolicy/)
(https://sc.edu/about/offices_and_divisions/division_of_information_technology/security/policy/universitypolicy/)

Disability Services

[Student Disability Resource Center](http://www.sa.sc.edu/sds/) (<http://www.sa.sc.edu/sds/>): The Student Disability Resource Center (SDRC) empowers students to manage challenges and limitations imposed by disabilities. Students with disabilities are encouraged to contact me to discuss the logistics of any accommodations needed to fulfill course requirements (within the first week of the semester). In order to receive reasonable accommodations from me, you must be registered with the Student Disability Resource Center (1705 College Street, Close-Hipp Suite 102, Columbia, SC 29208, 803-777-6142). Any student with a documented disability should contact the SDRC to make arrangements for appropriate accommodation.

Mental Health

If stress is impacting you or getting in the way of your ability to do your schoolwork, maintain relationships, eat, sleep, or enjoy yourself, please reach out to any of our mental health resources. Most of these services are offered at no cost as they are covered by the Student Health Services tuition fee. For all available mental health resources, check out [Student Health Services Mental Health](https://www.sc.edu/about/offices_and_divisions/health_services/mental-health/index.php) (https://www.sc.edu/about/offices_and_divisions/health_services/mental-health/index.php) and the quick reference list below.

- Wellness Coaching can help you improve in areas related to emotional and physical wellbeing (e.g., sleep, resiliency, balanced eating and more) – schedule an appointment at (803) 777-6518 or on [MyHealthSpace](https://myhealthspace.ushs.sc.edu/login_dualauthentication.aspx) (https://myhealthspace.ushs.sc.edu/login_dualauthentication.aspx)
- Access virtual self-help modules via [Therapy Assistance Online \(TAO\)](https://us.taoconnect.org/register) (<https://us.taoconnect.org/register>) – see [TAO registration instructions](https://www.sc.edu/about/offices_and_divisions/health_services/medical-services/counseling-and-psychiatry/online-support/index.php) (https://www.sc.edu/about/offices_and_divisions/health_services/medical-services/counseling-and-psychiatry/online-support/index.php).
- Access additional articles and videos on health and wellness topics on the Wellness Hub, thriveatcarolina.com, or by downloading the [CampusWell](https://www.campuswell.com/) (<https://www.campuswell.com/>) app and searching for University of South Carolina.
- Counseling & Psychiatry offers individual and group counseling and psychiatric services – schedule an appointment at (803) 777-5223 or on [MyHealthSpace](https://myhealthspace.ushs.sc.edu/login_dualauthentication.aspx) (https://myhealthspace.ushs.sc.edu/login_dualauthentication.aspx).
- Access the 24-hr Mental Health Support Line at (833) 664-2854.

- Access an anonymous [mental health screening program](https://www.uscscreening.org/welcome.cfm?access=website)
(<https://www.uscscreening.org/welcome.cfm?access=website>)

Course Schedule

Week 1: August 28

Lecture - Worden

Intro

1. Introduction to IRF staff
2. Course Requirements
3. Rules for use of IRF and COVID 19 restrictions
4. Specimen fixation, processing, sectioning, H&E and Trichrome stains

Lab

Schedule time in groups of 3 with Karmen for training

1. Fixation and Processing to get paraffin blocks
2. Paraffin and Cryo sectioning
3. H&E and Trichrome stains on tissue of choice

Week 2: Sept 4

No Lecture – Labor Day

Lab

1. Continue with histology lab sectioning and staining – Karmen
2. Learn Nikon E600 light microscope - Anna

Week 3: September 11

Lecture – Worden

1. Continue with histology
2. Begin Immunohistochemistry

Lab

1. Continue with histology lab sectioning and staining – Karmen
2. Continue with Nikon E600 light microscope and take images for class reports - Anna

Week 4: September 18

Lecture – Potts

1. Cell and tissue structure

Lab

1. Use Antigen Retrieval techniques and stain slides with provided immunohistochemistry kit – Meardey
2. Image slides on E600 and save for image analysis exercises

Week 5: September 25

Lecture – Potts

1. Cell and tissue structure

Lab

1. Use Antigen Retrieval techniques and stain slides with provided immunohistochemistry kit – Meardey
2. Begin Photoshop on E600 images - Worden

Week 6: October 2**Lecture – Worden**

1. Continue with histology

Lab

1. Photoshop - Worden

Week 7: October 9**Lecture – Worden**

1. Histology and Immunohistochemistry

Lab

1. Finish up all light microscopy, E600 and Photoshop

Week 8: October 16**Lecture – Worden**

1. Finish Immunohistochemistry
2. Digital Imaging

Lab - Anna

1. Specimen processing for confocal including cells, vibratome sections of tissue and triple label staining – Anna

Week 9: October 23**Lecture – Worden**

1. Digital Imaging

Lab

1. Stellaris confocal training –Anna

Light Microscopy/Digital Imaging Report due October 23rd**Week 10: October 30****Lecture – Worden**

1. Digital Imaging

Lab

1. Stellaris or Leica SP8 confocal training

Week 11: November 6**Lecture – Worden**

1. Confocal Microscopy

Lab

1. Confocal Microscopy Exercises

Week 12: November 13**Lecture – Worden**

1. Confocal Microscopy

Lab – continued from above

1. AMIRA -Lorain
2. Leica SP8: Multiphoton and second harmonic generation imaging (Harper)

Week 13: November 20**No Lecture**

Lab

1. Finish confocal and AMIRA lab exercises.

Week 14: November 27**Lecture – Worden**

1. Confocal Microscopy

Lab

1. Finish all projects

Week 15: December 4**Lecture – Worden**

1. Quiz Bowl

Confocal Reports due December 11th