SLCC

Engineering Department

MSE 1820 - 401: Fundamentals of Microscopy

[redacted]

Instructor:

Email:

Office Hours:

Textbook Information: An Introduction to Microscopy - Susan Bell and Keith Morris - ISBN: 978-1-4200-8450-4

COVID Policies: For the most recent Covid-19 information, visit the College's Covid-19 information page - **http://www.slcc.edu/safe/c19.aspx**

Course Description: This course introduces students to the use of optical microscopes in scientific applications. Includes both theory and practical applications.

Grade Breakdown	
A	93 – 100
A-	90 - 92
B+	87 - 89

B	83 - 86
B-	80 - 82
C+	77 - 79
C	73 - 76
C-	70 - 72
D	61 - 69
E	< 60

Grading Criteria

(20%) Cumulative Final Exam

(20%) Two In-Class Exams

(20%) Chapter/Lecture Quizzes

(20%) Post-lab Quizzes

(20%) Practicum

Important Dates:

Please visit the following website for the complete academic calendar. Pay particular attention to add, drop,and withdraw dates.

http://www.slcc.edu/academiccalenda

Lecture and Assignment Information: Prerecorded videos, associated PowerPoint lectures, Canvas quizzes, and post-lab quizzes can be accessed by clicking on the appropriate weekly module.

Chapter Quizzes and Post-Lab Quizzes: Will be administered through Canvas. You are allowed to use the textbook, PowerPoint lectures, and notes while completing chapter and post-lab quizzes.

Labs: During the first week of class, you will select a lab time used for the entire semester. The microscopy lab technician will facilitate the lab sessions with you.

Lab Attendance: If you need to miss a remote lab session, you are responsible for contacting the microscopy lab technician to provide notice of your absence. There will be no penalty for unexpected absences confirmed with appropriate documentation. Unexcused absences will result in a 10 point deduction on your post-lab grade.

Exams: There will be two in-class exams and a final exam.

Exam Make Up: You will be allowed one make-up for each exam that is missed. You will be given one week from the request date to make up the exam unless you have documentation stating extenuating circumstances (medical, legal, etc.). Email me with exam make up in the subject line if you need an assignment opened.

Late Work Policy: Students will be allowed unlocks for two assignments only . You will be given one week from request date to complete the assignment. Email me with assignment unlock in the subject line if you need an assignment opened.

Timeline:

Day	**Topic**
January 8th	Lecture: Light and Matter (Chapter 1)
January 10th	Lecture: Fundamentals of Light and Optics (Chapter 2)
January 15th	Holiday
January 17th	Lab: Parts of the Microscope/Lenses
January 22nd	Lecture: Bright-Field/Dark-Field Microscopy (Chapter 3 - 3.1)
January 24th	Lab: Dark Field Microscopy

January 29th	Lecture: Phase Contrast Microscopy (Chapter 3 - 3.2)
January 31st	Lab: Phase Contrast Microscopy
February 5th	Exam 1 The following assignments are due by 11:59 pm Friday, February 9th: Parts of the Microscope Lab Quiz Dark Field Microscopy Post-Lab Quiz Phase Contrast Microscopy Lab Quiz Chapter 1 Light and Matter Quiz Chapter 2 Fundamentals of Light and Optics Quiz Lenses and Condensers Chapter 3Quiz_Bright Field and Dark Field Microscopy Phase Contrast Microscopy Quiz
February 7th	No Lab
February 12th	Image J (Chapter 4)
February 14th	Lab: Inserting Scale Bars Using Image J
February 19th	Holiday - No Class

February 21st	Lecture: Laser Scanning Confocal Microscopy
February 26th	Lecture: Differential Interference Contrast (DIC) Microscopy - Part I Basic Operation
February 28th	Lecture: Differential Interference Contrast (DIC) Microscopy - Part II - Components and Use
March 4th	Spring Break - No Class
March 6th	Spring Break - No Class
March 11th	Lecture: Oil Immersion Lens/Sample Prep (Chapter 5)
March 13th	Lab: Imaging with the Oil Immersion Lens
March 18th	Lecture: Polarized Light Microscopy (Chapter 7)
March 20th	Polarized Light Microscopy Lab
March 25th	Complete the following assignments:

	Polarized Light Microscopy Lecture Quiz Polarized Light Microscopy Post-Lab Quiz
March 27th	Microscopy Demonstrations
April 1st	Fluorescence Microscopy Lecture
April 3rd	Exam 2 The following assignments are due by 11:59pm Friday, April 5th: ImageJ Calibration and Scale Bar Lab Quiz Oil Immersion Lens Lab Quiz Polarized Light Microscopy Lab Quiz Laser Scanning Confocal Microscopy Virtual Lab Quiz Differential Interference Contrast (DIC) Virtual Post-Lab Quiz Laser Scanning Confocal Microscopy Lecture Quiz Polarized Light Microscopy Lecture Quiz
April 8th	Lab: Fluorescence Microscopy - Sample Prep
April 10th	Lab: Fluorescence Microscopy - Imaging
April 15th	Open Imaging/Practicum Review

April 17th	Open Imaging/Practicum Review
April 22nd	Practicum
April 24th	Practicum The following assignments are due by 11:59 pm Friday, April 26th: Fluorescence Microscopy Quiz Fluorescence Microscopy Lab Quiz
April 29th	N/A
May 1st	Final Exam 1:30 - 3:30

Students with Disabilities, Emergency Procedures, and other Relevant College Policies:

Please refer to the institutional syllabus for important College policies: **Institutional Syllabus (https://slcc.instructure.com/courses/530981/pages/institutional-syllabus)**

Dropping the Course: If you decide for any reason to discontinue this class, you must go through the process of dropping the class with SLCC. I cannot and will not do it for you. If you stop submitting work and do not drop the class, I am required to give you a grade based on the limited amount of work you have submitted, which could result in an "E".

Academic Dishonesty: Academic dishonesty will not be tolerated. Evidence of cheating or plagiarism will result in a score of zero forthe assignment. A second offense will result in an E for the course grade. The same penalties will apply to anyone assisting the cheating efforts of others. Possession of outside materials, notes, communication devices, etc. during an exam without permission of the instructor is considered cheating.

Important Resources for Students: Please review the Institutional Syllabus page for a complete listing of available College resources.

Institutional Syllabus (https://slcc.instructure.com/courses/530981/pages/institutional-syllabus)

Tutoring - **https://www.slcc.edu/tutoring/index.aspx (https://www.slcc.edu/tutoring/index.aspx)**

STEM Learning Centers - **https://www.slcc.edu/stem/index.aspx (https://www.slcc.edu/stem/index.aspx)**

Provide free assistance in Math, Science,Accounting, CSIS and Allied Health Classes at 6 campus locations.

College-Wide Learning Outcomes: The Core Themes of SLCC's Mission focus on Access and Success, Transfer Education, Workforce Education and Community Engagement. As such, all courses and programs address one or more of the below College-Wide Learning Outcomes.

Upon successful completion of any program at SLCC, students should:

1. Acquire substantive knowledge in the discipline of their choice sufficient for further study, and/or demonstrate competencies required by employers to be hired and succeed in the workplace.

2. Learn to communicate effectively.

3. Develop quantitative literacies necessary for their chosen field of study.

4. Learn to think critically.

5. Develop the knowledge and skills to be civically engaged, and/or to work with others in a professional andconstructive manner.

MSE 1820 Student Learning Outcomes:

Students will demonstrate an understanding of fundamental light microscopy concepts including ray diagrams, diffraction, interference, and refraction and recognize how the concepts affect the ability to achieve images with the desired spatial resolution.

Students will demonstrate an understanding of the basic principles of visible light including dual particle/wave-like behavior, wavelength, frequency, polarization, birefringence, and fluorescence, and apply the principles when analyzing light microscopy techniques.

Students will identify the major components of a light microscope including objectives, eyepieces, illumination sources, filters, polarizers, and cameras, and recognize how each component affects basic microscope operation.

Students will examine light microscopy techniques including bright field, dark field, phase contrast, polarized light, and fluorescence and recognize how light is manipulated in each technique to acquire images.

Students will utilize digital imaging and image processing software to demonstrate proficiency in digital capture and manipulation of microscope images.

Students will utilize light microscopy techniques during weekly, hands-on training sessions to demonstrate proficiency in the acquisition of light microscope images.