

**Towson University**  
**Master of Science in Forensic Science**

**Forensic Microscopy**  
**Frsc 650 Fall 2025**

<b>Class</b>	SC 1147, Wednesday afternoon, 5:00-8:50 pm.
<b>Course</b>	This course is designed to provide students with an overview of the theory and practical aspects of evidence analysis using various microscopic techniques including the stereomicroscope, compound microscope, comparison microscope, polarizing light microscope, fluorescence microscope, phase contrast microscope, FTIR microscope, hot stage microscopy, microspectrophotometry and electron microscopy.
<b>Reference Material</b>	Various handouts and PowerPoint's will be used. The required text is <u>Practical Forensic Microscopy</u> , A Laboratory Manual, Barbara P. Wheeler, ISBN 978-0-470-03176-6 , latest edition.
<b>Related Courses</b>	Forensic Science Graduate Course, FRSC 610
<b>Instructor</b>	Joseph Harant, Adjunct Professor in the Forensic Science Department, received B.S. in Biology from Towson University. He has worked in various capacities in the Laboratory Section of the Baltimore City Police Department for 31 years, including the Mobile Unit, Latent Print Unit, Chemistry Unit, and the Trace Unit. He then was employed as the Forensic Scientist Supervisor of the Trace Evidence Section at the Maryland State Police-Forensic Sciences Division, retiring in 2021.
<b>Office</b>	The instructor will be available immediately after class. He can be reached at <a href="mailto:jharant@towson.edu">jharant@towson.edu</a> .
<b>Teaching</b>	Instruction will include lectures, hands-on practical exercises and required reading from the reference material.
<b>Homework</b>	Assignments are based on the experiments done in the previous class. All sections and questions are to be done and to be turned in by the next class.

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**Concepts and Skills**

Upon completion of this course, each student will be able to:

1. Understand the physics of light and optics.
2. Properly care for and set up microscopes.
3. Understand the parts and operation of various types of microscopes.
4. Perform microscopic comparisons and analysis of typical trace evidence utilizing various types of microscopes.
5. Fully characterize trace evidence from an instructor provided trace evidence collection.
6. Analyze and interpret the information obtained from microscopical analysis.

**Attendance Policy**

Full attendance is expected from each student. The instructor will give the students advanced notice if he must miss a class.

**Grading**

Light, Optics, Stereo and Compound Microscope Quiz	10%
PLM Quiz	10%
Fluorescence and Phase Contrast Quiz	10%
FTIR and Thermal Microscopy Quiz	10%
Microspectrophotometry and Electron Microscopy Quiz	10%
Final Exam	20%
Lab/ Homework	10%
Mock Case Scenario	20%

**Grading Scale**

95-100 %	A
90-94 %	A-
85-89 %	B+
80-84 %	B
70-79 %	C
Below 69 %	F

**Cheating**

Cheating will not be tolerated and will result in the immediate failure of the work and notation of such action in the student's official college record.

**Withdrawal**

Withdrawal from class should be done formally.

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- Lecture 1- 08/27**                   Instructor and student introductions  
Class goals  
Microscope overviews  
Physics of Light, Optics  
Stereomicroscopy  
Experiment 1A, Q 1, 3-13  
(Also label parts of stereoscope)
- Lecture 2- 09/03**                   Compound Light Microscopy  
Koehler Illumination  
Experiment 2A, Q 1, 3-9  
Experiment 2B, Q 1-6  
(Also label parts of compound microscope)
- Lecture 3- 09/10**                   Experiment 2C.  
Slide preparation (wet mounts, permanent mounts), cross sections  
(Collect hair samples)
- Lecture 4- 09/17**                   **Quiz 1 (Optics, Stereo and Compound Microscopy)**  
Comparison Microscopy-Hair comparisons  
(Ed. 1) Experiment 15, Q 1-6.  
(Ed. 2) Experiment 17, Q 1-6.
- Lecture 5- 09/24**                   Polarized Light Microscopy  
(Fiber characterization)  
(Ed. 1) Experiment 3A, Q 1-12 and 3B, Q 2-6  
(Ed. 2) 3A, Q 1-13; 3B, Q 2-5,8,9  
(Also label parts of PLM)
- Lecture 6- 10/01**                   PLM continued  
(Ed. 1) Experiment 3C, Q 1, 2, 5 b, c, 6, 7  
(Ed. 2) Q 1,2,5b, c,6,9
- Lecture 7- 10/08**                   **Quiz 2 PLM and Hair comparisons**  
Phase Contrast Microscope  
(Ed. 1 and 2) Experiment 5A, Q 1, 3-7

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<b>Lecture 8- 10/15</b>	Fluorescence Light Microscope (Ed. 1) Experiment 4A, Q 1-11 (Ed. 2) Q 1-4, 6-12
<b>Lecture 9- 10/22</b>	<b>Quiz 3 Fluorescence and Phase Contrast Microscopes</b> (Ed. 1), Exp. 24; (Ed. 2), Exp. 31 Hot stage (Thermal) Microscopy, Q 1-4 Fiber Unknowns for Mock Case
<b>Lecture 10- 10/29</b>	FTIR analysis with ATR and Microscope Fiber unknowns continued. (Ed. 1) Exp. 17, (Ed. 2), Exp. 20, Q 1-5, 7 (Ed. 1) Exp. 22, (Ed. 2) Exp. 29, Q 1-3, 5
<b>Lecture 11- 11/05</b>	<b>Quiz 4 FTIR/ATR Microscope, Thermal Microscopy</b> (Ed. 1), Exp.23; (Ed. 2) Exp. 30 Microspectrophotometry Q 1-6 Paint examinations, Paint Unknowns for Mock Case (Ed. 1 and 2) Exp. 14, Q 1, 3, 4, 6-9 (Ed. 1) Exp. 22, (Ed. 2), Exp. 29, Q 4
<b>Lecture 12- 11/12</b>	Paint unknowns continued. FTIR analysis (Ed. 1) Exp. 25, (Ed. 2) Exp. 32, Electron Microscopy Q. 1-6, 10
<b>Lecture 13- 11/19</b>	<b>Quiz 5 Microspectrophotometry and Electron Microscopy</b> Report Writing
<b>Lecture 14- 12/03</b>	Test review, Mock cases turned in.
<b>Lecture 15- 12/10</b>	<b><u>Final Exam</u></b>

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**Laboratory Policy for Pregnant Students**

Pregnant students should consult their physicians for advice on whether or not to perform experiments in the laboratory. Students are encouraged to provide their physician with a list of the chemicals that they might be exposed to while in lab. They should also check the MSDS sheets (available in the Department) to be aware of the hazards of the chemicals.

If a student is advised against performing laboratory work, then faculty must make accommodations for the student. Any accommodations should comprise a workload that is approximately equivalent to the regularly scheduled laboratory work. These accommodations may include:

- performing “dry” experiments only, in a place free from exposure to ongoing experiments;
- performing the wet chemistry at a later date;
- receiving an incomplete grade in the course pending completion of experimental work

**Chemistry Department Statement on Diversity and Inclusion**

The students, faculty, and staff at Towson University represent a diverse and vibrant community of learners and scholars. As a community, we value the unique contributions of each individual and promote active participation in all aspects of the learning process by each community member. Your instructor supports Towson University’s goal of fostering a diverse and inclusive educational setting. Your instructor strives to create an educational environment built upon the principles of mutual respect and support. Toward this end, all members participating in this course are expected to demonstrate respect for all other members of the class, both within and outside of the classroom. If you feel these expectations have not been met, please speak with your instructor or the designated diversity liaison, [Dr. Cindy Zeller \(czeller@towson.edu\)](mailto:czeller@towson.edu).

For further information regarding the diversity and inclusion policies of Towson University, please see, Towson University’s Office of Inclusion and Institutional Equity, [the Fisher College of Science and Mathematics Diversity Action Plan](#), and the [Chemistry Department Diversity Action Plan](#).