

FRNSC 411 Criminalistics: Trace and Impression Evidence

FALL 2019

COURSE SYLLABUS

It is the responsibility of each student to carefully review this document.

Course Instructor

Dr. Jack Hietpas

Assistant Professor

329A Whitmore Laboratory

University Park campus

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Phone: 814-863-5260

Faculty office hours: by appointment

Course Locations & Days/Times

Lecture

201 Osmond T/R 0800- 0850 hrs

Laboratory

333 Whitmore Laboratory

T/R 0905-1205 hrs

T/R 1325 – 1625 hrs

Teaching Assistant and Course Assistants

Alyssa Smale (Teaching Assistant): ans280@psu.edu

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Course Information

See the following Canvas website for course content and delivery:

<https://psu.instructure.com/courses/>

Introduction

You should have completed FRNSC 210 (Essential Practices of Forensic Science), CHEM 110, and CHEM 111 or their equivalents as the prerequisite courses for FRNSC 411. You should be familiar with Penn State's online course delivery system Canvas. This course is supported by online content which is accessible via Canvas.

This course is designed to prepare students for impression and trace evidence analysis in both the undergraduate and graduate level forensic science program by providing theory and knowledge essential to success in the forensic science courses and in the profession of criminalistics/ forensic science. The associated skills and abilities learned in FRNSC-210 will be further developed. In this course, students will learn principles of criminalistics, proper evaluation and comparison of impression evidence, and the theory and practical application of forensic microscopy to the analysis of unknown materials. The necessity of an objective, rigorous scientific approach in forensic investigation will be stressed.

Policies

Academic Integrity

All Penn State policies regarding ethics and honorable behavior apply to this course and each student must abide by the Academic Integrity policies set forth by the University Faculty Senate (Policy 49--20: Academic Integrity) and the Eberly College of Science. Academic dishonesty is not limited to simply cheating on an exam or assignment. The following is quoted directly from the "PSU Faculty Senate Policies for Students" regarding academic integrity and academic dishonesty: "Academic integrity is the pursuit of scholarly activity free from fraud and deception and is an educational objective of this institution. Academic dishonesty includes, but is not limited to, cheating, plagiarizing, fabricating of information or citations, facilitating acts of academic dishonesty by others, having unauthorized possession of examinations, submitting work of another person or work previously used without informing the instructor, or tampering with the academic work of other students." All University and Eberly College of Science policies regarding academic integrity/academic dishonesty apply to this course and the students enrolled in this course. It is your responsibility to be thoroughly familiar with all policies and sanctions. They can be accessed at:

- <http://science.psu.edu/current-students/Integrity/Syllabi.html>
- <http://www.science.psu.edu/academic/Integrity/Policy.html>
- <http://senate.psu.edu/policies-and-rules-forundergraduate-students/>

While discussion of course concepts and cooperative study are strongly encouraged, any collaboration, discussion, assistance, cheating (use of friends, books, notes, the internet, etc.) and plagiarism, etc., are NOT permitted during quizzes, examinations or any other assignments *unless otherwise specified in writing by the instructor*. All exam answers must be your own, and you must not provide any assistance to other students during quizzes homework, or exams. Any collaboration, discussion, assistance, cheating (use of friends, books, notes, the internet, etc.) about or during a quiz, examination, exercise, homework, assignment, or commit plagiarism or other unethical or dishonest behavior, **will result in failure of the quiz, examination, exercise, homework, and/or assignment and may lead to failure of the course and University disciplinary action. Integrity violations become part of your record.** Integrity and ethics are considered exceptionally important by the instructor and course assistants. You are entering a profession where your integrity is of paramount importance and cannot be suspect in any way. Do not think lying, stealing, or cheating will be tolerated. Do not tolerate this in other students in

the forensic science program – report it. **The sanctions will depend on the offense severity. No credit on the quiz, exam, exercise, homework, assignment, or other class assignment and may range to include failure of the course. Ethics violations become part of the academic record.**

Each student in this course is expected to work entirely on her/his own while taking any quiz or exam, to complete exercises or other assignments on her/his own effort without the assistance of others unless directed otherwise by the instructor, and to abide by University and Eberly College of Science policies about academic integrity and academic dishonesty. Academic sanctions are determined and assigned by the instructor or by the instructor together with the College Academic Integrity Committee. Disciplinary sanctions may be recommended by the instructor, the College Committee, or the Associate Dean, and are assigned by the Office of Judicial Affairs. The XF grade is a disciplinary sanction that is only assigned with the concurrence of the instructor, the College of Academic Integrity Committee, and Judicial Affairs.

Code of Mutual Respect

The Eberly College of Science Code of Mutual Respect and Cooperation embodies the values that we hope our faculty, staff, and students possess and will endorse to make The Eberly College of Science a place where every individual feels respected and valued, as well as challenged and rewarded.

<http://science.psu.edu/climate/code-of-mutual-respect-and-cooperation/Code-of-Mutual-Respect%20final.pdf/view>

Disability Policy

Penn State welcomes students with disabilities into the University's educational programs. If you have a disability--related need for reasonable academic adjustments in this course, contact the Office for Disability Services (ODS) at 814-863-1807 (V/TTY). For further information regarding ODS, please visit the Office for Disability Services Web site at

<http://equity.psu.edu/ods/>

To receive consideration for course accommodations, contact ODS and provide documentation. See the documentation guidelines at

<http://equity.psu.edu/student-disability-resources/guidelines>

If the documentation supports the need for academic adjustments, ODS will provide a letter identifying appropriate academic adjustments. Please share this letter and discuss the adjustments with your instructor as early in the course as possible. You must contact ODS and request academic adjustment letters at the beginning of each semester.

Goals

Students will be able to:

- Describe the importance of Kirk's philosophy with that of Inman and Rudin's six principles of criminalistics and the importance of scientific philosophy in criminalistics
- Describe the nature and origin of physical evidence
- Understand the ethical reasons for and the ability to properly capture and preserve the physical evidence record by performing observations and accurately documenting the record and physical evidence during and following laboratory analysis
- Explain impression evidence origins and perform impression evidence evaluations and comparisons
- Explain foundational theories of light and optics as used in forensic microscopy including describing birefringence resulting from phase shifts of light in anisotropic particles
- Use chemical microscopy to identify unknown materials
- Gain the ability to characterize, identify, and compare hair, fiber and soil evidence
- Communicate the results of analyses, examinations, and interpretations in written reports according to accreditation standards that are relevant to the investigator and attorney
- The primary aim of the course is to prepare students for employment in impression or trace evidence sections of a criminalistics or forensic science laboratory using an intensive, problem solving style as well as by reading, use of interactive websites, practical exercises, homework, quizzes, and exams.

Learning Outcomes

Upon completion of FRNSC 411, the student will be able to:

- Communicate Kirk's and Rudin/Inman's philosophy of criminalistics and the importance of scientific philosophy in criminalistics
- Describe the importance chain of custody, and proper packaging of evidence to maintain evidence integrity
- Summarize differences between identifying, class, and individualizing characteristics
- Identify, characterize, and compare the most common forms of trace evidence using light microscopy
- Explain the process of and perform physical comparisons
- Set up Kohler illumination on the microscope and explain its importance in most microscopy
- Explain resolution from Abbe's theory or theory of Airy discs and describe the importance of resolution over magnification
- Use a stereo light microscope and tungsten needle to perform particle isolation and general particle handling for trace evidence sample preparation
- Describe fundamental theories of light, microscopical illumination, image formation, and aberrations of optical lenses and their corrections
- Capture observations accurately in documentation
- Use morphology, refractive index, and other optical properties in the identification of unknown materials
- Prepare and maintain legal documents in case folders
- Perform microcrystal and chemical spot tests in the identification of materials

Expectations

The following summarizes the expectations for this course:

The Instructor will:

- Provide clear and concise information on all assignments and assessment methods through weekly taped lectures and email correspondence
- Respond to queries within 24-48 hours via email
- Treat all students fairly and respectfully
- Do everything reasonably possible to facilitate learning
- Uphold the level of academic excellence expected of all Penn State faculty
- Conduct her/himself respectfully in online discussions and contribute constructive relevant knowledge

The Course Assistants will:

- Respond to queries within 24-48 hours
- Treat all students fairly and respectfully
- Act as a liaison for the students and instructor for general requests and concerns
- Immediately contact the instructor if they are unable to adequately address a student's question or concern
- Conduct themselves respectfully in online discussions and contribute constructive relevant knowledge

The Students will:

- Be actively engaged in the course by reading and using the required textbooks and online resources
- Read course material assigned before engaging in homework, quizzes, exams, or exercises
- Be actively engaged in the course by interacting with the instructor, CA, and online classmates (when permitted)
- Communicate to instructors and CA via Canvas email
- Ask questions and/or ask for help if they do not understand a concept/topic/assignment/directions
- Attend voice thread sessions
- Be expected to be proactive and take responsibility for their education by reading ahead of anticipated material
- Be expected to maintain the highest levels of academic integrity, honesty, ethical behavior, and honor throughout the course
- Be familiar with the University and ECoS academic integrity policy
- Be expected to complete and submit all assessments by the date specified by the instructor or course assistant(s)
- Be expected to immediately notify both the instructor and your course assistant via email and/or Canvas if an unavoidable emergency prevents the timely submission of an assignment or completion of an assessment. The instructor will determine what constitutes an unavoidable emergency.
- Understand that late, incomplete, or missing assignments and/or incompleteness of assessments will adversely affect their grade
- Conduct themselves respectfully in online discussions and contribute constructive relevant knowledge

- Be expected to complete quizzes and examinations **alone, individually, without assistance from other individuals or resources**, including notes, textbooks, electronic or digital or online resources, or other means of communication, etc.
- Be expected to submit her/his own work unless the instructor permits collaboration

Grading

Standard PSU grading scheme. This table contains the minimum number of points a student must earn to achieve a particular letter grade in the class.

Percent	Minimum Number of Points	Letter Grade
100	2530	A
93	2353	A
90	2277	A-
87	2201	B+
83	2100	B
80	2024	B-
77	1948	C+
70	1771	C
60	1518	D
<60	<1518	F

Midterm and Final Exams

The midterm is worth 500 points and final is worth 500 points. ***The final exam is cumulative.*** Be sure to read the instructions provided for each exam before you begin.

Required Course Materials

- McCrone WC, McCrone LB, Delly JG. Polarized Light Microscopy. Chicago: McCrone Research Institute, 1984.
- Bloss FD. Optical Crystallography, Washington, DC: Mineralogical Society of America, 1999.
- Delly J. Essentials of Polarized Light Microscopy. Westmont, Il: College of Microscopy, 2008. http://www.jysco.com/archives/asbestos/PLM_reading_McCrone.pdf

- McRoberts A (editor), *The Fingerprint Sourcebook*, National Institute of Justice. <https://www.ncjrs.gov/pdffiles1/nij/225320.pdf>
- **Additional references will be provided by the instructor throughout the** Instructor provided reading and websites on CANVAS

Recommended Reading

- Saferstein R, editor. *Forensic Science Handbook*:
Volume I. 2nd ed. Upper Saddle River: Prentice-Hall, 2002. Chapters 1, 4, 5, 7, and 11.
Volume II. 2nd ed. Upper Saddle River: Pearson Education, Inc./Prentice-Hall, 2005.
Chapters 1, 2, 5, 6, and 9.

Late Work Policy

Because the student has at least seven (7) days to complete homework, activities, and exercises, late submissions will not be accepted for full credit without PRIOR authorization from the Instructor. Extensions may be granted for exigent circumstances if the instructor is informed ahead of time (documentation may be requested) and believes the extension is warranted. Not all circumstances may be considered exigent or worthy of delay by the instructor. Contact the instructor or your course assistant as soon as possible with any issues or concerns or if you have questions.

If no authorization has been granted, late assignments (homework and exercises - NOT quizzes and exams) will have 20% taken from the final grade of the assignment for every 24 hours that passes from the due date. For example:

- If the assignment is due at 11:59pm on Wednesday night and you submit it at noon on Thursday, you will have 20% taken off your final grade for the late assignment. If you earn 17/20 for that assignment, your grade will be lowered to 13/20.

Improperly submitted homework and exercises will be considered late until they are resubmitted properly. Your CA cannot grade what they cannot read. Email your CA to check for proper submission of your homework if you are concerned – give them *at least 24 hours* to respond. Some examples of improperly submitted work include:

- Blank or incomplete work on the assignment
- The wrong document was submitted
- Photos, copies, or scans of the document are too faint or illegible
- The assignment was emailed to a CA instead of uploaded to Canvas
- The work was cut and paste into a text box instead of submitted
- The document submitted is not a Word document or is in an un-openable or corrupted format

If no authorization has been granted, quizzes and exams cannot be made up. You will receive a grade of zero for missing quizzes and exams if you have not received prior approval from the instructor before the quiz or exam window closes.

Attendance Policy

Students are expected to attend every lecture and laboratory session on time (refer to University Faculty Senate Policy 42-27 Class Attendance for further information.) Recurrent attendance issues will result in deductions from the FINAL course score.

Three (3) unexcused absences: 10% deduction in FINAL score

Four (4) unexcused absences: 25% deduction in FINAL score

Five (5) unexcused absences: 40% deduction in FINAL score

Note: Two (2) late arrivals equal one (1) unexcused absence. Six (6) lates = 10% deduction!!

Lab Safety Violations and Lack of Cleanliness

Safety and cleanliness issues will incur penalties at the discretion of the instructor.

DRESS, SAFETY, & HYGIENE

Appropriate attire must be worn while in the laboratories, the cottages, and field. Dress, safety, and hygiene issues will incur penalties at the instructor's discretion; students may be dismissed from the lab.

Requirements include:

Trousers or long pants only.

Shorts, skirts, and dresses are prohibited.

Shirts must fully cover the upper torso (neck to below navel) and a portion of the upper arms.

No exposure of upper chest/arms — tank tops, unbuttoned button-down tops, low-cut/plunging halter-neck, scoop-neck, and V-neck tops are prohibited.

No exposure of belly/midriff — tube tops and other short tops are prohibited.

Fully enclosed footwear only.

Sandals, flip-flops, and other open-toed shoes are prohibited.

High heels and other potentially unstable footwear are prohibited.

Very loose-fitting clothing, long hair, neckties, and jewelry may pose safety hazards. Plus tuck them or restrain them in some way.

Revealing or potentially offensive attire is prohibited.

You will be asked to leave with no right of return or use of course assistant time to make up for lab time missed for that day and exercise.

Safety in the laboratory is very important. If you see something unsafe or someone performing an act that is unsafe - stop the student before they are injured. Inform the instructor immediately.

Part of the laboratory skills grade accounts for continuous safe acts in the laboratory.

Keeping your work areas clean is important as is the common areas. Points will be lost because of poor maintenance of the common areas including the floor around your work table.

Course Calendar

Week	Date	Lecture Topic	Reading	Laboratory	Lab Due Dates
1	27-AUG-2019	Laboratory Documentation and Reports	Inman and Rudin Chapters 3 and 6 Barnett Chapter 6: Ethical Issues- Technical Competence CAC Code of Ethics	Lab 10: Particles (Introduction to proper note taking)	Particles: End of Class 29-AUG-2019 Particles Complete (Optional): 13-DEC-2019
	29-AUG-2019	Footwear Impression Evidence	Bodziak Chapter 10	Online FirearmsID	
2	03-SEP-2019	Toolmarks/ Firearms	Petraco Introduction Vanderkolk Chapter 8	Lab 2: Toolmarks <i>Lab 1: Footwear (home)</i>	Toolmarks: Beginning of Lab 17-SEP-2019 <i>Footwear:</i> 24-SEP-2019
	05-SEP-2019	Firearms			
3	10-SEP-2019	Fingerprints	Chapter 3 and 9 of NIJ		
	12-SEP-2019	Fingerprints		Lab 3: Firearms <i>Lab 4: Fingerprints (home)</i>	Firearms: 17-OCT-2019 Fingerprints: 08-OCT-2019
4	17-SEP-2019	Spot tests and Microchemistry	Announced on Canvas Instructor	Lab 5: Chemical Microscopy	Chemical Microscopy: 03-OCT-2019

			Provided		
	19-SEP-2019	Optics, Light, RI, Becke Line	Bloss Chapters 1-5		
5	24-SEP-2019	Optics, Light, RI, Köhler Illumination	Bloss Chapters 1-5		
	26-SEP-2019	Quiz 1	Saferstein Chapter 4		
6	01-OCT-2019	Glass Manufacture, Classification, Methods of Analysis I	Bloss Chapter 6 De Forest 2001		
	03-OCT-2019	Glass Manufacture, Classification, Methods of Analysis II, GRIM	Bloss Chapter 7		
7	08-OCT-2019	Crystallography, Morphology, Indicatrix	Bloss Chapter 8	Lab 6: Glass RI (including Becke Line and Relief)	Glass: Beginning of Lab 24-OCT-2019
	10-OCT-2019	Interference of Polychromatic Light, Birefringence, Retardation, Extinction			
8	15-OCT-2019	Uniaxial Crystals	Announced on Canvas Bloss, Instructor Provided		
	17-OCT-2019	Conoscopy: Uniaxial Crystals	Announced on Canvas Bloss, Instructor Provided	Midterm	
9	22-OCT-2019	Biaxial Crystals	Bloss Chapter 10	Lab 7: Köhler/ Optical Properties	Köhler/ Optical Properties: Beginning of Lab 07-NOV-2019
	24-OCT-2019	Conoscopy: Biaxial Crystals	Bloss Chapter 11		
10	29-OCT-2019	Hair Microscopy	Saferstein Chapter 7		
	31-OCT-2019	Hair Microscopy	Announced on Canvas Instructor Provided		
11	05-NOV-2019	Natural and Synthetic Fibers	Robertson Chapter 1	Lab 8: Human Hair Comparison	Hair: Beginning of Lab 03-DEC-2019
	07-NOV-2019	Natural and Synthetic Fibers			
12	12-NOV-2019	Transfer and Persistence	Robertson Chapter 5		
	14-NOV-2019	QUIZ 2			

13	19-NOV-2019	Introduction to Geology and Soil Formation	Mute Witness: Hopen		
	21-NOV-2019	SEM-EDS Part 1	Announced on Canvas Instructor Provided		
14	23-NOV-2019 TO 01-DEC-2019: NO CLASS- HAPPY THANKSGIVING				
	03-DEC-2019	SEM-EDS Part 2		Lab 9: Fiber Comparison	Fibers: 12-DEC-2019 1800 hrs
	05-DEC-2019	Gunshot Residue-pGSR	Schwoeble Chapters 1-3		
15	10-DEC-2019	Evidence Collection Methods	Announced on Canvas Instructor Provided		
	12-DEC-2019	Forensic Case Examples of Trace Evidence			
		FINAL EXAM			

Unless otherwise stated, LABS are due at 1800 hrs.

Assignment of Points

Activity/ Laboratory	Points	Approximate Percentage
Assigned Reading Questions 14 @ 20 points each	280	11%
Midterm	500	20%
Final Exam	500	20%
Quiz 1	150	6%
Quiz 2	150	6%
Laboratory 1: Toolmarks	100	4%
Laboratory 2: Shoeprints	100	4%
Laboratory 3: Fingerprints	100	4%
Laboratory 4: Firearms	100	4%
Laboratory 5: Chemical Microscopy	100	4%
Laboratory 6: Glass Refractive Index	100	4%
Laboratory 7: Köhler/ Optical Properties	100	4%
Practical Exam 7b: Köhler Exam	50	2%
Laboratory 8: Human Hair Comparison	100	4%

Laboratory 9: Fiber Comparison	100	4%
Laboratory 10: Particles (optional)	100	4%
TOTAL POINTS	2530	100%