

FRNSC 427W Forensic Chemistry

Lectures: M W F 1:25 – 2:15 pm / Forest Resources 104 /// Labs: M F 2:30 -5:30 pm / 18 Thomas

Course Description: Forensic chemistry is a classroom and laboratory-based course designed to introduce the student to the forensic analysis of trace evidence. The trace evidence can include paint, fire debris, glass, controlled drug substances, blood alcohol analysis, fibers, smokeless powders, inks/dyes, gunpowder, and explosives. The focus of the course will be first on developing an understanding of the use of the electromagnetic spectrum and associated instrumentation for chemical analysis then on identifying and understanding the nature of the samples, common sample preparation methods, and analytical instrumental methods. The lab portion of the course will teach the student development of analytical methods for forensic chemical analysis. The analytical methods will include microscopic analysis, spectroscopic, trace chemical, and chromatographic analytical tools that are commonly used in forensic laboratories. The lab will focus specifically on the use of Microscopes, ATR/IR analysis, HPLC, LC/MS and GC/MS analysis.

The course will rely heavily on the students' knowledge and skills that have been learned or acquired during their studies in the prerequisite course work. The prerequisite knowledge includes, but are not limited to: algebra, calculus, general chemistry, organic chemistry, analytical chemistry, basic statistics, polarizing light microscopy, spectroscopy theory, chromatography theory, proper evidence handling practice, and good writing skills. All these knowledge areas are represented in the required pre-requisite courses which are CHEM 210, 211 and 213 AND CHEM 227 AND (FRNSC 411 OR CHEM 431W).

The learning objectives and outcomes are primarily focused on preparing the students to be capable and competent scientists with sufficient knowledge to chemically identify, quantitate and characterize the substances of interest in Forensic analysis. Critical thinking skills for determining the significance level of forensic evidence will also be developed.

Instructor: Dr. William Campbell

329A Whitmore Laboratory / whc10@psu.edu phone: (814) 863-3387 / Cell: 814-321-8769

Office hours: Zoom meetings by appointment

Teaching Assistant: Courtney Patterson / cep5483@psu.edu

Recommended Resources:

- Personal laptop or desktop computer, Scientific calculator capable of exponentials and logs.
- [Penn State Library System](#) (including Course Reserves)
- [Media Commons](#) (located in the Pattee Library)
- [Penn State Learning Center for Writing](#) (tutoring, undergraduate students)
- [The Graduate Writing Center](#) (graduate students)
- [The Chemistry Resource Room](#) (tutoring and advising, alt. [Link](#))
- [Office of Science Engagement](#) (career and research options)

Textbook (Required):

At this point, the textbook has been cancelled.

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Other reading:

- Materials Analysis in Forensic Science, ed. Max Houck, Academic Press, 2015 (Course Reserves at Pattee Library)
- Journal articles suggested in lecture
- Writing the Laboratory Notebook, Kanare (should be on Course Reserves)
- Resources posted on Canvas and files/folders in Box
- NOTE: the reading list will continue to be updated

Learning Objectives and Outcomes:

- Understand and be knowledgeable of the role of Quality Assurance in the forensic laboratory
- Be knowledgeable of the theory and operation of the instruments used in a forensic laboratory
- Develop an ability to perform forensic methods of analysis for fibers, drug chemistry and smokeless powders through learning and practice in the lab and lecture as well as paint and glass analysis from lecture.
- Develop the skills to properly record data, observations, and results
- Develop the ability to think critically, logically, and analytically
- Demonstrate an understanding of substances and materials with forensic significance
- Understand the evidentiary value and significance of evidence
- Be able to coherently explain analytical tools, methods, or techniques
- Apply the knowledge of how to properly select an analytical instrument, tool, method, or technique based on a set of criteria
- Develop the ability to build upon prior knowledge and experience to develop a complete understanding of forensic chemistry

Grading and Letter Grade Assignments: (At this point, Scoring is still tentative)

Classroom (800 points)

Homework/Assignments / Attendance and Participation: 200pts

Two Regular Exams (200 pts each)

Final Exam (200 points)

Laboratory (max: 475 points)

(Professionalism, Conduct, Behavior will be part of the grade)

Module 1 – HPLC Method Development / Benzodiazepines	HPLC Optimization
Module 2 - Smokeless Powders	GC/MS / Microscope
Module 3 – HPLC Standard Curve / Benzodiazepines	HPLC Standard Curve
Module 4 – LC/MS Method development for Illegal drugs	Tandem LC/ MS
Module 5 – ATR/IR Drugs /// Microscope IR / Fibers.	Infrared Spectroscopy / Extraction

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Letter Grade Assignments

93 % to 100 %	A
90 % to < 93 %	A-
87 % to < 90 %	B+
84 % to < 87 %	B
80 % to < 84 %	B-
77 % to < 80 %	C+
70 % to < 77 %	C
60 % to < 70 %	C-
0 % to < 60 %	D

Additional comments:

Scaling or curving. There is no consideration given to scaling or curving on the cumulative point scores in this course. The students' performance is entirely derived from individual effort. As a consequence, adjusting the score based on the overall performance of the class is not consistent with the expectations of the course.

Classroom Participation and Attendance. At the start of the semester, Participation and Attendance Points start at 80 / 100 points and additional points are accrued based on performance and behavior.

- Up to +10 points for attendance and timeliness over the semester
- Up to +10 points for appropriate and professional and respectful behavior over the semester

Additional comments on Attendance: More than two (2) unexcused absences will result in a deduction of 10 points from the Participation and Attendance Points for each absence exceeding the two (2) unexcused absences.

Late Assignment and Quiz/Exam Make-up Policy: Only documented cases of hardship, emergency, illnesses, etc. will be considered for late assignment submissions or quiz/exam make-up. Late assignments after the due date/time will receive an immediate 50% deduction from the maximum point score before assignment grading. Assignments received over 24 hours after the due date/time will not receive any credit.

Make-up Quizzes. If a student has a scheduling conflict with the date and time of the quiz, the student is responsible for letting the Instructor know that she/he cannot be there for the quiz with as much notice as possible (at least a week, preferably). If the student does not inform the Instructor, no make-up quiz will be offered. NOTE: Please see Exceptions and Unforeseen Circumstances.

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Personal hardship. Life events happen. The instructor can discuss options to assist the student in completing the course, or if need be, to drop the course.

Pre-laboratory assignments. Introduction write-ups must be submitted on Canvas by the due date/time in order to earn credit. Students who have not completed the pre-lab assignments will be required to complete them prior to beginning the laboratory. For this student, this could result in not having sufficient time to complete the laboratory exercises and adversely affect their grade as well as their learning experience. (NOTE: students who do not complete TWO or more pre-laboratory exercises in a timely manner will result in a drop of one letter grade from their final grade in the overall course.)

Laboratory Professionalism, Conduct, Behavior. At the start of the semester, Professionalism Points start at 70 / 100 points and additional points are accrued based on performance and behavior.

- Up to +10 points for laboratory attendance over the semester
- Up to +10 points for appropriate and professional behavior over the semester
- Up to +10 points for effective use of laboratory time (e.g, conversation restricted to laboratory exercises, restrict texting and mobile device use to immediate and necessary personal concerns)

Laboratory Time. Students may NOT use lab time in the other laboratory sessions to perform any lab work, data collection, retrieval, or analysis without explicit written permission from the Instructor. The student must make the request in writing at least 48 hours in advance.

Laboratory Clean-up. Any work spaces that are left messy at the end of all laboratory sessions will be documented and will result in point deductions for all students officially registered for that session. Point deductions range from 1 to 10 points per incident depending on the severity of the infraction.

Rubrics. Each of the assignments, laboratories, papers, etc. will have their own set of rubrics. Please check the SOPs for the details on each of them.

Policy on Late Assignments. An assignment that is handed in after the due date/time posted on Canvas or announced in class, whichever one is the more recent, there will be a 50% deduction from the max points for the first 24 hours in which the assignment is late. Assignments submitted more than 24 hours after the due date/time will not receive any credit. NOTE: Please see Exceptions and Unforeseen Circumstances. NOTE: Please be aware that some specific assignments will be clearly identified as NO LATE assignments will be accepted and they must be submitted before or on the due date/time.

Classroom Expectations.

Electronic devices – FRNSC 427W related work only during the class. Applies to mobile devices (laptops, tablets, smartphones, smart watches, etc.)

Questions posed to class – Students are expected to respond to questions

Conversations and cross-talk – Conversations and cross-talk during lectures, or when an instructor, guest, or a student is speaking, are rude and unprofessional

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Preparation for lectures is encouraged – The Instructor will make every attempt to have all the materials available in the appropriate Box folder prior to class.

Note-taking is encouraged – Passive learning (e.g. listening to lectures) has a higher chance of poorer retention in knowledge and results in increased studying time without improved test scores. It is ineffective, increases anxiety as test dates approach, and is a bad habit that needs to be replaced.

Exceptions and Unforeseen Circumstances. If a student has a medical or personal emergency, the appropriate documentation required by Penn State Policy (See Course Policies – Attendance below) must be provided and alternate arrangements could be made to help the student complete the assignments, quizzes, laboratories, etc. If there is a weather event or other campus emergency that prevents the scheduled events from being completed on time, then the Instructor will announce the new dates/times when it is feasible to determine a new date/time.

Course Policies – Attendance

If you need to request an exception due to a personal or medical emergency, contact the instructor directly as soon as you are able. Such requests will be considered on a case by case basis.

This course abides by the Penn State Class Attendance Policy 42-27: <http://senate.psu.edu/policies/42-00.html#42-27>, Attendance Policy E-11: <http://www.psu.edu/oue/aappm/E-11.html>, and Conflict Exam Policy 44-35: <http://www.psu.edu/ufs/policies/44-00.html#44-35>. Please also see Illness Verification Policy: <http://studentaffairs.psu.edu/health/welcome/illnessVerification/>, and Religious Observance Policy: <http://www.psu.edu/oue/aappm/R-4.html>. Students who miss class for legitimate reasons will be given a reasonable opportunity to make up missed work, including exams and quizzes. Students are not required to secure the signature of medical personnel in the case of illness or injury and should use their best judgment on whether they are well enough to attend class or not; the University Health Center will not provide medical verification for minor illnesses or injuries. Other legitimate reasons for missing class include religious observance, family emergencies, and regularly scheduled university-approved curricular or extracurricular activities. Students who encounter serious family, health, or personal situations that result in extended absences should contact the Office of Student and Family Services for help: <http://studentaffairs.psu.edu/familyservices/>. Whenever possible, students participating in University-approved activities should submit to the instructor a Class Absence Form available from the Registrar's Office: http://www.registrar.psu.edu/student_forms/, at least one week prior to the activity. (Note: This form is currently only available online as a PDF).

Campus emergencies, including weather delays, are announced on Penn State Live (<http://news.psu.edu>) and communicated to cellphones, email, the Penn State Facebook page, and Twitter via PSUAlert (to sign up, please see <https://psualert.psu.edu/psualert/>).

Academic Integrity Statement

All Penn State policies regarding ethics and honorable behavior apply to this course. Academic integrity is the pursuit of scholarly activity free from fraud and deception and is an educational objective of this

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institution. All University policies regarding academic integrity apply to this course. 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.

For any material or ideas obtained from other sources, such as the text or things you see on the web, in the library, etc., a source reference must be given. Direct quotes from any source must be identified as such.

Students in this class are expected to write up their assignment or reports individually, to work the exams on their own, and to write their papers in their own words using proper citations. Class members may work on the assignments in groups, but then each student must write up the answers separately. Students are not to copy problem or exam answers from another person's paper and present them as their own; students may not plagiarize text from papers or websites written by others. Students who present other people's work as their own will receive at least a 0 on the assignment and may well receive an F or XF in the course.

All exam answers must be your own, and you must not provide any assistance to other students during exams. Any instances of academic dishonesty WILL be pursued under the University and [Eberly College of Science regulations](#) concerning academic integrity. For more information on academic integrity, see [Penn State's statement on plagiarism and academic dishonesty](#).

[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.

Plagiarism

Plagiarism is the practice of taking someone else's work or ideas and presenting them as your own. You are advised to look up the definition of and descriptions of different forms of plagiarism. **Plagiarism will not be tolerated!** The **first offense** will result in a **grade of zero** on the assignment **and filing of an Academic Integrity Form which will be forwarded to the Associate Dean's Office**. If a policy of dropping the lowest grade is implemented during the semester, you will not receive the benefit of this policy and you will have all grades count toward your final grade, including the zero on the plagiarized material. The **second offense** of plagiarism will result in a **grade of "F" in the course and referral to the Committee on Academic Integrity where further action may be taken**. If you need help determining the correct way to paraphrase another work without committing plagiarism, ask myself or another knowledgeable mentor.

(text courtesy of Dr. Greg Broussard)

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In this course, the Penn State edition of TurnItIn Feedback Studio (integrated with Canvas) will be used by the instructor, TAs, and students as a method of checking for plagiarism and to monitor the instances of both unintentional and intentional instances of plagiarism.

What is TurnItIn?

Turnitin is a web-based writing assessment toolkit which allows instructors to provide feedback to students through markup tools, rubrics, proofing tools and originality reports to detect plagiarism.

Turnitin also provides peer review options. (from: <http://turnitin.psu.edu/>)

Links:

What is plagiarism? [Theodore W. Frick, Professor Emeritus](#)

Penn State Student Affairs [Office of Student Conduct](#)

Accommodations for Students with Disabilities

Penn State welcomes students with disabilities into the University's educational programs. Every Penn State campus has an office for students with disabilities. The Office for Disability Services (ODS) Web site provides contact information for every Penn State campus: <http://equity.psu.edu/student-disability-resources>. For further information, please visit the Office for Disability Services Web site.

In order to receive consideration for reasonable accommodations, you must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation <http://equity.psu.edu/student-disability-resources/applying-for-services>. If the documentation supports your request for reasonable accommodations, your campus's disability services office will provide you with an accommodation letter. Please share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. You must follow this process for every semester that you request accommodations.

Military Personnel

Veterans and currently serving military personnel and/or spouses with unique circumstances (e.g., upcoming deployments, drill/duty requirements, disabilities, VA appointments, etc.) are welcome and encouraged to communicate these, in advance if possible, to the instructor in the case that special arrangements need to be made.

Counseling and Psychological Services (CAPS)

Many students at Penn State face personal challenges or have psychological needs that may interfere with their academic progress, social development, or emotional wellbeing. The university offers a variety of confidential services to help you through difficult times, including individual and group counseling, crisis intervention, consultations, online chats, and mental health screenings. These services are provided by staff who welcome all students and embrace a philosophy respectful of clients' cultural and religious backgrounds, and sensitive to differences in race, ability, gender identity and sexual orientation.

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Counseling and Psychological Services at University Park (CAPS)

(<http://studentaffairs.psu.edu/counseling/>): 814-863-0395

Counseling and Psychological Services at Commonwealth Campuses

(<http://senate.psu.edu/faculty/counseling-services-at-commonwealth-campuses>)

Penn State Crisis Line (24 hours/7 days/week): 877-229-6400

Crisis Text Line (24 hours/7 days/week): Text LIONS to 741741

Educational Equity / Report Bias

Penn State takes great pride to foster a diverse and inclusive environment for students, faculty, and staff. Acts of intolerance, discrimination, or harassment due to age, ancestry, color, disability, gender, gender identity, national origin, race, religious belief, sexual orientation, or veteran status are not tolerated and can be reported through Educational Equity via the Report Bias webpage

(<http://equity.psu.edu/reportbias>).

Disclaimer Statement

Please note that the specifics of this Course Syllabus can be changed at any time, and you will be responsible for abiding by any such changes. Changes will be Announcement in Learning Management System (e.g., Canvas) and the new file will be uploaded to Box.

Penn State Values

Integrity: We act with integrity and honesty in accordance with the highest academic, professional, and ethical standards.

Respect: We respect and honor the dignity of each person, embrace civil discourse, and foster a diverse and inclusive community.

Responsibility: We act responsibly, and we are accountable for our decisions, actions, and their consequences.

Discovery: We seek and create new knowledge and understanding, and foster creativity and innovation, for the benefit of our communities, society, and the environment.

Excellence: We strive for excellence in all our endeavors as individuals, an institution, and a leader in higher education.

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Community: We work together for the betterment of our University, the communities we serve, and the world.

Nondiscrimination Statement

The Pennsylvania State University is committed to equal access to programs, facilities, admission and employment for all persons. It is the policy of the University to maintain an environment free of harassment and free of discrimination against any person because of age, race, color, ancestry, national origin, religion, creed, service in the uniformed services (as defined in state and federal law), veteran status, sex, sexual orientation, marital or family status, pregnancy, pregnancy-related conditions, physical or mental disability, gender, perceived gender, gender identity, genetic information or political ideas. Discriminatory conduct and harassment, as well as sexual misconduct and relationship violence, violates the dignity of individuals, impedes the realization of the University's educational mission, and will not be tolerated.

Direct all inquiries regarding the nondiscrimination policy to:

Dr. Kenneth Lehrman III
Vice Provost for Affirmative Action
Affirmative Action Office
The Pennsylvania State University
328 Boucke Building
University Park, PA 16802-5901
Email: kfl2@psu.edu
Tel (814) 863-0471

Diversity Statement

The instructor considers this classroom to be a place where you will be treated with respect. All members of this class are expected to contribute to a respectful, welcoming and inclusive environment for every other member of the class. Penn State is "committed to creating an educational environment which is free from intolerance directed toward individuals or groups and strives to create and maintain an environment that fosters respect for others" as stated in [Policy AD29 Statement on Intolerance](#).

Mandated Reporting Statement

Penn State's policies require me, as a faculty member, to share information about incidents of sex-based discrimination and harassment (discrimination, harassment, sexual harassment, sexual misconduct, dating violence, domestic violence, stalking, and retaliation) with Penn State's Title IX coordinator or deputy coordinators, regardless of whether the incidents are stated to me in person or shared by students as part of their coursework. For more information regarding the University's policies and procedures for responding to reports of sexual or gender-based harassment or misconduct, please visit

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<http://titleix.psu.edu>. Additionally, I am required to make a report on any reasonable suspicion of child abuse in accordance with the [Pennsylvania Child Protective Services Law](#).

Penn State Principles

The Pennsylvania State University is a community dedicated to personal and academic excellence. The Penn State Principles were developed to embody the values that we hope our students, faculty, staff, administration, and alumni possess. At the same time, the University is strongly committed to freedom of expression. Consequently, these Principles do not constitute University policy and are not intended to interfere in any way with an individual's academic or personal freedoms. We hope, however, that individuals will voluntarily endorse these common principles, thereby contributing to the traditions and scholarly heritage left by those who preceded them, and will thus leave Penn State a better place for those who follow.

I will respect the dignity of all individuals within the Penn State community. The University is committed to creating and maintaining an educational environment that respects the right of all individuals to participate fully in the community. Actions motivated by hate, prejudice, or intolerance violate this principle. I will not engage in any behaviors that compromise or demean the dignity of individuals or groups, including intimidation, stalking, harassment, discrimination, taunting, ridiculing, insulting, or acts of violence. I will demonstrate respect for others by striving to learn from differences between people, ideas, and opinions and by avoiding behaviors that inhibit the ability of other community members to feel safe or welcome as they pursue their academic goals.

I will practice academic integrity. Academic integrity is a basic guiding principle for all academic activity at Penn State University, allowing the pursuit of scholarly activity in an open, honest, and responsible manner. In accordance with the University Code of Conduct, I will practice integrity in regard to all academic assignments. I will not engage in or tolerate acts of falsification, misrepresentation or deception because such acts of dishonesty violate the fundamental ethical principles of the University community and compromise the worth of work completed by others.

I will demonstrate social and personal responsibility. The University is a community that promotes learning; any behaviors that are inconsistent with that goal are unacceptable. Irresponsible behaviors, including alcohol or drug abuse and the use of violence against people or property, undermine the educational climate by threatening the physical and mental health of members of the community. I will exercise personal responsibility for my actions and I will make sure that my actions do not interfere with the academic and social environment of the University. I will maintain a high standard of behavior by adhering to the Code of Conduct and respecting the rights of others.

I will be responsible for my own academic progress and agree to comply with all University policies. The University allows students to identify and achieve their academic goals by providing the information

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needed to plan the chosen program of study and the necessary educational opportunities, but students assume final responsibility for course scheduling, program planning, and the successful completion of graduation requirements. I will be responsible for seeking the academic and career information needed to meet my educational goals by becoming knowledgeable about the relevant policies, procedures, and rules of the University and academic program, by consulting and meeting with my adviser, and by successfully completing all of the requirements for graduation.

Course Class and Laboratory Calendar

NOTE: The course calendar is posted in the Files section / Administrative in Canvas. It will be ***subject to change*** at any time during the semester, and the students are responsible for taking note of these changes which will be posted on Canvas and/or announced in class.