

Course Change Request

New Course Proposal

Date Submitted: 11/23/20 2:00 pm

Viewing: **FRSC 404 : Advanced Instrumentation in Forensic Chemistry**

Last edit: 11/23/20 2:00 pm

Changes proposed by: kcarisi

Are you completing this form on someone else's behalf?

Yes

Requestor:

Name	Extension	Email
Brian Eckenrode	703-993-5071	beckenro@gmu.edu

Effective Term: Fall 2021

Subject Code: FRSC - Forensic Science

Course Number: 404

Bundled Courses:

Is this course replacing another course? No

Equivalent Courses:

Catalog Title: Advanced Instrumentation in Forensic Chemistry

Banner Title: Adv Instru in Forensic Chem

Will section titles vary by semester? No

Credits:

In Workflow

1. **FRSC Representative**
2. **SC Curriculum Committee**
3. SC Associate Dean
4. Assoc Provost- Undergraduate
5. Registrar-Courses
6. Banner

Approval Path

1. 11/24/20 12:10 am
Kimberly Rule
(kcarisi): Approved for FRSC Representative

4

Schedule Type: Lecture w/Lab**Hours of Lecture or Seminar per week:** 3**Hours of Lab or Studio per week:** 3**Repeatable:** May be only taken once for credit, limited to 3 attempts (N3) **Max Allowable Credits:** 12**Default Grade Mode:** Undergraduate Regular**Recommended Prerequisite(s):**
FRSC 303**Recommended Corequisite(s):****Required Prerequisite(s) / Corequisite(s) (Updates only):**

CHEM 314, 318, 321, MATH 114, STAT 250 or BIOL 214, and FRSC 304, or Permission of Instructor

Registrar's Office Use Only - Required Prerequisite(s)/Corequisite(s):

And/Or	(Course/Test Code	Min Grade/Score	Academic Level)	Concurrency?

Registration Restrictions (Updates only):**Registrar's Office Use Only - Registration Restrictions:****Field(s) of Study:****Class(es):****Level(s):****Degree(s):****School(s):****Catalog Description:**

This course will introduce advanced themes of forensic science and the application of analytical chemistry using state-of-the-art instrumentation hardware and software platforms. Students will perform hands-on experiments using instruments that are commonly found at the federal level and in more advanced state crime laboratories. The students will be exposed to widely used concepts in the advanced forensic analysis of drugs of abuse, toxicology, arson, inks, paints, polymers, and explosives. In addition, the operational concepts of commonly used analytical instrumentation such as GC-MS, FTIR, and TQMS will be taught, demonstrated, and used by the students. More advanced instrumentation will also be introduced in the course that may include: LC/MS, LC-MS/MS, QE+ with ESI and API front ends, high resolution mass measurements, MALDI-TOF, and advanced portable instruments.

Justification:

Justification (What has been proposed?): The Forensic Science Program is proposing a newly created course FRSC 404 Advanced Instrumentation in Forensic Chemistry which will be a 4 credit lecture and laboratory course.

Justification (Why is this proposal necessary?): The proposed FRSC 404 Advanced Instrumentation in Forensic Chemistry course will be critical to students who desire a career within Forensic Chemistry. The knowledge and skills presented in this course are required for students looking to be employed in any federal or state crime laboratory. Additionally, this course satisfies the educational requirement for the Forensic Science Education Programs Accreditation Commission (FEPAC) standard in the proposed BS Forensic Chemistry Concentration as "forensic science coursework that provide greater depth in forensic applications of chemistry beyond an introductory level to include laboratory training".

Does this course cover material which crosses into another department? No

Learning Outcomes:

Students will understand the advanced themes of the application of analytical chemistry to forensic science. Students will be able to use instruments that are commonly found at crime laboratories.

Students will understand the concepts in the advanced forensic analysis of drugs of abuse, toxicology, arson, inks, paints, polymers, and explosives.

Students will understand the operational concepts of commonly used analytical instrumentation such as GC-MS, FTIR, and TQMS.

Students will understand the practical application of more advanced instrumentation such as, LC/MS, LC-MS/MS, QE+ with ESI and API front ends, high resolution mass measurements, MALDI-TOF, and advanced portable instruments.

Attach Syllabus

[FRSC 404 Advanced Instrumentation in Forensic Chemistry Syllabus.pdf](#)

Additional Attachments**Staffing:**

Brian Eckenrode
Steven Burmeister

**Relationship to
Existing Programs:**

FRSC 404 Advanced Instrumentation in Forensic Chemistry will be a required course for the proposed Forensic Chemistry Concentration within the Bachelor of Science in Forensic Science degree.

**Relationship to
Existing Courses:**

FRSC 404 Advanced Instrumentation in Forensic Chemistry will be an advanced level Forensic Science course taken after successful completion of FRSC 304/5 Forensic Chemistry and Laboratory and other appropriate science/math pre-requisite courses. This course will introduce similar equipment and topics as discussed in Chemistry's Instrumental course but will be focused on the forensic science application and forensic casework examples to prepare students for employment specifically in crime laboratories.

**Additional
Comments:**

**Reviewer
Comments**

Key: 17046

George Mason University

FRSC 404: Advanced Instrumentation in Forensic Chemistry

Instructor: Brian Eckenrode, PhD
Forensic Science Program / College of Science
George Mason University

Hall / Room: SciTech Campus – TBD

Day / Time: TBD

E-mail: beckenro@gmu.edu

Telephone: (703) 928-3241 (mobile)

Office: Colgan Hall Rm 434

Office hours: TBD

LA: TBD

Lab Assist: TBD

Credits: 4 (lecture *and* laboratory)

Required Prerequisites: Minimum of a grade of C in CHEM 314, 318, 321, MATH 114, STAT 250 or BIOL 214, and FRSC 304, or Permission of Instructor

Recommended Prerequisites: FRSC 303

Required Texts: Basic Principles of Forensic Chemistry, J. Khan, T. Kennedy, and D. Christian, Jr.

Suggested Texts: Investigating Chemistry, Introductory Chemistry from a Forensic Science Perspective, 3rd Edition by Matthew E. Johl

Quantitative Chemical Analysis, (9th edition), D. Harris

Analytical Chemistry for Technicians, (4th edition), J. Kenkel

Catalog/Course Description: This course will introduce advanced themes of forensic science and the application of analytical chemistry using state-of-the-art instrumentation hardware and software platforms. Students will perform hands-on experiments using instruments that are commonly found at the federal level and in more advanced state crime laboratories. The students will be exposed to widely used concepts in the advanced forensic analysis of drugs of abuse, toxicology, arson, inks, paints, polymers, and explosives. In addition, the operational concepts of commonly used analytical instrumentation such as GC-MS, FTIR, and TQMS will be taught, demonstrated, and used by the students. More advanced instrumentation will also be introduced in the course that may include: LC/MS, LC-MS/MS, QE+ with ESI and API front ends, high resolution mass measurements, MALDI-TOF, and advanced portable instruments.

Course Information:

All lecture and laboratory slides will be available on Blackboard the night before or early on the day of each class for students to download and print. This class is a combined lecture and laboratory and each specific class lecture will build on the material used in the actual laboratory experiments. The experiments will be designed with actual forensic casework analyses in mind and extensive written reports will be required for each laboratory experiment.

Student Responsibilities: Students will be responsible for reading the required material prior to each class (*please see the schedule*) and to be prepared to facilitate discussions.

Grading: Class participation and attendance, homework, laboratory experiments with reports, and three exams will determine your grade in the course.

Specifically, your final grade will be calculated based upon the following:

❖ Class Participation and Attendance	5%
❖ Homework	20%
❖ Laboratory Experiments and Reports (5+)	30%
❖ Three Exams (15% each)	45%

Grading Scale:

95-100%	A	87-89	B+	77-79	C+	60-69	D
90-94	A-	83-86	B	73-76	C	< 60	F
		80-82	B-	70-72	C-		

GMU Honor Code

The Honor Code states that all students "pledge not to cheat, plagiarize, steal, or lie in matters related to academic work." Please adhere to the Honor Code in all that you do for this class.

Academic Integrity

GMU is an Honor Code university; please see the University Catalog for a full description of the code and the honor committee process. The principle of academic integrity is taken very seriously, and violations are treated gravely. What does academic integrity mean in this course? Essentially this: when you are responsible for a task, you will perform that task. When you rely on someone else's work in an aspect of the performance of that task, you will give full credit in the proper, accepted form. Another aspect of academic integrity is the free play of ideas. Vigorous discussion and debate are encouraged in this course, with the firm expectation that all aspects of the class will be conducted with civility and respect for differing ideas, perspectives, and traditions. When in doubt (of any kind) please ask for guidance and clarification.

GMU Code of Student Conduct

The University Code of Student Conduct is George Mason University's statement of community values. The Code fosters a safe, secure, and fair learning environment by establishing expectations for behavior, identifying a process for resolving incidents outside the stated expectations and the results of such processes. No student or student organization shall commit

an Act of Misconduct in any location. Students and student organizations found responsible under this CSC of committing Acts of Misconduct are subject to sanctions by the University. The Office of Student Conduct has authority over all non-academic disciplinary matters. Please refer to <https://studentconduct.gmu.edu/>.

Diversity and Inclusion

The Forensic Science Program, an intentionally inclusive community, promotes and maintains an equitable and just work and learning environment. We welcome and value individuals and their differences including race, economic status, gender expression and identity, sex, sexual orientation, ethnicity, national origin, first language, religion, age, and disability.

Sexual Harassment, Sexual Misconduct, and Interpersonal Violence

Notice of mandatory reporting of sexual or interpersonal misconduct: As a faculty member, I am designated as a “Non-Confidential Employee,” and must report all disclosures of sexual assault, sexual harassment, interpersonal violence, stalking, sexual exploitation, complicity, and retaliation to Mason’s Title IX Coordinator per University Policy 1202. If you wish to speak with someone confidentially, please contact one of Mason’s confidential resources, such as Student Support and Advocacy Center (SSAC) at 703-380-1434 or Counseling and Psychological Services (CAPS) at 703-993-2380. You may also seek assistance or support measures from Mason’s Title IX Coordinator by calling 703-993-8730, or emailing titleix@gmu.edu.

GMU E-mail Accounts

Students must activate their GMU email accounts to receive important University information, including messages related to this class.

Important dates to remember:

- Check the on-line GMU Calendar for dates such as: last day to drop with no tuition penalty or last days to drop with tuition penalty

Office of Disability Services

If you are a student with a disability and you need academic accommodations, please see me and contact the Office of Disability Services (ODS) at 993-2474. All academic accommodations must be arranged through the ODS. <http://ods.gmu.edu>

Writing Center: <http://writingcenter.gmu.edu>

For general questions and comments please contact wcenter@gmu.edu or call:
703-993-1200 (Robinson Hall A114, Fairfax Campus)
703-993-1824 (Enterprise Hall 076, Fairfax Campus)
703-993-4491 (Arlington Campus)
703-993-8451 (Prince William Campus)

All appointments are made through the online scheduling system so please do not email or call to schedule appointments. If you would like to cancel an appointment you may do so via the online scheduler, simply select your appointment and click the "Cancel appointment" box at the bottom of the reservation form and then "save".

University Libraries: “Ask a Librarian” <http://library.gmu.edu/mudge/IM/IMRef.html>
Margaret Lam, Forensic Science Liaison Librarian; <http://infoguides.gmu.edu/forensics>
 Fenwick Library, 402B
 4400 University Drive, MSN 2FL
 Fairfax, VA 22030
 703-993-9058
mlam3@gmu.edu

Counseling and Psychology Services (CAPS): (703) 993-2380; <http://caps.gmu.edu>

University Policies:

The University Catalog, <http://catalog.gmu.edu>, is the central resource for university policies affecting student, faculty, and staff conduct in university academic affairs. Other policies are available at <http://universitypolicy.gmu.edu/>. All members of the university community are responsible for knowing and following established policies.

University policy states that all sound emitting devices shall be turned off during class unless otherwise authorized by the Professor.

GEORGE MASON UNIVERSITY
ADVANCED INSTRUMENTATION IN FORENSIC CHEMISTRY – FRSC 404
 LECTURE and LABORATORY SCHEDULE

Week	Lecture and Lab Topics	Required Reading
1	Introduction/Orientation/Lab Safety	CH 1-4 CH 18
2	Quadrupole Mass Spectrometry – Tuning and Maintenance	Handouts
3	Gas Chromatography – Interface to MS and Preparation	CH 10
4	Advanced Instrumentation GC/MS Data Systems and Libraries Interpreting MS spectra	Handouts
5	Chemical Extractions and Sample Preparation Techniques	CH 9
6	Exam #1 and Practical	
7	Controlled Substance Analysis – Urine or Blood matrix	CH 12-17
8	Introduction to Triple Quadruple MS	Handouts

9	Target Analysis for Quantitation using a TQMS – MS/MS	Handouts
10	Liquid Chromatography – Interface to an MS and Preparation for Forensic Toxicology	Handouts
11	Exam #2 and Practical	
12	Advanced FTIR and Spectroscopy – Optical tuning of the Instrument	CH 11
13	FTIR Data System, Libraries, and Comparison Algorithms Latent Fingerprint analysis and Trace Explosives	Handouts
14	Drug-facilitated Sexual Assault – GHB in Beverages	Handouts
15	Exam #3 and Practical	

Note: The schedule is subject to change, please listen for announcements during class. Additional reading assignments may be added throughout the semester.