

FRSC 420–001-5239: Body Fluid Analysis (4 credits / 5 contact hours)

Classroom: SM 572

Meeting Times: T 12:00 – 4:05 PM

Instructor: Kelly M. Elkins, Ph.D.

Office: SM 514 F

Office Hours: T 10-11 AM, R 1-3 PM or by appt.

E-mail: kmelkins@towson.edu

Tel: 410-704-6217 (office)

Required Text:

Butler, John M. Fundamentals of Forensic DNA Typing, Academic Press (2010) ISBN: 978-012-374999-4

Other Readings from the Scientific Literature (e.g., peer-reviewed journal articles from *Analytical Chemistry*, *Forensic Science International*, *FSI-Genetics*, *Journal of Forensic Sciences*, *International Journal of Legal Medicine*, *Legal Medicine*, etc.) will be provided via Blackboard Calculator, colored pencils, black or blue pens

Catalog Description:

Current methods and concepts in forensic biology with laboratory practice in identification and individualization of biological forensic samples by several different methods, including biochemical testing, antigen-antibody reactions, and DNA typing, representing best practice in forensic science. Prerequisites: FRSC 368, ANTH 357, BIOL 409 (may be taken concurrently).

Objective:

This course is a lecture/laboratory course in which students will gain theoretical and practical knowledge of the techniques used in modern forensic DNA laboratories. Students will detect, identify and individualize human samples using chemical, serological, microscopic and molecular biological techniques.

Assessment:

10%	Serology Case Report (100 points)
10%	DNA Testing Case Report (100 points)
5%	DNA Analysis Problem Set (50 points)
5%	Paternity & Missing Person Cases Problem Set (50 points)
10%	Presentation of researched case and DNA case testing results (100 points)
15%	Exam I (150 points) - All exams will be in-class, fill in and short answer, closed book, and no notes.
15%	Exam II (150 points)
30%	Final Exam (300 points)
100%	Total - 1000 points

Grade assignment will be based on the standard grading system: A = 93 % or above (930 – 1000 points), A- = 90 – 92.9 % (900-929 points), B+ = 87.0-89.9 % (870-899 points), B=83-86.9 % (830-869 points), B- = 80-82.9 % (800-829 points), C+ = 77-79.9 % (770-799 points), C = 70-76.9 % (700-769 points), D+ = 67- 69.9 % (670-699 points), D = 60-66.9 % (600-669 points), F = below 60% (less than 600 pts)

Important Dates:

February 7: Change of Schedule period ends for full term (14 weeks).

Last day to drop a course with no grade posted to academic record.

April 10: Last day to withdraw from full term courses with a grade of W. Last day to change to pass/fail option or audit options.

No class: March 20-24: Spring Break

IMPORTANT: Students who fail to appear for the first two class sessions, or the first session of evening classes, may forfeit their space in class. Instructors have the right to release these spaces to other students wishing to add the class to their schedules. Students who lose their spaces must officially withdraw from the course through Enrollment Services to avoid earning an FX grade for non-attendance.

Tuesday Class Meeting Tentative Schedule*:

Date	Topic	Chapter
1/31	Introduction to course, Syllabus, Bloodborne Pathogens, Universal Precautions, Safety, Overview and history of body fluid analysis and DNA typing, Types of cases, Sample collection, storage, and characterization, Chain of Custody, Avoiding contamination, Visual Inspection Using Alternate Light Source, Pipetting	1, 4, 17
2/7	Detection of blood, semen, urine, and saliva, Serology Report Writing	
2/14	Exam I , Obtain samples for DNA case testing	
2/21	Basics of DNA Biology and Genetics, Historical Methods, Serology Case Testing	2, 3
2/28	DNA extraction, Serology Case Report Due	5
3/7	DNA quantitation: Colorimetric, Spectroscopic, and PCR-based quantitation methods	6, 7
3/14	Exam II , Short Tandem Repeat Markers	8
3/21	<i>SPRING BREAK (no class)</i>	
3/28	Fundamentals of DNA Separation using CE and Multi-dye Detection	9
4/4	STR Genotyping and Data Interpretation and Tabulation of Data	10
4/11	DNA Analysis Problem Set, Paternity & Missing Person Cases Problem Set	17
4/18	Statistical Interpretation and DNA databases, Report Writing	11, 12
4/25	Forensic Challenges: Degraded DNA, Mixtures, and LCN, Printed copy of researched DNA case for presentation due	14
5/2	Future Trends, Social, Ethical and Regulatory Concerns Additional Loci and Non-human DNA Testing, DNA Case Testing Project Report Due	18 15
5/9	Presentation of researched DNA case and DNA Case testing project	
5/16	Make-up / Review for final	
5/18 (Thursday)	Final Exam (Cumulative) 12:30 – 2:30 PM	

**Instructor reserves the right to change the schedule or topics. Students will be notified by email.*

Attendance: All classes are considered equally important and full attendance is expected. Since this course is taught as a lecture/lab, any absence will result in missing laboratory experience. It is the student's responsibility to make up any missed work. Attendance may be recorded and absence from class may be grounds for grade reduction.

Safety:

Students are required to read and sign a laboratory safety agreement during the first lab session. Students are expected to follow all safety rules and regulations, both written and verbal, at all times in the laboratory. Students who fail to comply with safety regulations will be asked to leave the laboratory, and will be subject to the penalties below.

Dress Code: Long pants / ankle length skirts and closed-toed shoes that cover the top of the foot are required. Any student wearing shorts, shorter than ankle length skirts or open-toe shoes will be denied permission to work in the laboratory.

Food: Food and drinks (including water) are not permitted in the laboratory at any time. Any food or drink found in the laboratory will be immediately discarded. Please keep food and drink in the hallway.

Goggles:

Approved safety goggles must be worn at all times in the laboratory as indicated by your instructor. If a student forgets to bring their goggles to lab, they may borrow a pair from the instructor.

Important Information**Cell Phones and Pagers:**

Cell phone usage in the class meeting/lab is strictly prohibited. If you need to take a call in case of emergency (e.g., sick child, parent care, etc.), exit the classroom to the adjacent hallway.

Chemistry Department Statement on Classroom 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 a classroom 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. 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).

For further information regarding the diversity and inclusion policies of Towson University, please see Towson University's "Strategy 1:Exposure to Diversity" , the Fisher College of Science and Mathematics Diversity Action Plan, and the Chemistry Department Diversity Action Plan.

Students with Disabilities:

This course is in compliance with Towson University policies for students with disabilities. Students with disabilities are encouraged to register with Disability Support Services (DSS), 7720 York Road, Suite 232, 410-704-2638 (Voice) or 410-704-4423 (TDD). Students who expect that they have a disability but do not have documentation are encouraged to contact DSS for advice on how to obtain appropriate evaluation. A memo from DSS authorizing your accommodation is needed before any accommodation can be made.

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

Course repeat policy: "Students may not repeat a course more than once without prior permission of the Academic Standards Committee."

Student Academic Integrity Policy (TU 03.01.00):

The Towson University Code of Conduct prohibits "all forms of dishonesty including cheating (and) plagiarism." Plagiarism is copying the words of another or the use of ideas of another without proper citation. Plagiarism can result from copying an entire document to inappropriate paraphrasing. In order to avoid plagiarism, the use of words or ideas of another without proper citation, it is imperative to consciously think about what you have read and what you are trying to write. In scientific literature, we do not normally use direct quotes from the primary resources that we are using to gather our information. It is important to paraphrase the ideas and conclusions obtained from the primary literature and rewrite them in your own words. One method to assure that you will not plagiarize is to take notes on each of your primary resources and then write the paper based on your notes, not from the references. Your paper will summarize the works of others, not directly quote from them. If you have any questions about plagiarism and correct citations see <http://towson.libguides.com/c.php?g=563937&p=3884946> for further examples and methods to correct the problems. The consequences of cheating or plagiarism will be a failing grade of 0 points for the assignment and may result in failure of the course. Plagiarism, fabrication,

falsification, cheating, complicity in academic dishonesty, abuse of academic materials, multiple submissions of the same work or part thereof for multiple courses/assignments, will not be tolerated and will result in a failing grade of 0 for that assignment and may result in failure of the course.

Academic Dishonesty Policy: All types of Academic Dishonesty are deplorable and will be dealt with accordingly. Please read and familiarize yourself with the University Academic Dishonesty Policy, found at the link below. Plagiarism, obtaining aid from or giving aid to another student as well as obtaining aid through electronic devices or notes constitutes cheating and will result in failure of the course. <http://inside.towson.edu/generalcampus/tupolicies/documents/03-01.00%20Student%20Academic%20Integrity%20Policy.pdf>

In Case of Emergency:

In the event of a University-wide emergency course requirements deadlines and grading schemes are subject to changes that may include alternative delivery methods, alternative methods of interaction with the instructor, class materials, and/or classmates, a revised attendance policy, and a revised semester calendar and/or grading scheme. In the case of a University-wide emergency, please refer to the following about changes in this course:

1. Web Site: www.towson.edu
2. Telephone Number(s)
3. TU Text Alert System: This is a service designed to alert the Towson University community via text messages to cell phones when situations arise on campus that affect the ability of the campus to function normally. Sign up: <https://www.towson.edu/publicsafety/notification/>

Lab Safety Contract

This safety contract *lists* the lab-safety rules that are to be executed by everyone involved in order to ensure the safety of work place for everyone (students, faculty and staff). Each student must complete and sign both copies. Return one copy to the instructor and retain the other copy for your reference.

GENERAL RULES

1. Students are required to practice disciplined and responsible conduct at all times when present in the laboratory. Be alert and proceed with caution at all times in the lab.
2. Pre-lab reading assignments are to be completed prior to entering the laboratory (Read thoroughly all experimental procedures as stated in the lab-manual before entering the laboratory).
3. Use of any type of food/drink (beverages, chew gum, tobacco, etc), and cosmetics (lip balm, gloss) in the laboratory is prohibited.
4. Use of cell phones, radios, and headphones are not allowed in lab. (Store with your other personal items in designated areas).
5. Observe good housekeeping practices. Work areas should be kept clean and tidy at all times. Bring only your lab manual, lab notebook and other necessary materials to the work area. Keep aisles clear.
6. All written and verbal instructions are to be followed carefully. (If you do not understand a direction or part of a procedure, ask the instructor present before proceeding).
7. Unsupervised presence of students in the lab is prohibited.
8. Chemicals and equipment are NOT to leave the laboratory unless authorized by the instructor.
9. Fume hood sashes are not to be opened beyond the 18" mark when in use. (Never put your head into the hood).
10. Hands and pens/pencils are to be kept away from face, eyes, and mouth while using chemicals or equipment. Hands are to be washed with soap and water after performing all experiments, especially before going to the restroom or leaving the lab for any reason.
11. All work surfaces and apparatus are to be cleaned each day by the student at the end of the experiment. Return of all equipment/glassware (clean and in working order) to the proper location is required. Broken items must be reported to the instructor and disposed of in the proper container.
12. Proper disposal of all chemical waste is a must. Label on the waste container must be checked thoroughly before adding chemical waste to the container. Waste containers are not to be over filled (notify the instructor if the container is full).
13. Sinks are to be used only for disposal of water and other solutions as specified by the instructor.
14. If you have any allergies, sensitivities, or medical conditions (especially including pregnancy) which might be aggravated by chemicals, be sure to inform your instructor in writing, early in the semester so that any special arrangements which may be necessary can be made for your protection.

PERSONAL PROTECTIVE EQUIPMENT

1. Approved chemical splash goggles OR safety glasses.
2. Contact lenses *should* be replaced with prescription glasses.
3. Dress properly for lab. Clothing must cover the body from the shoulders down to toes.
 - a. NO bare midriffs, tank tops or low-cut tops
 - b. NO shorts, skirts, or cropped pants
 - c. SHOES must be closed-toed and completely cover the heel and top of the foot. NO sandals.

4. Long hair, hanging items (jewelry, hoodie strings etc), and loose or baggy clothes must be secured.
5. Gloves are available for use when needed and must be removed before leaving lab. Do not handle personal items such as pens with the gloves on.

HANDLING CHEMICALS

1. All chemicals in the lab are to be considered dangerous and used with caution. Chemicals are not to be touched, tasted, or smelt. Only "wafting" method of smelling chemicals should be practiced (if needed).
2. Only directed amounts of chemicals should be used /transferred. Unused chemicals must not be returned to their original container. Proper disposal in the waste containers must be practiced.
3. All reagent bottles and waste containers must be capped when not in use. Reagent bottles must not be removed from their designated dispensing area.

HANDLING CHEMICALS CONT.

4. Flammable solvents must not be used anywhere near flame.
5. Acids must be handled with care (add acid to water, not water to acid).
6. Any spills must be promptly reported to the instructor. Clean-up of small spills should be performed immediately as directed by the instructor.

HANDLING GLASSWARE AND EQUIPMENT

1. Never handle broken glass with your bare hands. Use the dust pan and broom provided to clean up the broken glass. Place the broken glass in the containers marked "broken glass".
2. Examine glassware before each use. Never use chipped or cracked glassware. Never use dirty glassware.
3. Fill wash bottles ONLY with deionized water and use it only as intended, e.g., rinsing glassware and equipment, or adding water to a container.
4. Unplug hotplates when not in use. When removing an electrical plug from its socket, grasp the plug, not the electrical cord. Hands must be completely dry before touching the plug or switch.
5. Report damaged electrical equipment immediately. Look for things such as frayed cords, exposed wires, and loose connections. Do not use damaged electrical equipment.
6. Do not use a piece of equipment/ instrumentation until its proper use is demonstrated by the instructor.

ACCIDENTS and INJURIES

1. Report any accident (spill, breakage, etc.) or injury (cut, burn, etc.) to the instructor immediately, no matter how trivial.
2. Report fires to the instructor immediately.
3. If a chemical splashes in your eye(s) or on your skin, immediately flush with running water from the eyewash station or safety shower for at least 20 minutes. Notify the instructor immediately.
4. Know the location of the following safety equipment:
 - a. Fire extinguisher
 - b. Safety shower
 - c. Eye wash
 - d. First aid kit

POLICY for PREGNANT STUDENTS

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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.

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SAFETY GUIDELINES ACKNOWLEDGEMENT

I have read the laboratory safety guidelines outlined above for this course in Towson University's Department of Chemistry and agree to abide by all the guidelines therein.

Printed Name_____

Signature_____ Date_____

Course Number_____ Section_____ Semester_____ Year_____