

## CHE 3710 Criminalistics II

Spring 2016

Lecture Monday & Wednesday, 1-2:15p

Lab Monday 3-5:15p

SI 3095

Instructor: Dr. Megan E. Filbin-Wong

Office Hours: T 1-4p, W 2:15-4p or by appointment

Contact: [mfilbin1@msudenver.edu](mailto:mfilbin1@msudenver.edu)

Office: SI 3055 (lab, SI 3097)

(please put CHE 3710 in e-mail subject line)

### What Makes This Course Awesome?

This course is primarily focused on forensic DNA analysis and as you all know, you can't escape your genes! You will learn how DNA is collected from a crime scene and used to identify individual(s). Watching CSI will never be the same...

### What Is Expected of You?

Criminalistics is an applied science that meshes biochemistry, chemistry and biology with real-life questions/problems. In other words, learning criminalistics require more than just reading a textbook. As such, there are expectations you must take away to learn and succeed in this course and work in a crime lab:

- 1) Regular Attendance – Lectures are an important part of learning. Sure, the book does a pretty good job at explaining topics, but nothing takes away from open discussion during the biweekly lectures. No one is isolated in a crime lab – forensic scientists collaborate. Here's your chance to practice collaboration.
- 2) Schedule Your Time Accordingly – Please plan your schedule around the assigned homework reading, lab notebook and reports as well as the exams. I expect *at least* two weeks notification for any lab or exam you may miss and there will not be any flexibility on the date and time of the final exam. Review the schedule now and make sure you have set aside the time necessary to complete this course.
- 3) Apply Yourself – In a crime lab, showing up to meetings, nodding your head without paying much attention and quickly rushing through lab protocols will quickly get you fired. Why? You aren't applying yourself. The same tenet holds true for this course – challenging yourself to learn will result in success! If you find that you are truly struggling, plan on coming to my office hours for additional help (see below).

### What Can You Expect from the Instructor?

I will give clear and on-time lectures, define your learning objectives for each topic and encourage class participation throughout the course. Your assignments will cover the material you are expected to understand and I will grade lab reports and exams fairly as outlined below. If you are unable to see me during my office hours, I will be flexible with my time to ensure your questions are answered and your concerns are addressed.

### Required Materials

- 1) Fundamentals of Forensic DNA Typing (2010). Butler, J.M., Elsevier, Burlington, MA. ISBN: 978-0-12-374999-4 (Alternatively, you can also purchase: Forensic DNA Typing, 2<sup>nd</sup> ed. (2005). Butler, J.M., Elsevier, Burlington, MA. ISBN: 0-12-147952-8)
- 2) Forensic DNA Biology: A Laboratory Manual (2013). Elkins, K., Elsevier, Oxford, UK. ISBN: 978-0-12-394585-3
- 3) Journal articles posted on Blackboard.
- 4) Scientific or Graphing Calculator for labs and exams (no cell phones, laptops, tablets or other savvy devices are allowed during exams).
- 5) Carbon-copy Lab Notebook

### Reading

Lectures are based on the content of the Butler book(s) – so it is important that you supplement what you learn in class by reading the assigned chapters.

### Lab Notebooks

Lab notebooks are essential to ALL experimentation. You are expected to keep a lab notebook throughout the course and record everything you do in a clear and organized fashion. Each experiment should start on a new page with a title and date clearly stated. Any observations you make should be recorded and experimental questions/analyses must be stated as well. Any task that was done on computer (e.g. graphing) should be printed and pasted into your notebook.

Record everything in your lab notebook IN INK, if you make a mistake cross out the mistake with one line and re-write accordingly. Your lab notebook should have the following sections for each lab:

- a) Title and Date
- b) Purpose/objective of the experiment
- c) Changes to procedure (it is not necessary to re-write the procedure listed in the manual, only changes you made during experimentation)
- d) Tables or lists from the lab manual for collecting data
- e) Calculations
- f) Conclusions

While your lab notebook may seem tedious and pointless, it is actually quite the opposite. If experiments cannot be repeated based on the way they were set-up initially, they are often dismissed. So, it behooves you to be diligent and professional when keeping a lab notebook. **Your lab notebook is worth 100 points (10% of your overall grade).**

### Lab Reports

The laboratory portion of the course will consist of three reports. You will have 1.5 weeks to complete each lab report. All reports must be typed and the date analyzed using Xcel or equivalent program (use the best fit line function to calculate slope when graphing data points). Each report should be concise (science writing is direct, relevant and clear – not “flowery”) and well organized. Numerical data should not be rounded; data should be exact and significant (i.e. follow the rules of significant figures). Please refer to report guidelines and rubric below for further information.

Your lab report should be *entirely* your own. Group work in lab does not equate to equivalent reports. That is considered plagiarism. You should write your report in your own words and with your own thoughts! This also includes any ideas you may receive from reading journal articles/textbook on these topics. Make sure you cite your source. Each day lab reports are late, 5% of your grade for that report will be deducted. Lab reports more than seven days late will not be accepted. **Reports are worth 100 points each (30% of your overall grade).**

### Lab Quizzes

Quizzes will be given at the beginning of each course meeting. Each quiz will consist of five questions about the material to be covered that day. So, in order to do well on the quizzes, it is essential you read the lab manual and any accompanying material before class. There will be 11 quizzes this semester and no make-up quizzes. If you miss a class or are tardy, you will receive a zero. To compensate, your lowest quiz score will be dropped. If you miss a lab/quiz, you are still responsible for the content covered in your absence! **Quizzes are worth 10 points each (10% of your overall grade)**, so be sure to prepare for each course meeting. *If you are caught looking at someone’s paper, using any devices besides a scientific/graphing calculator, or in any way cheating, you will receive a zero on the quiz. Just don’t cheat.*

### Literature Presentation

You will be required to research and present a current topic in DNA forensics during the last three weeks of the lab portion of this course. You will have time to research (published research in journals such as the Journal of Forensic Sciences) and you are expected to present a 10-15 minute slideshow on your findings. **Your presentation is worth 100 points (10% of your overall grade).**

### Exams

A total of three exams will consist of approximately 25-30 short answer / calculation / structure and/or multiple choice questions. Exams will cover the material stated on the schedule and will be given during the full class period. *If you are caught looking at someone’s paper, using any devices besides a scientific calculator, or in any way cheating, you will receive an F on the assignment.* Make-up exams will not be given on a routine basis and are strictly the decision of the instructor. **Exams are worth 100 points each (30% of your overall grade).**

### Final Exam

Your final exam will be cumulative. The final is required for all students and will be given during finals week in May (05/09-05/13, TBA). **It is worth 100 points (10% of your overall grade).**

## Grade Calculation

If you have at least 90.0% you have earned an A. The cutoffs for the other scores are: 89.9-80.0% (B), 79.9-70.0% (C), 69.9-60.0% (D), and less than 60% will be an F.

Lab Notebook (10/11 entries, 10 points each)	100 points (10%)
Lab Quizzes (10/11 quizzes, 10 points each)	100 points (10%)
Lab Reports (3 reports, 100 points each)	300 points (30%)
Literature Presentation	100 points (10%)
3 Exams	300 points (30%)
Final Exam	100 points (10%)
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Total	1000 points (100%)

*Points are tentative and subject to change by the instructor.*

Please keep track of your grades throughout the semester. If you are struggling to determine exactly what your grade is, please come to my office hours or schedule an appointment to see me in person. Exam grades will generally be available at the next regularly-scheduled course meeting. Final grades will be available by web and kiosk on May 20<sup>th</sup> at <http://connectu.msudenver.edu>. **The Family Educational Rights and Privacy Act prohibit me from releasing your grades via phone or email unless you register with the Registrar's office and obtain a non-identifying security code.**

## Drop Dates

You are expected to know and observe the MSU Denver regulations regarding class drop dates (for more information, please see <http://www.msudenver.edu/advising/student/academicpolicies/>). It is your responsibility to withdraw from a course (see <http://www.msudenver.edu/registrar/student/dropandwithdrawaldeadlines/>).

For other policies, including Administrative Withdraw and Incomplete notation, please see: <http://www.msudenver.edu/handbook/academicpoliciesforstudents/>.

## Academic Dishonesty

Academic dishonesty is a serious offense. Any occurrence diminishes the quality of scholarship and the learning experience for everyone on campus. An act of academic dishonesty will lead to sanctions including a reduction in grade (up to and including a permanent F for the course), probation, suspension or expulsion. Academic dishonesty includes cheating, fabrication, plagiarism, submitting the same paper or work for more than one class and facilitating academic dishonesty (don't help others cheat!). Most importantly, academic dishonesty hurts you the most – you are here to learn, so do just that. Getting a degree means nothing if you can't use the knowledge you learn at MSU Denver and apply it to a career. For definitions and more information, see the Student Engagement and Wellness website: <http://www.msudenver.edu/studentengagementandwellness/studentconductandconflictresolutionsservices/studentconductservices/academicintegrity/academicdishonesty/>.

## Harassment & Discrimination, Disability Accommodation, Religious Holiday Class Attendance

The Metropolitan State University of Denver does not discriminate on the basis of race, color, creed, national origin, sex, age, sexual orientation or disability in admission or access to, or treatment in, its educational programs or activities. Inquiries concerning Title IX should be reported to the Deputy Title IX Coordinator/Assistant Dean & Student Conduct Officer by calling 303.556.3559 or by going to Tivoli 311.

If the alleged perpetrator is an MSU Denver employee, visitor to campus or a non-student, please report the incident to the Title IX Coordinator/Executive Director of Equal Opportunity & Assistant to the President, by calling 303.556.4746 or by visiting the Student Success Building, #440.

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The Metropolitan State University of Denver is committed to making reasonable accommodations to assist individuals with disabilities in reaching their academic potential. If you have a disability that may impact your performance, attendance or grades in this class and are requesting accommodations, then you must first register with the Access  
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Center located in the Auraria Library, Suit 116, (call 303.556.8387). I cannot provide accommodations prior to my receipt of a faculty notification letter from the Access Center. Please note that accommodations are never provided retroactively (i.e. prior to the receipt of your faculty notification letter). Once I receive your official Access Center faculty notification letter, I would be happy to meet with you to discuss your accommodations. All discussions will remain confidential. More information is available by visiting the Access Center website (<http://www.msudenver.edu/access/>).

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Students at MSU Denver who, because of their sincerely held religious beliefs, are unable to attend classes, take examinations, participate in graded activities or submit graded assignments on particular days shall, without penalty, be excused from such classes and be given a meaningful opportunity to make up such examinations and graded activities or assignments provided that advance written notice that the student will be absent for religious reasons is given to the faculty members during the first two weeks of the semester.

Nothing in the paragraph above shall require MSU Denver faculty members to reschedule classes, repeat lectures or other ungraded activities or provide ungraded individualized instruction solely for the benefit of students who, for religious reasons, are unable to attend regularly scheduled classes or activities. However, presentations, critiques, conferences and similar activities involving individual students shall be scheduled to avoid conflicts with such students' religious observances or holidays provided that reasonable advance notice of scheduling conflicts is given to faculty members. Because classroom attendance and participation is an important aspect of learning, MSU Denver students should not register for courses if regularly scheduled classes or activities routinely conflict with their religious observances or holidays (e.g., conflicts resulting in weekly absences for an entire semester). Any MSU Denver student who believes that an MSU Denver faculty member has violated this policy is entitled to seek relief under Section V of the MSU Denver Equal Opportunity Grievance Procedure.

**Syllabus Changes & Policy**

Any changes in this syllabus I may deem necessary during the semester will be announced in class and made available in writing. I reserve the right to revise the syllabus and grading policies at any time.

Week	Dates	Lecture Topics	Chapters	Lab Experiment	Manual Chapter
1	01/20 W	Course Introduction	1 Paper #1		
2	01/25 M	Sources of DNA: Sample Collection and Identification of Biological Fluids	4 Paper #2	Lab Safety Overview	1
	01/27 W			Pipetting	
3	02/01 M	DNA Biochemistry & Genetics	2 Paper #3	Serology	2
	02/03 W				
4	02/08 M	DNA Extraction	5 Paper #4	Sampling Biological Evidence for DNA Extraction	3
	02/10 W			<b>Lab Report 1 Due (Serology)</b>	
5	02/15 M	DNA Quantitation & Separation	6 & 9 (pg 175-179)	DNA Extraction	4
	02/17 W				
6	02/22 M	DNA Amplification	7 Paper #5	DNA Quality and Quantity – Electrophoresis	5
	02/24 W	<b>Exam I (Chapters 1,2,4,5,6)</b>			
7	02/29 M	Biology & Analysis of STRs	8 Paper #6	DNA Quality and Quantity – Spectroscopy	6
	03/02 W				
8	03/07 M	Capillary Electrophoresis & STR Typing	9 & 10	Real-Time PCR	8
	03/09 W			<b>Lab Report 2 Due (DNA)</b>	
9	03/14 M	STR Typing Data Interpretation	10	Multiplex PCR	11
	03/16 W	<b>Exam II (Chapters 7 – 10)</b>			
10	<b>SPRING BREAK!!!</b>				
11	03/28 M	Statistical Interpretation of Forensic DNA Evidence	11 Paper #7	Capillary Electrophoresis of STR Multiplex PCR	12
	03/30 W				
12	04/04 M	DNA Databases	12 Paper #8	Reading Electropherograms & Profile Interpretation	
	04/06 W				
13	04/11 M	Additional Loci & Mitochondrial DNA	15 Paper #9	Computing Random Match Probability	13
	04/13 W				
14	04/18 M	Lineage Markers	16 Paper #10	Research for Literature Presentations	
	04/20 W			<b>Lab Report 3 Due (PCR &amp; Analysis)</b>	
15	04/25 M	Challenges in DNA Forensics	14	Literature Presentations	
	04/27 W	<b>Exam III (Chapters 11,12,15,16)</b>			
16	05/02 M	Applications – Missing Persons, Mass Disasters	17 Paper #11	Literature Presentations	
	05/04 W	Review			
FINAL	TBA	Final Examination	n/a	--	--

## Sample Criminalistics II Laboratory Report (Title of Report)

REPORT PREPARED BY:

LAB PARTNERS (S):

DATE OF ANALYSIS:

OBJECTIVE: Evaluate a red stain present on a piece of cloth using presumptive tests and extract DNA from a bloodstain.

METHOD/PROCEDURE (WITH TECHNIQUES USED/MODIFICATION):

The Kastle-Meyer reagent was used for presumptive analysis of the stain. DNA was extracted from the cloth stain and from the control sample using the chelex method. Buccal swab reference samples were quantified using real-time PCR with the QuantiTect SYBR Green PCR kit (Qiagen) and submitted for DNA (STR) analysis using the SGM plus multiplex kit (Applied Biosystems) using PCR according to the manufacturer's instructions. Fragment analysis was performed using the ABI 310 capillary electrophoresis genetic analyzer and allele calls were performed using GeneMapperID.

ARTICLES ANALYZED/DATA COLLECTED (TABLE):

Item Number	Description
01	Buccal Swab Reference
02	Control
03	Blood stain

**Include qPCR or electropherogram results as appropriate.**

ANALYSIS AND RESULTS (TABLE):

A chemical indication of blood was present on the cloth using the Kastle-Meyer test.

Results of DNA Analysis using SGM+ kit:

STR Locus	01 Buccal Swab	02 Control	03 Blood Stain
D3S1358	16, 16	14, 14	15, 16
vWA	16, 18	16, 17	18, 19
FGA	21, 25	20, 21	23, 24
Amelogenin	X, Y	X, X	X, Y
D8S1179	14, 14	10, 16	12, 13
D21S11	28, 30	29, 30	28, 32.2
D18S51	13, 17	12, 14	15, 18

The male DNA profile obtained from the Buccal swab (item 01) does not match the DNA profile obtained from the bloodstain (item 03) due to exclusions at all loci; therefore, the source of the Buccal swab can be excluded as the source for the male DNA obtained from the bloodstain. This male DNA profile will be searched against the CODIS database and any matches will be reported.

SAMPLE CALCULATIONS (ONE PER TYPE):

As applicable, statistics or other calculations as assigned.

CONCLUSION:

A chemical indication of blood was present on the cloth using the Kastle-Meyer test. The items were subjected to DNA analysis using the ABI SGM plus kit. The male DNA profile obtained from the Buccal swab (item 01) does not match the DNA profile obtained from the bloodstain sample (item 03); therefore the source of the Buccal swab can be excluded as the source for the male DNA obtained from the bloodstain. This male DNA profile will be searched against the CODIS database and any matches will be reported.

### **Typical Laboratory Report Grading Rubric**

Reports shall not be longer than **five pages**, 12-pt font, double-spaced. This does *not* include Figures, Tables, Graphs, or References.

<b>Points</b>	<b>Content</b>
3	Title
2	Name
3	Date
2	Partner(s)
5	Objective
15	Methods
40	Data (graphs and tables)
10	Calculations (one sample per type)*
10	Questions
10	Conclusion
<b>100</b>	<b>Total</b>

\*Points will be deducted if values have the incorrect number of significant figures or units (0.5 pts. per value).