



MARSHALL UNIVERSITY
Forensic Science Program

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FSC 604 Genetics and DNA Technologies
Spring 2025 – Tuesday/Thursday 12:30pm - 1:50pm, WW1

Instructor
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Required Texts
None
Recommended Texts
Forensic DNA Typing, Butler 2005 AND Forensic DNA Typing: Interpretation, Butler 2015
Course Description
Unless otherwise indicated by your instructor, the current instructional format of this course is set to be face to face. This course will provide advanced instruction in evidence collection, testing methods and analysis as it relates to DNA testing for forensic purposes as well as paternity testing. The students must be conversant in the principles, methods and technology associated with DNA testing. Students will learn about quality assurance issues and laboratory accreditation. (3 hours)
Prerequisites
Formal admission to the Forensic Science Program based on academic achievement, Hepatitis B immunization or waiver, supportive letters of recommendation, and passing a background check.
Goals
<ul style="list-style-type: none">• Provide students with confidence in knowledge related to the principles and procedures of various extraction, quantitation, amplification, electrophoresis, and analysis methods present in forensic DNA testing.
Objectives
<ul style="list-style-type: none">▪ Associate the history of DNA testing as it relates to forensic science▪ Discuss the types of viable biological samples and compare the relative amounts of DNA achievable from those samples▪ Calculate sample and reagent concentrations using mathematical formulas▪ Review DNA extraction techniques and recognize important considerations associated with the extraction process▪ Describe the principle and procedure of various DNA quantification procedures▪ Recognize the principle and procedure of DNA amplification procedures▪ Identify and describe the principle and use of capillary electrophoresis as it relates to STR analysis and sequencing▪ Evaluate other forms of DNA in addition to autosomal STRs such as mitochondrial, Y-STR and mini-STR▪ Define various DNA analysis software programs▪ Interpret DNA profiles from single source and mixed samples▪ Categorize the theory behind paternity testing statistics▪ Learn about forensic laboratory accreditation and requirements▪ Describe the principle and procedure of various validation methods▪ Research current events that have implication in the field of DNA analysis

Evaluation/Assessment of Learner Objectives

~450 Total Class Points

Exams – 3, multiple choice, T/F, short answer, exam points range from ~100 to 130.

Assignments – a minimum of 4 assignments which reinforce material and can be used as effective study guides for exams

Exam 1 and 2 dates to be determined, exam week is provided. Exam 3 will be Tuesday May 6th 12:30-2pm.

**Exam questions in which less than 35% of the class receives full credit will be considered for omission from the final score at the instructor's discretion. If removed, the points per exam and total points will be adjusted appropriately.*

Grading Policy

Grading Scale:

90-100%	A
80-89%	B
70-79%	C
60-69%	D
59% and below	F

Attendance Policy

Attendance is Mandatory: Students enrolled in the Forensic Science Program are expected to attend all classes, laboratories, seminars, internship sessions, and presentations offered by guest speakers. If you are sick or are not able to make it to class, a phone call or e-mail is required BEFORE class time. If you are unable to take an exam on the selected day, arrangements must be made BEFORE the scheduled date to take the exam. Failure to do so will result in a failing grade. <http://www.marshall.edu/wpmu/student-affairs/files/2011/08/Medical-Withdrawal-Policy.pdf>

Student Absence Form: www.marshall.edu/forensics <Student Only> <Forms>; <http://www.marshall.edu/forensics/student-resources>; <http://www.marshall.edu/forensics/faculty-resources-and-forms>
Completion of an Instructor-signed Student Absence Form is facilitated by the Student and sent on to the Program Coordinator for all absences. This may occur BEFORE the absence (recommended) or on the first day of class upon return. Whether the absence is EXCUSED or UNEXCUSED will dictate whether the student will be granted make-ups and whether they will receive point or grade reductions. Completed Absence Forms will be placed in the student's formal file. A Completed Absence Form is one bearing signatures of the student, instructor(s), and program coordinator. If the student is not able to attend class for any reason, a phone call or e-mail to the Instructor is required BEFORE class time as this is a standard employer practice.

Excused Absences: The Program Coordinator and Instructor must be notified of absences. Formal documentation is required for Excused Absences which may involve physician statements excusing the student from class, obituaries, or professional travel documentation. With an Excused Absence, the student may be asked to take an exam BEFORE the scheduled date. No exams, labs, or other formal exercises will be made up without an Excused Absence.

Examples of Excused Absences include:

- Personal Medical Emergency – Formal documentation is required from a licensed physician or appropriate healthcare provider
- Death in the Immediate Family – Documentation required
- Forensic Professional Travel – Documentation required. Marshall University Forensic Science Program, Marshall University, the West Virginia Policy Board for Higher Education is not liable for accidents or injuries incurred during trips within or out of the state.

Unexcused Absences: Any unexcused absence in which a student misses a lab or exam or other graded activity will result in the deduction of one letter grade from the student's final grade or a reduction of points as specified in the Course Syllabus. Any quizzes missed during an unexcused absence will result in a zero.

Punctuality: On time arrival is expected of all students. A point deduction of 20 points will be made if a lack of punctuality is persistent (>3 times for the semester).

Medical Withdrawal: <http://www.marshall.edu/wpmu/student-affairs/files/2011/08/Medical-Withdrawal-Policy.pdf>

Final Grade Appeal: Any student who believes the final course grade is wrong may appeal the grade. See (<http://www.marshall.edu/graduate/graduate-student-appeals/>). The appeal is limited to three areas: a) The final grade assigned for a course is based on an obvious error (e.g. a clear error such as error in computing a grade or failure to grade one of the answers on an exam). b) Standards different from those established in written department, or Graduate College policies, if specific policies exist, were used in assigning the grade. c) The instructor departed from his or her previously articulated, written standards, without notifying graduate students, in determining the grade. There are several steps in the appeal process. These are designed to allow the student, faculty, and program director to correct the error or come to a mutual compromise before it goes to the Graduate College/College of Science Dean's Office for final review.

Make-up Policy

The program coordinator and instructor must be notified of absences. Doctor's excuse may be required if more than one absence occurs.

Academic Dishonesty

Academic dishonesty in any form will not be tolerated. Plagiarism is defined as "submitting as one's own work or creation any material or an idea wholly or in part created by another. This includes oral, written, and graphical material, and both published and unpublished work. It is the student's responsibility to clearly distinguish his/her own work from that created by others. This includes the proper use of quotation marks, paraphrase, and the citation of the original source" (2008-2009, Graduate Catalog, p. 61). Refer to Marshall University Board of Governors Policy No. AA-12 Academic Dishonesty - <http://www.marshall.edu/president/Board/Policies/MUBOG%20AA-12%20Academic%20Dishonesty.pdf> – for complete details.

Policy for Student's with Disabilities

Marshall University is committed to equal opportunity education for all students, including those with physical, learning and psychological disabilities. University policy states that it is the responsibility of students with disabilities to contact the Office of Disabled Student Services (DSS) in Prichard Hall 117 (304.696.2271) to provide documentation of their disability. Following this, the DSS Coordinator will send a letter to each of the student's instructors outlining the academic accommodation he/she will need to ensure equality in classroom experiences, outside assignment, testing, and grading. The instructor and student will meet to discuss how the accommodation(s) requested will be provided. For more information, access the website for the Office of Disabled Student Services: <http://www.marshall.edu/disabled/>

Affirmative Action Policy

It is the policy of Marshall University to provide equal opportunities to all prospective and current members of the student body, faculty, and staff on the basis of individual qualifications and merit without regard to race, color, sex, religion, age, disability, national origin, or sexual orientation. To obtain information on the implementation of the policy regarding nondiscrimination, contact the Director of Equity Programs, Old Main, Marshall University, Huntington, WV 24755 (304.696.2592)

COVID-19 Related Information

Marshall's official COVID-19 protocols are online at <https://www.marshall.edu/coronavirus> (URL: <https://www.marshall.edu/coronavirus/>). Policies and protocols may change over time as we respond to changing conditions. The website will always contain the most recent information – check it frequently for the most current information.

Generative AI is fully prohibited in the course.

Students are prohibited from using generative AI in any way on any assignment in this course. The use of generative AI in this course will be considered a violation of both Marshall's [Academic Dishonesty Policy](https://www.marshall.edu/academic-affairs/policies/#academicdishonesty) (URL: <https://www.marshall.edu/academic-affairs/policies/#academicdishonesty>) and the [Student Code of Conduct](https://www.marshall.edu/student-conduct/files/Studnet-Code-of-Conduct-2022.pdf) (URL: <https://www.marshall.edu/student-conduct/files/Studnet-Code-of-Conduct-2022.pdf>).

Campus Carry Policy

- University Policy, UPGA-12 (Campus Carry Policy) derives its authority from West Virginia State law, including the Campus Self-defense Act (W. Va. Code § 18B-4-5b). It pertains to the exercise of Concealed Carry on Marshall University's campus, except in designated areas, by individuals with a valid permit to Conceal Carry.
- Individuals who choose to Conceal Carry are responsible for knowing and understanding all applicable federal, state, and local laws and Marshall University Board of Governors Rules, University Policies, and Administrative Procedures. University Policy, UPGA-12 applies to areas of campus and buildings that are directly under the possession or control of Marshall University.
- Concealed Handguns are not observable to others and must be holstered and concealed on the body of the permit holder or in a personal carrier, such as a backpack, purse, or other bag that remains under the exclusive and uninterrupted control of the permit holder. This includes wearing the personal carrier with a strap, carrying or holding the personal carrier, or setting the personal carrier next to or within your immediate reach at all times. If your participation in class activities impedes your ability to maintain constant control of your Handgun, please make alternate arrangements prior to coming to class.

Faculty Office

- NOTICE: University Policy, UPGA-12 (Campus Carry Policy) defines Sole Occupancy Offices as areas that may restrict Concealed Carry. Please be aware that my office is a Sole Occupancy Office and this statement serves as notice that concealed weapons or handguns are not permitted in my office. If you plan to attend a meeting in my office or to drop by my office, secure your weapon or handgun appropriately before you arrive.

Acceptable Use Policy

Access to Marshall University's resources is a privilege and is provided with an expectation of responsible and acceptable use. To read the principles and guidelines as well as federal, state, and local regulations, please go to <http://www.marshall.edu/ucs/cs/accptuse.asp>.

Inclement Weather Policy

In the case of inclement weather, please follow Marshall's procedures if any cancellations/delays occur. <http://www.marshall.edu/ucomm/weather.html>.

Week(s)	Topics and Activities
Week 1	DNA overview and history
Week 2	Biology and DNA Analysis Overview / Presumptive and Confirmatory Tests/ DNA extraction for biological samples and DNA Purification Methods
Week 3	DNA extraction for biological samples and DNA Purification Methods
Week 4	Laboratory Solutions/Quantification of DNA
Week 5	Exam 1, subject to change
Week 6	Quantification of DNA and Real Time PCR, week of AAFS – class will meet
Week 7	Polymerase Chain Reaction
Week 8	STRs, Y-STRs, Mini STRs
Week 9	Exam 2, subject to change
Week 10	Spring Break
Week 11	Capillary Electrophoresis of STR fragments
Week 12	DNA data interpretation
Week 13	DNA data interpretation
Week 14	DNA mixtures
Week 15	Quality Assurance/Artificial Intelligence and Validation/Verification, Ethics
Week 16	Current Events
Week 17	Exam 3 – May 6th

Course schedule and activities subject to change. Students will be made aware of any changes.

Any Extra credit exercises will not count against the student score.