

Course Change Request

New Course Proposal

Date Submitted: 09/21/20 7:36 pm

Viewing: **FRSC 450 : Practical Forensic Skeletal Biology**

Last edit: 10/06/20 4:15 pm

Changes proposed by: afalsett

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

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. 10/01/19 2:00 pm
Emily Rancourt
(erancour):
Approved for FRSC Representative
2. 10/01/19 2:03 pm
Gregory Craft
(gcraft): Rollback to FRSC Representative for SC Curriculum Committee
3. 10/06/19 2:22 pm
Emily Rancourt
(erancour):
Approved for FRSC Representative
4. 10/22/19 11:44 am
Gregory Craft
(gcraft): Approved for SC Curriculum Committee
5. 10/24/19 9:31 pm
Jennifer Bazaz
Gettys (jbazaz):

- Approved for SC
Associate Dean
6. 11/21/19 10:05 am
Krista Shires
(kshires): Rollback
to SC Associate
Dean for Assoc
Provost-
Undergraduate
7. 12/06/19 9:01 am
Jennifer Bazaz
Gettys (jbazaz):
Rollback to Initiator
8. 09/21/20 8:22 pm
Emily Rancourt
(erancour):
Approved for FRSC
Representative
9. 09/22/20 3:23 pm
Jennifer Bazaz
Gettys (jbazaz):
Rollback to FRSC
Representative for
SC Curriculum
Committee
10. 10/06/20 8:13 pm
Kimberly Rule
(kcarisi): Approved
for FRSC
Representative

No

Effective Term: Spring 2021

Subject Code: FRSC - Forensic Science

Course Number: 450

Bundled Courses:

Is this course replacing another course? No

Equivalent Courses:

Catalog Title: Practical Forensic Skeletal Biology

Banner Title: Practical FRSC Skeletal Bio

Will section titles vary by semester? No

Credits: 3

Schedule Type: Lecture

Hours of Lecture or Seminar per week: 3

Repeatable: May be only taken once for credit, limited to 3 attempts (N3) **Max Allowable Credits:** 9

Default Grade Mode: Undergraduate Regular

Recommended Prerequisite(s):
At least 60 credit hours.

Recommended Corequisite(s):

Required Prerequisite(s) / Corequisite(s) (Updates only):
Minimum grade of C or higher in FRSC 200 and 201.

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:**

Practical forensic skeletal biology is the application of human skeletal biology that includes all aspects of musculoskeletal anatomy, physiology, and changes due to pathogens as it applies in a medico-legal context. It also includes in depth knowledge of bone as a source of cellular regeneration for normal repair as well as highly specialized knowledge of surface anatomy, including all aspects of human growth and development. Students are exposed to disease processes that impact the organic nature of bone as well as change due to Wolfe's Law, Davis's Law, and refinements by Frost that provide baselines to understand mechanical changes overtime via mechanotransduction or due to trauma. Actual cases in combination with hands-on practical experiences in the classroom and at our outdoor training facility will examine how modern forensic science examines human thanatobiomes, apneumones, volatile organic compounds, modern survey techniques to determine the postmortem fate of human remains.

Justification:

This course covers a unique specialty within forensic science that is highly desired by students and will be taught by a Board Certified Forensic Anthropologists which will integrate biologically based medical, scientific, sociological and legal methodology as applied to skeletal biology.

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

Learning Outcomes:

- (1) Students will demonstrate knowledge about human growth and development from implantation to senescence.
- (2) Students will demonstrate and understanding of bone biomechanics including principles such as Wolfe's Law.
- (3) Students will understand how functional anatomy and skeletal biology is applied modern medico-legal settings.
- (4) Students will demonstrate an understanding of the modern death investigation system in the United States and the contribution of applied or practical skeletal biology.
- (5) Students will demonstrate a competency in human remains recovery using FARO systems technology and evaluation of the postmortem interval by understanding the role of human thanatobiomes and apneumones.

Attach Syllabus

[Syllabus- FRSC 450 Falsetti 2020.pdf](#)

Additional Attachments

[FRSC 450 Practical Forensic Skeletal Biology Week 1 Lecture outline.pdf](#)

[FRSC 450 Practical Forensic Skeletal Biology Week 8 Lecture outline.pdf](#)

[FRSC 450 Practical Forensic Skeletal Biology Week 4 Lecture outline.pdf](#)

Staffing:

Anthony B. Falsetti

Relationship to Existing Programs:

This course will be added as an option for the Forensic Science BS majors as an Additional Science course which are upper level science courses which allow majors to tailor their degree towards their specialty of interest related to forensic science. This course has been designed to meet Forensic Science Education Programs Accreditation Commission (FEPAC) requirements, that our BS program is submitting.

Relationship to Existing Courses:

None

Additional Comments:**Reviewer Comments**

Gregory Craft (gcraft) (10/01/19 2:03 pm): Rollback: Per Email

Krista Shires (kshires) (11/21/19 10:05 am): Rollback: Rollback pending discussion with SOAN department. Course can be reconsidered after discussion resolves.

Jennifer Bazaz Gettys (jbazaz) (12/06/19 9:01 am): Rollback: Rolling this back to you so it doesn't accidentally get approved sitting in this approval step. Thank you.

Jennifer Bazaz Gettys (jbazaz) (09/22/20 3:23 pm): Rollback: FRSC Representative approval submitted by accident.

Key: 16525



GEORGE MASON UNIVERSITY
FRSC 450 Practical Forensic Skeletal Biology (3 credits)
Fall 2021

Instructor: Anthony B. Falsetti, Ph.D., D-ABFA
Office: Exploratory Hall Room 3407
Email: afalsett@gmu.edu
Phone: 703-993-6091 (office)
Appointment: <https://anthonyfalsetti.youcanbook.me>

Course Materials: There is one required textbook, Basic and Applied Bone Biology 2nd Edition, (eds.) David B. Burr & Matthew R. Allen, 2019 Academic Press. Additional readings that support weekly topics will be provided by the instructor.

Course Objectives:

Forensic biology is the application of biology to associate a person(s), whether suspect or victim, to a location, an item (or collection of items), another person (victim or suspect, respectively). Practical forensic skeletal biology is the application of human skeletal biology that includes all aspects of musculoskeletal anatomy, physiology, and changes due to pathogens. It also includes in depth knowledge of bone as a source of cellular regeneration for normal repair as well as highly specialized knowledge of surface anatomy. Practical skeletal biology includes all aspects of human growth and development from implantation, through embryogenesis and finally senescence. Practical forensic biology involves the application of skeletal biological principles to human remains in a medico-legal context. Students are instructed and exposed to disease processes that impact the organic nature of bone as well as change due to Wolfe's Law, Davis's Law, and refinements by Frost that provide baselines to understand mechanical changes overtime via mechanotransduction or due to trauma. We will also examine, using actual cases combined with hands-on practical experiences in the classroom and at our outdoor training facility how modern forensic science examines human thanatobiomes, apneumones, volatile organic compounds, modern survey techniques (FARO Systems) to determine the postmortem fate of human remains.

Course Learning Objectives:

- (1) Students will demonstrate knowledge about human growth and development from implantation to senescence.
- (2) Students will demonstrate and understanding of bone biomechanics including principles such as Wolfe's Law.
- (3) Students will understand how functional anatomy and skeletal biology is applied modern medico-legal settings.
- (4) Students will demonstrate an understanding of the modern death investigation system in the United States and the contribution of applied or practical skeletal biology.
- (5) Students will demonstrate a competency in human remains recovery using FARO systems technology and evaluation of the postmortem interval by understanding the role of human thanatobiomes and apneumones.

Prerequisites include FRSC 200 and 201 and at least 60 Credit hours.

Student Responsibilities: Students are expected to review assigned reading prior to each class to facilitate understanding and discussion. Students are responsible for material covered in assigned readings as well as course lectures, discussions, and exercises. While grades are not dependent on attendance *per se*, participation in certain exercises and discussions will count toward the final grade and students are strongly encouraged to attend each class.

Assessments:

PARTICIPATION (10% of grade): Everyone is expected to participate in the practica, discussion boards, hallway meetings, polls or other online assessments.

WEEKLY QUIZZES (10% of grade): These are designed to evaluate your knowledge of the topics presented and will be given at the end of every week of the term.

QUARTERLY EXAMINATIONS (80% of grade): Rather than a traditional midterm and final exam, quarterly exams will be used to evaluate your knowledge of the topics presented in the text, video, and provided lectures.

Grading:

100-98	A+	89-88	B+	79-78	C+	69-60	D
97-94	A	87-84	B	77-74	C	59-60	F
93-90	A-	83-80	B-	73-70	C-		

FORENSIC SCIENCE PROGRAM & UNIVERSITY RESOURCES

RESPECT FOR DIVERSITY:

It is my intent that students from all diverse backgrounds and perspectives be well served by this course, that students’ learning needs be addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength and benefit. It is my intent to present materials and activities that are respectful of diversity: gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture. Your suggestions are encouraged and appreciated. Please let me know ways to improve the effectiveness of the course for you personally or for other students or student groups. In addition, if any of our class meetings conflict with your religious events, please let me know so that I can make arrangements for you.

GMU Honor Code:

Standards of academic integrity as set forth by the University are strictly observed and rigorously enforced in this class. The complete Honor Code is as follows: *To promote a stronger sense of mutual responsibility, respect, trust, and fairness among all members of the George Mason University community and with the desire for greater academic and personal achievement, we, the student members of the university community, have set forth this honor code: **Student members of the George Mason University community pledge not to cheat, plagiarize, steal, or lie in matters related to academic work.***

*****SELF-PLAGIARISM*****

Please keep in mind that submitting a paper or even portions of a paper from another class is not allowed and is considered plagiarism. Per the GMU Honor Code on plagiarism:

“Self-Plagiarism is the concept of resubmitting work you have already written, for a different assignment or class. The concept of Self-Plagiarism may seem strange, after all the work is your own and you are the author. But consider the ethical issues behind resubmitting work. To resubmit a completed, or part of a completed assignment, gives you an unfair advantage over other students and is not completing the assignment in the way the professor asked. Completing an assignment with disregard to how the professor specified the assignment should be completed violates the spirit of academic integrity.

According to the Mason Honor Code, it is NOT ok to resubmit already completed and graded work in place of a new assignment or paper. If you feel that work you have already done should be accepted for a new assignment, you must speak to your professor first. Resubmitting completed work from one class to another can result in you being called in for a violation.”

GMU Email: <http://masonlive.gmu.edu>

Each student is responsible for activating their GMU email account and checking their account on a regular basis for University and class announcements. **All masonlive accounts must be activated.**

GMU Police Policy: 703-993-2810

If you are currently employed with a law enforcement agency as a sworn officer and would like to carry a firearm on campus and into class, you must contact GMU Police Department as a courtesy.

GMU Students with Disabilities: <http://ods.gmu.edu>

If you are a student with a disability and you need academic accommodations, please contact the Office of Disability Resources at 703-993-2474. All academic accommodations must be arranged through that office, your instructor is not obligated to provide accommodations without documentation from ODS.

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)

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, Physical Sciences Liaison Librarian; <http://infoguides.gmu.edu/forensics>

Fenwick Library, A244

703-993-2212

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.



FRSC 450 Practical Forensic Biology

Course Schedule

Week	Date	Topics Covered	Due/Prepare to Discuss
1		<ul style="list-style-type: none"> • Introduction and Overview • Human Bone • How is it organized? 	Chapter 1. Bone Morphology and Organization & Chapter 2. Bone Marrow
2		<ul style="list-style-type: none"> • Cell Regulation 	3. Bone Cells & Chapter 4. Regulation of Bone Cells
3		<ul style="list-style-type: none"> • Bone Remodeling & Imaging (3D) • CT Scans 	Chapter 5. Bone Growth Modeling & Remodeling & Chapter 6 Skeletal Imaging
		<ul style="list-style-type: none"> • Quarterly Exam I 	
4		<ul style="list-style-type: none"> • Wolf's Law • Davis's Law • Frost 	Chapter 7. Skeletal Hard Tissue Biomechanics
5		<ul style="list-style-type: none"> • Locomotor Behavior, Lower Limb Injury 	Skeletal Hard Tissue Biomechanics (Cont.)
6		<ul style="list-style-type: none"> • Quarterly Exam II 	
7		<ul style="list-style-type: none"> • 	Chapter 10. Skeletal Changes Across the Life Span & Chapter 11. Mechanical Adaptation
8		<ul style="list-style-type: none"> • 	Chapter 12. Fracture Healing
9		<ul style="list-style-type: none"> • 	Chapter 16. Bone & Muscle
10		<ul style="list-style-type: none"> • Quarterly Exam III 	
11		<ul style="list-style-type: none"> • 	Chapter 19. The Microbiome & Bone
12		<ul style="list-style-type: none"> • Practical Laboratory Exercises (Sci-Tech) 	Biological properties of Putrefaction and Decomposition
13		<ul style="list-style-type: none"> • Practical Laboratory Exercises (Sci-Tech) 	Thanatobiome & apneumones Identification
14		<ul style="list-style-type: none"> • Practical Laboratory Exercises (Sci-Tech) 	FARO Systems Field Training
15		<ul style="list-style-type: none"> • Quarterly Exam IV 	

Note: Schedule is subject to change. Please listen for announcements during class and check email and Blackboard regularly.

FRSC 450 Practical Forensic Skeletal Biology
Week 1 Outline: Bone Morphology and Organization

1. The Functions of Bone
2. Bone Is Organized as a Multiscale Material
3. Bone Composition
4. The Nanoscale Organization of Bone
 - Collagen
 - Enzymatically Mediated Collagen Cross-Linking
 - Nonenzymatically Mediated Collagen Cross-Linking
 - Collagen Orientation
 - Bone Mineral
 - Noncollagenous Extracellular Matrix Proteins
 - Proteoglycans and Glycosaminoglycans
 - Glycoproteins
 - SIBLING Proteins
 - Osteocalcin
 - Osteonectin
5. The Microstructural Organization of Bone
 - Woven Bone
 - Primary Bone
 - Primary Lamellar Bone
 - Plexiform Bone
 - Primary Osteons
 - Secondary Bone
 - Interstitial Bone
6. The Macroscopic Organization of Bone
 - Cortical Bone
 - Cancellous Bone
 - Skeletal Envelopes
7. The Blood Supply and Innervation of Bone
 - Blood Supply
 - Innervation of Bone
8. Bone Fluid Compartments
9. Bone Mass and Bone Quality
 - Rate of Bone Turnover
 - Bone Trabecular Architecture
 - Tissue Material (Intrinsic) Properties
 - Microdamage Accumulation

FRSC 450 Practical Forensic Skeletal Biology
Week 8 Outline: Skeletal Changes Across the Life Span

1. Prenatal Growth
 - Development and Maturation
 - Calcification and Mineral Homeostasis
2. Postnatal Growth
 - Newborn Mineral Homeostasis
 - Infancy and Childhood Skeletal Growth
 - Puberty and Adolescence
 - Race and Ethnic Differences
 - Endocrine Regulators
 - Genetic Regulation
 - Timing of Growth Rates
 - Development of Peak Bone Mass
 - Fracture Risk in Children
3. Skeletal Changes With Reproduction
 - Pregnancy
 - Lactation
4. Skeletal Changes With Aging
 - Skeletal Expansion and Age
 - Skeletal Mass and Age

FRSC 450 Practical Forensic Skeletal Biology
Week 7 Outline: Skeletal Hard Tissue Biomechanics

1. Introduction to Basic Bone Structure and Function
 - Main Functions of Bone in the Body
 - Bone Is a Hierarchical Structure
2. Fundamentals of Solid Mechanics
 - The Force–Displacement Curve
 - Stress and Strain in Axial Loading
 - Modulus of Elasticity and Poisson’s Ratio
3. Methods of testing mechanical properties of whole bone
 - Axial Loading in Tension and Compression
 - Torsion
 - Bending
 - Factors Contributing to Whole Bone Mechanical Properties
 - Bone Mass: Cancellous Bone
 - Cancellous Architecture and Anisotropy
 - Cortical Bone Size (Mass) and Architecture
 - Bone Tissue Material Properties
 - The Bone Extracellular Matrix: Type I Collagen
 - The Bone Extracellular Matrix: Inorganic Hydroxyapatite
4. Methods of Testing the Mechanical Properties of Bone Tissue
 - Other Measures of Bone “Strength”