
MEMORANDUM

TO: Faculty Senate

FROM: Dr. Richard Harvey

DATE: January 9, 2019

SUBJECT: Curriculum Proposal #18-19-2
Science and Technology/BCG/Forensic Science

I recommend approval of the attached Curriculum Proposal 18-19-2. The Forensic Science curriculum is being revised to include new forensic focused specialization courses (Human Osteology FORS 3301, Forensic Anthropology FORS 3305, Forensic Toxicology FORS 3310, Forensic Taphonomy FORS 3225, and Fingerprint Analysis FORS 3215). These courses will give students forensic specific specialization electives. These courses will allow us to grow our Forensic Science Program and to give our students more relevant forensic science electives. See Appendix D.

cc: Susan Ross
Steve Roof
Mark Flood
Kristy Henson
Laura Ransom
Cheri Gonzalez
Lori Schoonmaker

CURRICULUM PROPOSAL (Submit one hard copy and an electronic copy to the Associate Provost by the second Tuesday of the month.)

Proposal Number: 18-19-2

School/Department/Program: Science and Technology/BCG/Forensic Science

Preparer/Contact Person: Mark Flood & Kristy Henson

Telephone Extension: x4309 / x4877

Date Originally Submitted: Oct. 2018

**Revision (Indicate date and label it
Revision #1, #2, etc.):** _____

Implementation Date Requested: Fall 2019

- I. **PROPOSAL.** Write a brief abstract, not exceeding 100 words, which describes the overall content of the proposal.

The Forensic Science curriculum is being revised to include new forensic focused specialization courses (Human Osteology FORS 3301, Forensic Anthropology FORS 3305, Forensic Toxicology FORS 3310, Forensic Taphonomy FORS 3225, and Fingerprint Analysis FORS 3215). These courses will give students forensic specific specialization electives. These courses will allow us to grow our Forensic Science Program and to give our students more relevant forensic science electives. See Appendix D.

- II. **DESCRIPTION OF THE PROPOSAL.** Provide a response for each letter, A-H, and for each Roman Numeral II–V. If any section does not apply to your proposal, reply N/A.

A. Deletion of course(s) or credit(s) from program(s)

1. B.S. Forensic Science deletions from requirements:

Remove elective options:	Any BIOL above 3000	
	BIOL 2224	Microbiology 4
	BIOL 4420	Developmental Biology 4

Total hours deleted. 0

B. Addition of course(s) or credit(s) from program(s)

1. B.S. Forensic Science additions: these will all be options for specialization elective category

FORS 3301 Human Osteology	(4)
FORS 3305 Forensic Anthropology	(4)
FORS 3310 Forensic Toxicology	(4)
FORS 3225 Forensic Taphonomy	(2)
FORS 3215 Fingerprint Analysis	(2)

Total hours added. 0

C. Provision for interchangeable use of course(s) with program(s)

Not applicable.

D. Revision of course content. Include, as an appendix, a revised course description, written in complete sentences, suitable for use in the university catalog.

Revised catalog course descriptions for all the courses shown in the table in Appendix B and course outline is included in Appendix C. **FORS 2225 Trace Evidence and Microscopy.**

E. Other changes to existing courses such as changes to title, course number, and elective or required status.

Name change: FORS 2225 Forensic Microscopy and Spectroscopy (3) to **FORS 2225 Trace Evidence and Microscopy.** See Appendix C #1.

F. Creation of new course(s). For each new course

1. Designate the course number, title, units of credit, prerequisites (if any), ownership (FSU, PC&TC, or shared) and specify its status as an elective or required course. If you are creating a shared course, attach a memo from the Deans of the affected Schools explaining the rationale for the course being shared.

Number	Course Title	Credits	Prerequisites	Ownership	Status
FORS 3301	Human Osteology	4	BIOL 1106 with a C or higher	FSU	Elective
FORS 3305	Forensic Anthropology	4	FORS 3200 with a C or higher	FSU	Elective
FORS 3310	Forensic Toxicology	4	FORS 3200 with a C or higher	FSU	Elective
FORS 3225	Forensic Taphonomy	2	FORS 3200 with a C or higher	FSU	Elective
FORS 3215	Fingerprint Analysis	2	FORS 3200 with a C or higher	FSU	Elective

2. Include, as an appendix, a course description, written in complete sentences, suitable for use in the college catalog.

Appendix B contains the catalog course descriptions for the proposed new courses.

3. Include, as an appendix, a detailed course outline consisting of at least two levels.

Appendix C #2-6 contains the two-level course outlines for the proposed new courses.

4. In order to meet the requirements as outlined in Goal One of the Strategic Plan, please include Outcome Competencies and Methods of Assessment as an appendix. Examples are available upon request from the Chair of the Curriculum Committee.

Appendix C also contains the Outcome Competencies and Methods of Assessment for the proposed new courses.

- G. Attach an itemized summary of the present program(s) affected, if any, and of the proposed change(s).
1. Describe how this proposal affects the hours needed to complete this program. Specifically, what is the net gain or loss in hours? Use the format for Current and Proposed Programs in Appendix A.
 2. Include proof that this proposal meets the degree definition policy (Board of Governor's Policy #52) as part of the Proposed Program in Appendix A.
 3. Exceptions to the degree definition policy: As per policy #52, programs seeking exceptions to any of the maximum credit hour limits must submit formal requests to the Board of Governors for approval. Explain the rationale for the exception by documenting the existence of one or more of the criteria in paragraph 4.2.

RATIONALE FOR THE PROPOSAL.

A. **Quantitative Assessment:** Indicate the types of assessment data, i.e., surveys, interviews, capstone courses, projects, licensure exams, nationally-normed tests, locally developed measurements, accreditation reports, etc., that were collected and analyzed to determine that curricular changes were warranted. Quantitative data is preferred.

- The Forensic Science Program is making elective revisions based on course offerings at similar institutions, along with alumni feedback, and feedback of the Forensic Science program review. In order to compete with similar institutions we need to offer more direct forensic science courses, replacing biology and chemistry electives.
- There are currently 70 forensic science majors and each student is required to take a minimum of 8 specialization, elective hours. We hope to grow the major and reach 150 total majors in the next 3-5 years.

B. **Qualitative Assessment:** Based upon the assessment data above, indicate why a curricular change is justified. Indicate the expected results of the change. Be sure to include an estimate of the increased cost, or reduction in cost of implementation. FOR EXAMPLE: Will new faculty, facilities, equipment, or library materials be required?

- According to the past AAFS visit, we were lacking in forensic science specialized courses and full-time faculty members. When comparing to other accredited institutions we lack heavily in specialized forensic science courses. Four out of five of these courses are extremely cheap to run and can incorporate materials already present in the forensic science laboratory.
- Forensic Toxicology is the only course that will require additional purchases. The instrument that will be used in this course was purchased last year on an Instrumentation Grant which this department co-authored. Monetary needs to successfully run this course would include: lab supplies (reagents, chemicals, kits). Other monetary needs would go towards the chemistry faculty member assisting in developing laboratory methods. This could be met with release time.
- As the program grows, the forensic science budget should grow accordingly.
- The new courses will be offered every-other year until the program grows and demand increases. These courses will fit into the 12-hour faculty load with no faculty overload.

Example of when the course would be offered:

Courses	Offered
Human Osteology	Fall 2018, Fall 2020, etc.
Forensic Anthropology	Spring 2019, Spring 2021, etc.
Forensic Toxicology	Fall 2019, Fall 2021, etc.
Forensic Taphonomy	2 nd 8 weeks - Spring 2020, Spring 2022, etc.
Fingerprint Analysis	1 st 8 weeks - Spring 2020, Spring 2022, etc.

III.

Should this proposal affect any course or program in another school, a memo must be sent to the Dean of each school impacted and a copy of the memo(s) must be included with this proposal. In addition, the Deans of the affected schools must sign below to indicate their notification of this proposal.

By signing here, you are indicating your college's/school's notification of this proposal.

College/School	Dean	Signature
Science & Technology	Steven Paul	Steven Paul

IV. Should this proposal affect any course to be added or deleted from the general studies requirements, a memo from the chair of the General Studies Committee indicating approval of the change must be included with this proposal.

No.

V. ADDITIONAL COMMENTS.

APPENDIX A

B.S. Degree in Forensic Science Current Program

Required Major Courses		HRS
BIOL 1106	Biological Principles II	4
BIOL 3360	Biochemistry	4
BIOL 3380	Genetics	4
BIOL 3390	Molecular Biotechnology	4
CHEM 1105	Chemical Principles I	5
CHEM 2200	Foundational Biochemistry	4
CHEM 2201	Organic Chemistry I	4
CHEM 2202	Organic Chemistry II	4
CHEM 2205	Analytical Chemistry	4
CHEM 3315	Instrumental Analysis	4
FORS 2201	Introduction to Forensic Science	4
FORS 2225	Microscopy and Spectrometry	3
FORS 3200	Forensic Biology	4
FORS 3385	Research in Forensic Science	3
FORS 4401	Capstone Seminar in Forensic Science	3
FORS 4411	Forensic Science Internship	2
MATH 1113	Applied Statistics	3
TOTAL Required Major Courses		63
Specialization Electives - 8 hours		
BIOL 2224	Microbiology	4
BIOL 4420	Developmental Biology	4
CHEM 3301	Physical Chemistry I	4
CHEM 3304	Inorganic Chemistry	4
CHEM 4404	Synthetic Methods and Materials	4
CHEM 4412	Physical Chemistry II	4
		8
TOTAL HOURS FOR MAJOR		72

Required and Recommended General Studies Courses		
Attribute IA – Critical Analysis		3
	ENGL 1102 (required)	
Attribute IB – Quantitative Literacy		4
	MATH 1585 or 2501 (required)	
Attribute IC – Written Communication		3
	ENGL 1101 (required)	
Attribute ID – Teamwork		3
	CRIM 2295 (required)	
Attribute IE – Information Literacy		IA
	ENGL 1102 (required)	
Attribute IF – Technology Literacy		3
	TECH 1100	

Attribute IG – Oral Communication		3
	COMM 2200	
Attribute III - Citizenship		3
	POLI 1103	
Attribute IV - Ethics		ID
	CRIM 2295 (required)	
Attribute V - Health		3
	CRIM 2212	
Attribute VI - Interdisciplinary		III
	POLI 1103	
Attribute VIIA - Arts		3
	INTR 1120	
Attribute VIIB - Humanities		VIIA
	INTR 1120	
Attribute VIIC – Social Sciences		V
	CRIM 2212	
Attribute VIID - Natural Science		4-5
	PHYS 1101 or 1105 (required)	
Attribute VIII – Cultural Awareness		3
	Any course in VIII	
Additional General Studies hours		4-5
	PHYS 1102 and 1106 (required)	
Writing Intensive	BIOL 3390	X
TOTAL GENERAL STUDIES HOURS		39-41
TOTAL FREE ELECTIVES		7-9
TOTAL HOURS		120

B.S. Degree in Forensic Science
Proposed Program

Required Major Courses		HRS
BIOL 1106	Biological Principles II	4
BIOL 3360	Biochemistry	4
BIOL 3380	Genetics	4
BIOL 3390	Molecular Biotechnology	4
CHEM 1105	Chemical Principles I	5
CHEM 2200	Foundational Biochemistry	4
CHEM 2201	Organic Chemistry I	4
CHEM 2202	Organic Chemistry II	4
CHEM 2205	Analytical Chemistry	4
CHEM 3315	Instrumental Analysis	4
FORS 2201	Introduction to Forensic Science	4
FORS 2225	Trace Evidence and Microscopy	3
FORS 3200	Forensic Biology	4
FORS 3385	Research in Forensic Science	3
FORS 4401	Capstone Seminar in Forensic Science	3
FORS 4411	Forensic Science Internship	2
MATH 1113	Applied Statistics	3
TOTAL Required Major Courses		63
Specialization Electives - 8 hours		
CHEM 3301	Physical Chemistry I	4
CHEM 3304	Inorganic Chemistry	4
CHEM 4404	Synthetic Methods and Materials	4
CHEM 4412	Physical Chemistry II	4
FORS 3301	Human Osteology	4
FORS 3305	Forensic Anthropology	4
FORS 3310	Forensic Toxicology	4
FORS 3225	Forensic Taphonomy	2
FORS 3215	Fingerprint Analysis	2
		8
TOTAL HOURS FOR MAJOR		71

Required and Recommended General Studies Courses		
Attribute IA – Critical Analysis		3
	ENGL 1102 (required)	
Attribute IB – Quantitative Literacy		4
	MATH 1585 or 2501 (required)	
Attribute IC – Written Communication		3
	ENGL 1101 (required)	
Attribute ID – Teamwork		3
	CRIM 2295 (required)	
Attribute IE – Information Literacy		IA
	ENGL 1102 (required)	
Attribute IF – Technology Literacy		3
	TECH 1100	
Attribute IG – Oral Communication		3

	COMM 2200	
Attribute III - Citizenship		3
	POLI 1103	
Attribute IV - Ethics		ID
	CRIM 2295 (required)	
Attribute V - Health		3
	CRIM 2212	
Attribute VI - Interdisciplinary		III
	POLI 1103	
Attribute VIIA - Arts		3
	Any course in VIII	
Attribute VIIB - Humanities		3
	History or Literature that also counts for attribute VIII	
Attribute VIIC – Social Sciences		V
	CRIM 2212	
Attribute VIID - Natural Science		4-5
	PHYS 1101 or 1105 (required)	
Attribute VIII – Cultural Awareness		VIIB
	History or Literature that also counts for attribute VIIB	
Additional General Studies hours		4-5
	PHYS 1102 and 1106 (required)	
Writing Intensive	BIOL 3390	X
TOTAL GENERAL STUDIES HOURS		39-41
TOTAL FREE ELECTIVES		8-10
TOTAL HOURS		120

Appendix B. Course Descriptions for Existing and Revised/New Courses

Old Catalog Course Description	New Catalog Course Description
	<p>FORS 3301 Human Osteology. 4 hours. This course introduces methods and concepts used to analyze human skeletal remains in forensic and archaeological contexts. Osteology is a hands-on course providing a basis for advanced studies such as: comparative anatomy, forensic anthropology, bioarchaeology, paleoanthropology, and gross anatomy. Students will learn standard osteological analyses using real human remains. The course will consist of hands-on lectures and mostly independent laboratory activities. In this course students will learn: 1) how to identify whole and fragmentary human skeletal remains, 2) how to distinguish between human and non-human bone, and 3) how to estimate age, sex, ancestry, and stature of an individual. PR: BIOL 1106 with a C or higher</p>
	<p>FORS 3305 Forensic Anthropology. 4 hours. This course provides a broad overview of the sub-discipline forensic anthropology. Forensic anthropology applies human osteology to a legal setting. In this course students will build on previously learned human osteology by applying it to scenarios such as, mass disasters, human rights, and trauma. Students will learn how to differentiate between comingled remains and fragmentary remains. This course will also give a brief overview of human decomposition as it leads to skeletal identification and time since death. This course will consist of hands-on laboratory activities. PR: FORS 3200 with a C or higher.</p>
	<p>FORS 3225 Forensic Taphonomy 2 hours. This course looks into human taphonomy with an emphasis on forensics. We will focus on the process of decomposition, burial, and re-exposure of individuals. This course will look at how taphonomy alters evidence during forensic investigations. This is an 8 week course. FORS 3200 with a C or higher.</p>
<p>FORS 2225 Forensic Microscopy & Spectroscopy. 3 hrs. This course is an introduction to the microscopy and spectroscopic techniques employed by forensic scientists to analyze trace evidence including hairs, fibers, paint chips, glass fragments, etc. The course will consist of two hours of classroom instruction and two hours of laboratory each week. PR: CHEM 2200 and MATH 1115 or higher. Spring semester of even years.</p>	<p>FORS 2225 Trace Evidence and Microscopy. 3 hours This course is designed to teach students how to properly evaluate and compare impression evidence, and apply forensic microscopy of unknown materials. Students will analyze various hair, fibers, glass, paint, and soil using microanalysis. This course is hands-on providing extensive experience with microanalysis. PR: CHEM 2200 and MATH 1540 or higher. Spring semester of even years.</p>
	<p>FORS 3310 Forensic Toxicology. 4 hours. This course focuses on aspects of drug chemistry with an emphasis in forensics. Students will learn standard analytical testing techniques. This course will also focus on how forensic toxicology relates to pharmacokinetics and metabolism, drug abuse, postmortem toxicology, and driving under the influence of alcohol and drugs. We will address mechanisms of drugs and toxins with their physiological and pathological consequences. PR: CHEM 2200, FORS 3200 with a C or higher.</p>

<p>FORS 3215 Fingerprint Analysis. 2 hours. Fingerprints play a large role in forensic science. In this course we explore different techniques and methods to capture and analyze fingerprints. Students will learn advanced techniques in latent fingerprints, lifting fingerprints, and preparation of fingerprints in a forensic setting. We will also discuss factors that may affect fingerprint analysis. PR: FORS 3200 with a C or better or permission.</p>

Appendix C. Course Descriptions, Outlines and Outcomes for New and Revised Courses

1. FORS 2225 Trace Evidence and Microscopy

- I. Microscope maintenance
- II. Stereomicroscope
 - a. Familiarization with the stereomicroscope
- III. Compound light microscope
 - a. Familiarization with the compound light microscope
 - b. Measurements using the ocular micrometer
 - c. Microscopic mounting techniques
 - d. Determining refractive index
- IV. Polarized light microscope
 - a. Familiarization with the polarized light microscope
 - b. Determining refractive index of anisotropic materials
 - c. Determining birefringence and sign of elongation
- V. Fluorescence microscope
 - a. Familiarization with the fluorescence microscope
- VI. Phase contrast microscope
 - a. Familiarization with phase contrast microscope
- VII. Physical match examinations
- VIII. Construction examinations of evidence
- IX. Lamp filament examination
- X. Fingerprint examinations and comparison
- XI. Tool mark examination
- XII. Firearm examination
 - a. Firearms
 - b. Gunshot residue
- XIII. Shoe and tire print/impression examination
- XIV. Botanical examinations
- XV. Paint examinations
- XVI. Hair examinations
 - a. Hair
 - b. Animal hair
 - c. Determination of racial and somatic origin characteristics of human hair
 - d. Human hair examinations and comparisons
 - e. Evaluation of human hair for DNA
- XVII. Glass examination
 - a. Glass
 - b. Glass breakage determinations
- XVIII. Fiber examination
 - a. Textile fibers
 - b. Natural fibers
 - c. Man-made fiber
 - d. Fiber comparison
- XIX. Soil examination
 - a. Soil
 - b. Identification of minerals in soil
- XX. Microchemical testing – inorganic ions
- XXI. Microscopic analysis of controlled substances
- XXII. Semen examinations

Outcome Competencies and Methods of Assessment

LEARNING outcomes for Trace Evidence and Microscopy

1. Demonstrate basic microscope maintenance and proper use techniques.
2. Discuss types of objects and demonstrate proper examinations.
3. Demonstrate successful analysis of trace materials.
4. Differentiate between trace materials (fingerprint, tool, firearm, shoe, tire, botanical, paint, hair, glass, fiber, and soil).
5. Defend trace analysis and matching materials in a court room setting.

Assessment for lecture/discussion/lab LEARNING outcomes

Learning outcomes will be assessed by standard exam and quiz questions that are multiple choice or matching or essay format. Other objectives will be tested by lab practicals. 1.1 Broad Knowledge and 2.1 Graduate Competitiveness.

1. FORS 3301 Human Osteology

XXIII. Introduction

- a. Introduction to human osteology
 - i. Watch video about Dr. William Bass and the creation of the first ever Body Garden and its importance in forensic anthropology.
- b. Sub-fields of osteology
 - i. Forensic osteology
 - ii. Paleoanthropology
 - iii. Archaeology
 1. bioarchaeology
- c. Information gained from skeletal morphology
 - i. Environment
 - ii. Populations
 - iii. Cultural behaviors
 - iv. Evolutionary history
 - v. Age, sex, stature, diet, ancestry, and pathology of an individual
- d. Differentiating between human and non-human remains
 - i. Quadruped long bones
 - ii. Biped long bones
 1. Give example of local business owners reaching out to determine if bones discovered were animal or human and how hard/easy it is to distinguish.
- e. Differentiating between multiple human remains
 - i. How many individuals
 - ii. What you can gain from fragmentary remains
 - iii. How to distinguish between multiple individuals

XXIV. Anatomical language

- a. Anatomical position
- b. Cranial & post cranial
- c. Axial & appendicular
- d. Plans & sections
 - i. Coronal
 - ii. Frontal
 - iii. Sagittal
 - iv. Cross
 - v. Longitudinal
 - vi. Oblique

- e. Directional terminology
 - i. Body
 1. Anterior/posterior
 2. Cranial/caudal
 3. Medial/lateral
 4. Proximal/distal
 5. Palmar/dorsal
 6. Plantar/dorsal
 - ii. Teeth
 1. Distal/mesial
 2. Buccal/lingual
- f. Anatomical regions
- g. Joint movement
 - i. Flexion/extension/hyperextension
 - ii. Abduction/adduction
 - iii. Circumduction
 - iv. Medial/lateral rotation
 - v. Elevation/depression
 - vi. Dorsiflexion/plantar flexion
 - vii. Inversion/eversion
 - viii. Radial deviation/ulnar deviation
 - ix. Supination/pronation
 1. Joint movement corresponds with a lab activity using a goniometer to test joint range-of-motion of class and compares it to the average. Use real tools common in a PT clinic, AT clinic, or other Sport's medicine facility.
- h. General meaning of words and how it affects skeletal feature

XXV. Ethics in osteology

- a. Ethics
 - i. Define
 - ii. Components of ethics
 1. Legal
 2. Political
 3. Societal
 4. Economical
 5. Expert Witnessing
 - iii. Common ethical issues
 1. NAGPRA
 2. Australian Aborigines
 3. Orthodox Jews
 4. African Americans
 - iv. Caring for the dead
 1. Religious
 2. Cultural
 - v. Discuss potential solutions to ethical issues studying human remains have
 1. 3D scanning
 2. Racial repayment
 3. Only that ethnicity working with remains
 4. Etc.

XXVI. Bone Biology and Variation

- a. Skeletal system
 - i. Function & structure

- b. Blood formation
 - i. Red bone marrow
 - ii. Yellow bone marrow
 - iii. WBC
 - iv. RBC
- c. Skeletal ontogeny
- d. Skeletal morphology & high amounts of variation
 - i. Every skeleton is unique
 - ii. Sexual dimorphism
 - iii. Population variation
 - iv. Idiosyncratic variation
- e. Bone materials
 - i. Collagen
 - ii. Hydroxyapatite
 - iii. Periosteum
 - iv. Collagen
- f. Bones as levers to the muscular system
 - i. 1,2,3 levers
 - ii. Joints
 - 1. Tendon vs ligament
 - iii. Types of joints
 - 1. Fibrous
 - a. Syndesmoses
 - b. Gomphosis
 - c. Synostosis
 - 2. Cartilaginous
 - a. Synchrondroses
 - b. Symphysis
 - 3. Synovial
 - a. Pivot
 - b. Ball and socket
 - c. Hinge
 - d. Condylloid
 - e. Saddle
 - f. Plane
 - iv. Origin/insertion
 - 1. Agonist/antagonist
- g. Gross anatomy of bone
 - i. Cortical/trabecular
 - 1. Endosteal surface
 - 2. Periosteal surface
 - 3. Medullary cavity
- h. Ontogeny
 - i. Diaphysis
 - ii. Osteogenic tissue
 - iii. Metaphysis
 - iv. Epiphyses
 - 1. Epiphyseal plate
 - 2. Epiphyseal line
 - 3. Pseudo-epiphysis
- i. Skeletal histology

- i. Differentiate between mature and immature bone
 - ii. Secondary osteons
 - iii. Haversian canal
 - iv. Volkmann's canal
 - v. Lacunae
 - vi. Osteoblasts
 - vii. Osteoclasts
- j. Osteogenesis
 - i. Intramembranous ossification
 - ii. Endochondral ossification
 - iii. Medical issues- osteogenesis imperfecta
- k. Bone repair
 - i. Callus
 - ii. Primary bony callus
 - iii. Compact bone
 - iv. Medical issue- fibrodysplasia ossificans progressiva (FOP)

XXVII. Skull & Teeth

- a. 20 bones of the skull
 - i. Articulated & disarticulated
 - 1. Cranial bones
 - 2. Facial bones
 - 3. Wormian bones
 - 4. Inca bone
 - 5. All bony landmarks
 - 6. Siding
 - 7. Age
 - 8. Sex
 - 9. Stature
 - 10. Ancestry
- b. Bone growth
 - i. Skull bones
 - ii. Suture fusion
 - iii. Teeth
 - 1. Deciduous
 - 2. Adult
- c. Craniometric & odontometrics
- d. Dental form and function
 - i. Dental terminology
 - ii. Dental formula
 - 1. 2:1:2:3/2:1:2:3
 - iii. Tooth anatomy
- e. Medical issues
 - i. Cavities
 - ii. Infections
 - iii. Braces
 - iv. Concussions
 - v. Early skull fusion

XXVIII. Hyoid and vertebrae

- a. Disarticulated and articulated bones
 - 1. Age
 - 2. Sex

- 3. Stature
- 4. Ancestry
- b. Bone growth
- c. Function of vertebrae and hyoid
- d. Joints
- e. Medical
 - i. Scoliosis
 - ii. Lordosis
 - iii. Hyoid fracture
 - iv. Spinal injuries
 - v. Disk problems

XXIX. Thorax: sternum and ribs

- a. Disarticulated and articulated bones
 - 1. Age
 - 2. Sex
 - 3. Stature
 - 4. Ancestry
- b. Bone growth
- c. Siding
- d. Function and purpose
- e. Joints
- f. Medical
 - i. CPR
 - ii. Rib fracture

XXX. Shoulder girdle

- a. Disarticulated and articulated bones
 - 1. Age
 - 2. Sex
 - 3. Stature
 - 4. Ancestry
- b. Bone growth
- c. Siding
- d. Joints
- e. Medical
 - i. Rotator cuff

XXXI. Arm

- a. Disarticulated and articulated bones
 - 1. Age
 - 2. Sex
 - 3. Stature
 - 4. Ancestry
- b. Bone growth
- c. Siding
- d. Joints
- e. Medical
 - i. Fractures
 - ii. Tennis elbow

XXXII. Hand

- a. Disarticulated and articulated bones
 - 1. Age
 - 2. Sex

- 3. Stature
 - 4. Ancestry
 - b. Bone growth
 - c. Joints
 - d. Medical
 - i. Carpal tunnel
 - ii. Arthritis
- XXXIII. Pelvis
- a. Disarticulated and articulated bones
 - 1. Age
 - 2. Sex
 - 3. Stature
 - 4. Ancestry
 - b. Bone growth
 - c. Siding
 - d. Joints
 - e. Medical
 - i. Hip dysplasia
 - ii. Arthritis
 - iii. Hip dislocation
 - iv. Coccyx fracture
 - v. Human 'tail'
 - vi. Hip replacement
- XXXIV. Leg
- a. Disarticulated and articulated bones
 - 1. Age
 - 2. Sex
 - 3. Stature
 - 4. Ancestry
 - b. Bone growth
 - c. Siding
 - d. Joints
 - e. Medical
 - i. Knee replacement
 - ii. Athletic injuries
- XXXV. Foot
- a. Disarticulated and articulated bones
 - 1. Age
 - 2. Sex
 - 3. Stature
 - 4. Ancestry
 - b. Bone growth
 - c. Joints
 - d. Medical
 - i. Sprained ankle
 - ii. Bipedal
 - iii. Broken foot
- XXXVI. Biomechanics
- a. Muscular attachments and movements
 - b. Walking, running
 - c. Medical

- i. How to tell if someone has a bone condition based on gait
 - ii. Athletic effects on skeleton
- XXXVII. Field procedures for skeletal remains
 - a. How to excavate human remains
 - i. Document
 - ii. Photo
 - iii. Sketch
 - iv. Bag
 - v. Clean
 - vi. Label
 - vii. Analyze
 - b. Common archeological tools
- XXXVIII. Laboratory procedures and reports
 - a. Clean
 - b. Stabilize/repair broken bones
 - c. Prepare skeletons for analysis
 - d. Difference between fossil and skeletal
 - e. Restoration
 - i. CT
 - ii. MRI
 - iii. 3D scan
 - iv. 3D print
 - f. Use standard osteometric tools
 - i. Calipers
 - ii. Osteometric board
 - iii. Mandibulometer
 - iv. Spreading calipers
 - g. Students will conduct osteological analyses on a set of skeletal remains and file these reports
- XXXIX. Pathology
 - a. Antemortem
 - b. Postmortem
 - c. Perimortem
 - d. Paleoepidemiology
 - e. Paleopathology
 - f. Fracture
 - g. Dislocation
 - h. Artificial deformities
 - i. Trephining
 - ii. Skull binding
 - i. Skeletal disorders
 - i. Cranial
 - ii. Vertebral
 - iii. Circulatory
 - iv. Osteoarthritis
 - v. Infectious disease
 - vi. Metabolic disease
 - vii. Endocrine disorders
 - viii. Periodontal disease
- XL. Postmortem skeletal modifications
 - a. Taphonomy
 - b. Antemortem

- c. Bone fracture
- d. Chemistry
- e. Weather
- f. Human vs non-human
- g. Scavenging
- h. Human bone modification
 - i. Cuts, chops, gun, scraps

Outcome Competencies and Methods of Assessment

LEARNING outcomes for Osteology

1. Utilize methods for advanced and accurate skeletal identification. I.e.: siding, age, sex, ancestry, height.
2. Distinguish between human and non-human remains.
3. Discuss the accepted theory of the nature and origin of diversity between human populations and how these are affected by cultural practices.
4. Analyze biomechanical functions of the skeletal system of living and non-living individuals.
5. Execute proper handling and respect when working with human skeletal remains.

Assessment for lecture/discussion/lab LEARNING outcomes

Learning outcomes will be assessed by standard exam and quiz questions that are multiple choice or matching or essay format. Other objectives will be tested by lab practicals. Students are responsible for conducting an in-class research project that will overlap with all concepts learned throughout the semester. This resulting project will end with a scientific poster and presentation to the class. – This ties into the overarching program outcomes: 3.1 Written Expression and 4.1 Oral Expression.

2. FORS 3305 – Forensic Anthropology

Introduction to Forensic Anthropology Course Outline

XLI. Introduction

- a. What is Forensic anthropology?
- b. History of Forensic Science
 - i. Thomas Dwight- father of forensic anthropology
 - ii. Wilton Marion- wrote FBI manual on skeletal identification
 - iii. William Bass, Ellis Kerley, Clyde Snow- Body farm
- c. Medicolegal
 - i. Define
- d. Forensic anthropology protocol
 - i. Are they human?
 - ii. How many individuals?
 - iii. When was death?
 - iv. How old?
 - v. Sex, race, stature?
 - vi. Anatomical anomalies?
 - vii. COD?
 - viii. Manner of death?
- e. Anthroposcopy
 - i. Osteometry

- ii. Standard osteometric tools
- iii. Contemporary/noncontemporary remains
- iv. Regression for skeletal data

XLII. Basics of human osteology and odontology

- a. Anatomical language
 - i. Anatomical position
 - ii. Cranial & post cranial
 - iii. Axial & appendicular
 - iv. Plans & sections
 - 1. Coronal
 - 2. Frontal
 - 3. Sagittal
 - 4. Cross
 - 5. Longitudinal
 - 6. Oblique
 - v. Directional terminology
 - 1. Body
 - a. Anterior/posterior
 - b. Cranial/caudal
 - c. Medial/lateral
 - d. Proximal/distal
 - e. Palmar/dorsal
 - f. Plantar/dorsal
 - 2. Teeth
 - a. Distal/mesial
 - b. Buccal/lingual
- b. Skeleton
 - i. All bones and landmarks
 - ii. Histology

XLIII. Medicolegal significance

- a. What is medicolegal?
- b. Distinguishing bone and teeth from other materials
 - i. Human and non-human
 - ii. Residue
 - iii. Ash
 - 1. Histological differences in each
- c. Distinguishing bone maturity
 - i. Human vs non-human
 - ii. Morphology of human vs non-human
- d. State of preservation
 - i. Color
 - ii. Texture
 - iii. Hydration
 - iv. Weight
 - v. Condition
 - vi. Fragility
 - vii. Soft tissue
- e. Body modifications
 - i. Personal belongings
- f. Condition of interment
 - i. graves

- XLIV. Recovery scene methods
 - a. Issues
 - i. Police and the forensic anthropologist
 - b. Locating the remains
 - i. GPR
 - ii. Magnetometer
 - iii. Visual assessment
 - c. Searching for remains
 - i. Soil compaction
 - d. Searching for associated materials
 - i. Search patterns
 - ii. Mapping
 - e. Datum point
 - i. Quadrates
 - ii. Rough sketch
 - iii. Final sketch
 - f. Grave excavation
 - i. Common tools
 - ii. Excavating and documenting
 - iii. Collecting remains
 - 1. Labeling
 - 2. Chain of custody
 - g. Mass disasters
 - i. Personnel
 - ii. Locating, mapping, collecting
 - iii. Temporary morgue
 - iv. Victim information
 - v. DMORT
 - h. Genocide investigation
 - i. Field conditions
 - ii. Excavating mass graves

- XLV. Postmortem interval
 - a. Forensic taphonomy
 - b. Postmortem interval PMI
 - c. Decomposition
 - i. Autolysis
 - ii. Putrefaction
 - iii. Adipocere
 - iv. Mummification
 - v. Skeletonization
 - d. Surface finds
 - i. Climate
 - 1. Hot/dry
 - 2. Warm/moist
 - 3. Cold
 - ii. Buried
 - iii. Submerged
 - iv. Body score
 - e. Animal scavenging
 - i. Stages of scavenging
 - f. Forensic entomology

- g. Forensic botany
- h. Chemical analysis

XLVI. Treatment and examination

- a. Forensic anthropology laboratory
- b. Preparing remains
- c. Examination
 - i. Removal of soft tissue
 - ii. Disarticulation
 - iii. Reconstruction
 - iv. Sorting
 - v. Reassembly
- d. Inventorying
 - i. Standard osteological analysis
- e. Fragmented remains
 - i. MNI- minimum number of individuals
 - ii. GIS- geographic information system

XLVII. Ancestry

- a. Cultural affiliation
 - i. NAGPRA
- b. Ethnicity/race
- c. Anthroposcopic traits
 - i. Eyes
 - ii. Nose
 - iii. Maxilla
 - iv. Face
 - v. Vault
 - vi. Jaw/teeth
 - vii. Frequency of traits
- d. Osteometric traits
 - i. Direct measurements
 - 1. Long bones
 - 2. Skull
- e. Other ancestral characteristics
 - i. Mandible
 - ii. Hair
- f. Genetics
 - i. Blood types
 - ii. DNA
 - 1. Ancestry Informative markers (AIMS)

XLVIII. Sex

- a. Pelvis
- b. Anthroposcopic traits
 - i. Pelvis
 - ii. Skull
 - iii. Mandible
 - iv. Sacrum
- c. Osteometric traits
- d. Subadults

XLIX. Age at death

- a. Subadults
 - i. Epiphyses

- ii. Diaphysis
 - iii. Long bone length
 - iv. Primary and secondary ossification centers
 - 1. Epiphyseal union
 - v. Deciduous teeth
 - 1. Tooth eruption
 - vi. Skull fusion
 - b. Adults
 - i. Symphyseal surface
 - 1. Pubic symphysis
 - 2. Os coxae auricular surface
 - 3. Ribs
 - 4. Sutures
- L. Stature
 - a. Long bones
 - i. Various formulas for each bone and ethnicity
 - ii. Partial long bone formula
- LI. Death, trauma, and the skeleton
 - a. Define trauma
 - b. Cause and manner of death
 - c. Basic bone trauma
 - i. Fractures
 - 1. Complete
 - 2. Incomplete
 - 3. Hinge
 - 4. Greenstick
 - 5. Displacement
 - 6. Simple
 - 7. Comminuted
 - 8. Hoop
 - 9. Radiating
 - 10. Pathological
 - 11. Stress
 - 12. Fatigue
 - d. Characteristics of force trauma
 - i. Direction
 - ii. Tension
 - iii. Compression
 - iv. Torsion
 - v. Shearing
 - vi. Speed
 - vii. Focus
 - e. Types of trauma
 - i. Blunt
 - ii. Sharp
 - iii. Projectile
 - iv. Miscellaneous
 - f. Timing of bone injury
 - i. Antemortem
 - ii. Perimortem
 - iii. Postmortem

- LII. Projectile trauma
 - a. Ammunition & firearms
 - i. Caliber
 - ii. Gauge
 - iii. Pellets
 - iv. Bullet construction
 - 1. Hollow
 - 2. Full-metal
 - 3. Semijacket
 - b. Velocity
 - i. Calculating velocity
 - ii. Rifling
 - iii. Entry wound
 - iv. Exit wound
 - c. Bullets on bone
 - d. Wound beveling
 - i. Inward beveling
 - ii. Beveling
 - iii. Outward beveling
 - iv. Reverse beveling
 - e. Wound shape
 - i. Round
 - ii. Oval
 - iii. Keyhole
 - iv. Irregular
 - v. Fracture lines
 - 1. Radiating
 - 2. Concentric
 - 3. Butterfly
 - f. Bullet wound analysis
 - i. Description
 - ii. Caliber
 - iii. Bullet construction
 - iv. Velocity
 - v. Direction of fire
 - vi. Sequence
 - g. Pellet wound analysis
 - i. Misc projectiles
 - h. Determining cause & manner of death
- LIII. Blunt trauma
 - a. Size
 - i. Length x width
 - b. Shape
 - i. Round
 - ii. Angular
 - c. Weight
 - i. Heavy vs light objects
 - d. Fractures
 - i. Bow
 - ii. Plastic
 - iii. Bruise

- iv. Occult intraosseous
- v. Torus/buckling
- vi. Greenstick
- vii. Toddler's
- viii. Vertical
- ix. Depressed
- x. Complete fractures
 - 1. Transverse fracture
 - 2. Oblique fracture
 - 3. Spiral fracture
 - 4. Comminuted fracture
 - 5. Epiphyseal fracture
- e. Effects of BFT
 - i. Outbending
 - ii. Inbending
 - 1. Skull
 - iii. Buttresses
 - 1. Alveolar ridge
 - 2. Malar eminences
 - 3. Nasofrontal process
 - 4. LeFort fracture
 - a. LeFort 1
 - b. LeFort 2
 - c. LeFort 3
 - 5. Midfrontal
 - 6. Midoccipital
 - 7. Posterior temporal
 - 8. Anterior temporal
 - iv. Ring fracture
 - v. Long bones
 - vi. Other bones
- f. Wound analysis
 - i. Description
 - 1. Size
 - 2. Shape
 - 3. Direction
 - 4. Energy
 - 5. Number of blows
 - 6. Sequence
 - 7. Misc analysis
 - 8. Cause & manner of death

LIV. Sharp and miscellaneous trauma

- a. Sharp trauma
 - i. Wastage
 - ii. Effects of sharp trauma
 - 1. Puncture
 - 2. Incisions
 - 3. Characteristics
 - 4. Clefts
 - iii. Wound analysis
 - 1. Description

2. Instrument characteristics
3. Force
4. Number of traumatic events
5. Sequence

b. Blast trauma

c. Strangulation

- i. Hanging
- ii. Ligature
- iii. Manual

1. Hyoid

- a. Mature
- b. Immature

d. Chemical trauma

e. Cause and manner of death

LV. Antemortem skeletal conditions

a. Accessory ossicle

- i. Accessory foramen
- ii. Foramen of Huschke
- iii. Septal aperture

b. Skeletal anomalies

- i. Wormian bones
- ii. Epipteric bone
- iii. Japonium
- iv. Metopism
- v. Spondylolysis
- vi. Spina bifida
- vii. Bipartite patella
- viii. Congenital pseudoarthrosis
- ix. Persistent ulna styloid ossicle
- x. Os trigonum

c. Markers of occupational stress

- i. Hypertrophy
- ii. Insertion of muscles
- iii. Osteophytosis
- iv. Facets
- v. Grooves
- vi. Deformations
- vii. Accessory bones

d. Pathological conditions

- i. Osteolytic disease
- ii. Osteoproliferative lesions
- iii. Rickets
- iv. Lytic lesions
 1. Anemia
 2. Porotic hyperstosis
 3. Schmorl's nodes
- v. Proliferative lesions
 1. Osteophytes
 2. Generalized bone disease
 3. Button osteoma
- vi. Deformative lesions

1. Wedging
 2. Osteomalacia
 3. Kyphosis
- e. Misc anomalies
- i. Trephination
 - ii. Trauma-induced pseudoarthrosis

LVI. Postmortem changes to bone

- a. Dismemberment
- b. Saw & saw damage
 - i. Crosscut saws
 - ii. Rip saws
 - iii. Tooth set
 1. Kerf
 - iv. Superficial false start scratches
 1. False start kerf
 - v. Sectioned bone cut
 - vi. Breakaway spur
 - vii. Analysis of saw marks
 1. Description
 2. Direction
 3. Teeth
 4. Blade width
 5. Blade type
 6. Blade shape
 7. Energy
- c. Animal scavenging
 - i. Carnivores
 - ii. Punctures
 - iii. Pits
 - iv. Scoring
 - v. Furros
 1. Rodents
- d. Fire damage
 - i. Temperature
 - ii. Color change
- e. Weathering
- f. Burial damage
- g. Water transport damage
- h. Miscellaneous
 - i. Cryoturbation
 - ii. Mineralization

LVII. Additional aspects of individualization

- a. Define individualization
- b. Facial approximation
 - i. Facial thickness
 1. $\text{Width} = \text{opening width} + 12.2$
 2. $\text{Width} = \text{opening width} + 1.63$
 3. $\text{PP} = 0.56 \times \text{Na-M}$
 - ii. Epicanthic fold
 - iii. Pat pads
 - iv. Everted lips

- v. Ear length
 - 1. $\text{Length} = 54.95 + (4.85 * \text{sex}) + (.1 * \text{age})$
- c. Handedness
- d. Body weight
 - i. $\text{Wt} = 0.024 (\text{dry skeletal wt}) + 50.593$
 - ii. $\text{Wt} = 0.013 (\text{dry skeletal wt}) + 85.406$

LVIII. Obtaining an identification

- a. Positive
 - i. Personal identification
 - ii. Radiography
 - 1. Frontal sinuses
 - 2. Septum
 - 3. Scalloping
 - iii. Dental/surgical devices
- b. Probable
 - i. Point comparison
 - ii. Combing information
 - 1. Match to antemortem characteristics
 - 2. Bayesian statistics
 - iii. Photographic superimposition
- c. Misc
 - i. Identification by exclusion
 - 1. DNA testing

LIX. Ethics

- a. Responsibilities
 - i. Confidentiality
 - ii. Honesty
 - iii. Evidence
 - iv. Opinion
 - v. Expert witnessing
 - vi. Possible
 - vii. Probable
 - viii. General tendency
 - ix. Certainty
 - x. Word qualifiers
 - xi. inconsistent
- b. Personal ethics
- c. Final report
 - i. Court testimony
 - ii. Pretrial meeting
 - iii. Qualifications
 - iv. Direct examination
 - v. Corss-examine
 - vi. Impeach
 - vii. Redirect examination

Outcome Competencies and Methods of Assessment

LEARNING outcomes for Forensic Anthropology

1. Apply advanced and accurate skeletal identification to individuals with pathologies.
2. Distinguish between multiple individuals based on fragmentary remains.

3. Apply proper forensic techniques when analyzing cause of death on skeletal remains.
4. Execute proper handling and respect when working with human skeletal remains.

Assessment for lecture/discussion/lab LEARNING outcomes

Learning outcomes will be assessed by standard exam and quiz questions that are multiple choice or matching or essay format. Other objectives will be tested by lab practicals. Students are responsible for conducting an in-class research project that will overlap with all concepts learned throughout the semester. This resulting project will end with a scientific poster and presentation to the class. – This ties into the overarching program outcomes: 3.1 Written Expression and 4.1 Oral Expression.

3. FORS 3225 – Forensic Taphonomy

- LX. Introduction
 - a. What is taphonomy?
 - b. Osseous data
 - c. Taphonomic characteristics
 - d. How to collect materials
- LXI. Microscopic destruction of bone
 - a. Skeletal histology
 - i. Bone regrowth
 - ii. Bone death
- LXII. Human decomposition ecology
 - a. Grave autopsy
 - i. Recognizing graves
 - ii. Collecting
 - iii. Preserving
- LXIII. Forensic entomology
 - a. Define
 - b. Collection techniques
 - c. Insect life
 - i. Flies
 - ii. Beetles
 - iii. Bees
 - d. Insect development and temperature
- LXIV. Human decomposition
 - a. Algor mortis
 - b. Rigor mortis
 - c. Livor mortis
 - d. Adipocere
 - e. Autolysis
 - f. Putrefaction
 - g. Mummification
 - h. Skeletonization
 - i. How weather/environment affects each of these
- LXV. Decomposition effects
 - a. Burial
 - i. Open
 - ii. Grave
 - iii. Shallow grave
 - iv. Under cement

- v. Greenhouse effect
- vi. water
- b. Weather
 - i. Hot/dry
 - ii. Hot/humid
 - iii. Cold
 - iv. wet
- c. Insect activity
 - i. Flesh eating beetles
 - ii. Flies
 - iii. Other beetles
- d. Drugs, toxins

Outcome Competencies and Methods of Assessment

LEARNING outcomes for Forensic Taphonomy

1. Explain the stages of decomposition and recognizes such stages when encountering remains.
2. Analyze insect activity to determine time of death.
3. Compare and contrast insect activity and decomposition.
4. Discuss how environment, weather, and location can affect decomposition.
5. Apply proper preservation techniques.

Assessment for lecture/discussion/lab LEARNING outcomes

Learning outcomes will be assessed by standard exam and quiz questions that are multiple choice or matching or essay format. Other objectives will be tested by lab practicals. Students are responsible for conducting an in-class research project that will overlap with all concepts learned throughout the semester. This resulting project will end with a scientific poster and presentation to the class. – This ties into the overarching program outcomes: 3.1 Written Expression and 4.1 Oral Expression.

4. FORS 3310 – Forensic Toxicology

LXVI. Fundamentals

- a. Introduction
 - i. Define forensic toxicology
 - ii. Job of forensic toxicologists
- b. History of forensic toxicology
 - i. Ancient Egypt
 - ii. Ancient Greece
 - iii. Ancient Rome
 - iv. Dark Ages and Medieval period
 - v. Dr. addington
 - vi. Orfila, the father of forensics
 - vii. Marsh text
 - viii. Lafarge case
 - ix. Reinsch test
 - x. Isolation of alkaloid poisons
 - xi. Development of forensic toxicology
 - 1. Europe
 - 2. US
 - a. Dr. Buchanan

- b. Alcohol testing
 - xii. Chromatography
 - xiii. Mass spectrometry
- c. Toxicity and toxidromes
 - i. Prongs of toxicity
 - 1. Exposure
 - 2. Dose
 - 3. Mechanism
 - ii. Multiple drug effects
 - 1. Additive
 - 2. Synergistic
 - 3. Potentiation
 - 4. Antagonism
 - iii. Descriptions of toxicity or toxic potential
 - 1. Issues
 - a. Concentration units
 - b. Unexpected effects
 - c. Class descriptions of toxicity
 - 2. Measuring and describing
 - a. Measuring /describing the environment
 - b. Epidemiological studies
 - c. Individual symptoms/behaviors
 - d. Characterization of toxin levels
 - iv. Medical response
 - 1. Clinical evaluation and response
 - a. Evaluation/stabilization
 - b. Emergency medical technician response
 - c. Consciousness assessment
 - d. History and physical examination
 - 2. Patient monitoring and clinical laboratory testing
 - 3. Toxidromes
 - a. Cholinergic
 - b. Anticholinergic
 - c. Sympathomimetic
 - d. Opiate
 - e. Hallucinogenic
 - f. Sedative-hypnotic
 - 4. Antidotes
 - 5. Decontamination
- d. Toxicokinetics
 - i. Introduction to toxicokinetics
 - 1. Mechanism
 - 2. Expression
 - 3. Magnitude
 - 4. Pharmacokinetics
 - 5. Pharmacodynamics
 - 6. Toxicokinetics
 - ii. Fate of drugs and poisons in the body
 - iii. Blood
 - iv. Routes in & out
 - 1. Absorption

- a. Mechanisms of absorption
 - b. Factors affecting absorption
 - c. Drug delivery mechanisms
 - d. Bioavailability
 - 2. Distribution
 - a. Distribution process
 - b. Compartments
 - c. Volume of distribution
 - 3. Elimination
 - a. Parameters
 - b. Kinetics
 - c. Multiple dose considerations
- e. Biotransformation
 - i. Metabolism
 - 1. How metabolism occurs
 - 2. Metabolic transformations are enzymatic processes
 - 3. Limitation of enzymatic processes
 - a. Saturation of enzyme catalysis
 - b. Enzyme induction
 - c. Inhibition of enzymatic processes
 - 4. Drug-drug interaction
 - ii. Phase I and phase II reactions
 - 1. Phase I
 - a. Cytochrome P450s
 - b. Flavin-containing monooxygenases
 - c. Cytosolic enzymes
 - 2. Phase II
 - a. Glucuronidation
 - b. Sulphation
 - c. Methylation
 - d. Acetylation
 - e. Amino acids
 - f. Glutathione
 - g. Mercapturic acids
 - iii. Reactive metabolites
- f. Postmortem toxicology
 - i. Postmortem examinations
 - 1. Role of medical examiner
 - 2. Scene investigation
 - 3. Types of postmortem examinations
 - a. Records review
 - b. External examination
 - c. Autopsy
 - 4. Findings and reports
 - 5. Autopsy process
 - ii. Role of toxicologist in postmortem forensic examinations
 - 1. Samples and sampling
 - 2. Scope of testing
 - a. Screening
 - b. Quantitative analysis
 - c. Specialized toxicology testing

3. Challenges and confounders of postmortem testing
 - a. Analytical
 - b. Interpretive
4. Pediatric cases
5. Geriatric cases

LXVII. Organ system toxicology

- a. Neurotoxicology
 - i. Anatomy
 - ii. Physiology
 1. Neurons
 2. Glial cells
 - iii. Neurotoxicologic responses
 1. Susceptibility of the nervous system
 2. Manifestations of neurotoxicity
 - iv. Neurotransmission
 1. Neuronal membrane potential
 2. Propagation of depolarization
 3. Events at the synapse
 4. Inhibitory neurotransmission
 - v. Ion channel toxins
 1. Sodium channel agents
 - a. Antiarrhythmic sodium channel agents
 - b. Local anesthetics
 2. Potassium channel agents
 3. Calcium channel agents
 - vi. GABA receptor inhibitors and agonists
 - vii. Neural body toxins
 - viii. Toxins that attack myelin
 - ix. Toxins that attack axons
 - x. Toxins that affect synaptic functions
 - xi. Cholinergic toxins
- b. Cardiac toxicology
 - i. Anatomy and physiology
 1. Normal anatomy
 2. Normal electrophysiology
 3. Electrocardiogram
 4. Clinical assessment of heart conditions
 - ii. Disease state
 1. Hypertrophy
 2. Ischemia and infarction
 3. Rate abnormalities
 4. Rhythm disturbances
 - a. Atrial fibrillation
 - b. Ventricular fibrillation
 - c. Long QT syndrome and Torsades de Pointes
 5. Cardiomyopathies
 6. Tamponade
 7. Inflammation
 8. Heart failure
 9. Valvular disease
 - iii. Mechanisms of therapy

1. Inhibition of Na-K ATPase
 2. Sodium channel blockers
 3. Calcium channel blockers
 4. Potassium channel blockers
 5. Adrenergic receptor blockers
 6. Nitrates
 7. Angiotensin-converting enzyme (ACE) inhibitors
- iv. Common toxins
1. Cocaine and other sympathetic amines
 2. Nicotine
 3. Digoxin/digitalis
 4. Doxorubicin
 5. Tricyclic antidepressants
- v. Uncommon toxins
1. Aconitine
 2. Tetrodotoxin
 3. Grayanotoxins
 4. The yew plant
 5. Lily of the valley
 6. Oleander
- c. Hepatotoxicity
- i. Anatomical description
 1. Gross description
 2. Microscopic description
 - a. Classic lobule
 - b. Liver acinus
 - c. Portal lobule
 - ii. Physiological processes
 1. Energy and nutrient processing
 2. Synthesis of biomolecules
 3. Detoxification
 4. Bile formation and elimination
 5. Storage
 - iii. Hepatic injury
 1. Hepatocellular death: apoptosis and necrosis
 2. Cholestasis and jaundice
 3. Fatty liver
 - a. Steatosis
 4. Cirrhosis
 5. Disease states
 - a. Hepatitis
 - b. Diabetes
 - iv. Liver function tests
 1. Other hepatic function measures
 - v. Hepatotoxins
 1. Acetaminophen
 2. Alcohol
 3. Carbon tetrachloride
 4. Mushroom toxins
 5. Microcystins
 6. Bromobenzene

7. Warfarin
- d. Kidney toxicology
 - i. General overview
 1. Anatomy and physiology, and basic functions
 - ii. Excretion
 1. Filtration
 2. Reabsorption
 3. Secretion
 - iii. Blood pressure control
 - iv. Hormone production
 1. Erythropoietin
 2. Calcitriol
 3. Gluconeogenesis
 - v. Clinical measurements of renal function
 1. Blood urea nitrogen
 2. Creatinine
 3. Glomerular filtration rate
 - vi. Examples of toxins
 1. Heavy metals
 2. Aminoglycosides
 3. Chemotherapeutic agents
 4. Hexachlorobutadiene
 5. Aristolochic acid
 6. Orellanine
- e. Pulmonary toxicology
 - i. Anatomy and physiology
 1. Lungs
 2. Physiology of breathing
 3. Clinical assessment of pulmonary function
 - ii. Disease states
 1. Bronchial disease
 2. Parenchymal disease
 3. Interstitial diseases
 - iii. Asphyxia
 1. Interference with cellular utilization of oxygen
 - a. Biochemistry and physiology of respiration
 - b. Cyanide
 - c. Hydrogen sulfide
 2. Interference with transport/absorption- carbon monoxide
 3. Caustic action within the airway
 - a. Mechanism
 - b. Symptoms
 - c. Pathology
 - i. Smoke inhalation
 - iv. Oxygen blockage and displacement
 1. Hypoxic environments
 2. Physical asphyxia
 3. Huffing solvents and aromatic hydrocarbons
 - v. Common toxins
 1. Nicotine
 2. Ammonia gas

3. Chlorine gas
 4. Sulfur dioxide
 5. Ozone
 6. Nitrogen dioxides
 - vi. Uncommon toxins
 1. Phosgene
 2. Silicon
 3. Asbestos
 4. Paraquat
- LXVIII. Toxins, drugs, and drug classes
- a. Alcohol
 - i. Ethanol
 1. Ethanol pharmacokinetics
 - a. Absorption
 - b. Distribution
 - c. Metabolism
 - d. Elimination
 2. Physiological effects of ethanol
 - a. Mechanism of action
 - b. Effects of ethanol and correlation with blood alcohol concentration
 3. Alcohol calculations and inferences
 - a. Back-extrapolation
 4. Alcohol and diabetes
 5. Health effects of chronic ethanol use
 6. Alcohol testing
 7. Ethanol consideration in postmortem cases
 - a. Ethanol-drug combinations
 - ii. Methanol
 1. Pharmacokinetics
 2. Methanol toxicity
 - a. Toxic mechanism
 - b. Clinical presentation
 - c. Treatment
 - d. Pathology
 - e. Forensic toxicology considerations
 - iii. Isopropanol
 1. Pharmacokinetics
 2. Toxicology
 - iv. Ethylene glycol
 1. Pharmacokinetics
 2. Ethylene glycol toxicity
 - b. Opiates and opioids
 - i. History
 - ii. Chemistry
 1. Morphine and structural analogs
 - iii. Pharmacokinetics
 1. Absorption/distribution
 2. Metabolism
 3. Elimination
 - iv. Mechanism of action
 1. Effects on the nociceptive response

- v. Physiological effects
 1. Analgesia
 2. Euphoria
 3. Respiratory depression
 4. Intestinal motility
 5. Cardiovascular effects
 6. Miosis
 7. Cough suppression
- vi. Opiate/opioid toxicity
 1. Mechanism
 2. Clinical presentation
 3. Treatment
 4. Withdrawal
 5. Postmortem considerations
- vii. Tolerance and dependence
- viii. Morphine analogs and related compounds
 1. Heroin
 2. 6-mono-acetylmorphine
 3. Codeine
 4. Thebaine
 5. Hydrocodone, hydromorphone, oxycodone, oxymorphone
 6. Meperidine
 7. Methadone
 8. Fentanyl
 9. Buprenorphine
 10. Naloxone and naltrexone
- c. Non opiate sedative/hypnotic drugs
 - i. Barbiturates
 - ii. Benzodiazepines
 - iii. Z-drugs
 - iv. Antihistamines
 - v. Herbal medications
 - vi. Tricyclic antidepressants
 - vii. Antipsychotics
 - viii. Misc compounds
 1. Trazodone
 2. Chloral hydrate
 3. Glutethimide
 4. Methaqualone
 5. Clonazepam/clonazepamate
 6. γ -hydroxybutyric acid
- d. Sympathomimetic amines
 - i. History
 - ii. Examples and mechanisms
 1. Amphetamine
 2. Methamphetamine
 3. MDA and MDMA
 4. Ephedrine, pseudoephedrine, and related β -hydroxyphenylethylamines
 5. Methylphenidate
 6. Cocaine
 7. Cathinones

- 8. Benzyl-and phenylpiperazines
- iii. Analysis and interpretation of SMA results
- e. Hallucinogens, psychedelics, and cannabinoids
 - i. Psychedelics
 - 1. Serotonin-releasing agents and receptor agonists
 - 2. Tryptamines
 - 3. Lysergic acid and related structures
 - 4. Phenethylamines
 - 5. Cannabinoids
 - ii. Dissociative agents
 - iii. Deliriants
- f. Cholinergic and anticholinergic toxins
 - i. History
 - ii. Cholinergic synapse
 - 1. Normal cholinergic neurotransmission
 - 2. Cholinergic toxins and mechanisms
 - a. Presynaptic toxicity
 - b. Synaptic toxicity
 - c. Postsynaptic toxicity
 - 3. Anticholinergic toxins and mechanism
 - a. Presynaptic toxicity
 - b. Postsynaptic
- g. Metals
 - i. Arsenic
 - ii. Antimony
 - iii. Cadmium
 - iv. Lead
 - 1. Gastrointestinal toxicity
 - 2. Heme synthesis toxicity
 - 3. Neurotoxicity
 - v. Mercury
 - 1. Elemental mercury toxicity
 - 2. Organic mercury toxicity
 - 3. Inorganic mercury toxicity

Outcome Competencies and Methods of Assessment

LEARNING outcomes for Forensic Toxicology

1. Utilize proper collection methods.
2. Discuss how types of drugs will affect an individual and the physiology behind the organ systems.
3. Test various substances to determine presence of drugs.
4. Differentiate between toxins, drugs, and other chemicals.
5. Apply toxicology to a forensics setting.

Assessment for lecture/discussion/lab LEARNING outcomes

Learning outcomes will be assessed by standard exam and quiz questions that are multiple choice or matching or essay format. Other objectives will be tested by lab practicals. Students are responsible for conducting an in-class research project that will overlap with all concepts learned throughout the semester. This resulting project will end with a scientific research paper and presentation to the class. – This ties into the overarching program outcomes: 3.1 Written Expression and 4.1 Oral Expression.

5. FORS 3215 Fingerprint Analysis

- LXIX. Fingerprint Analysis
- a. History of fingerprints
 - i. Nonsystematic methods of identification
 - b. Systematic methods of identification
 - i. Bertillonage
 - ii. Fingerprints
 - 1. Define
 - 2. Fingerprint patterns and characteristics
 - 3. Additional fingerprint definitions
 - c. Fingerprint pattern types and associated terminology
 - i. Loop pattern
 - 1. Loop ridge counting
 - 2. Radial and ulnar loops
 - 3. Issues
 - ii. Plain arch and tented arch patterns
 - 1. Plain arch
 - 2. Tented arch
 - iii. Whorl pattern
 - 1. Plain whorl
 - 2. Central pocket loop whorl
 - 3. Double loop whorl
 - 4. Accidental whorl
 - 5. Ridge tracing and counting whorl patterns
 - 6. Palm print
 - d. Classification
 - i. Henry with FBI Extensions, NCIC, IAFIS
 - 1. Henry with FBI extensions
 - a. Ridge count conversion
 - b. Conversion chart
 - c. Referencing
 - d. Filing sequence
 - 2. NCIC classification system
 - 3. IAFIS
 - 4. Other systems
 - a. Manual methods
- LXX. Development, identification, and presentation of fingerprints
- a. Known fingerprints
 - i. Manual method
 - ii. Live scan
 - b. Unknown fingerprints
 - i. Conditions affecting latent prints
 - ii. Crime scene search and fingerprint development
 - iii. Fingerprint development techniques
 - 1. Powder techniques
 - 2. Chemical techniques
 - iv. Procedure after developing prints
 - v. Fingerprint comparison and identification
 - c. Court presentation
 - i. Preparation
 - ii. Court presentation

1. Verbal
2. Nonverbal
- iii. Challenges to the science of fingerprints

Outcome Competencies and Methods of Assessment

LEARNING outcomes for Fingerprint analysis

1. Apply manual and live scanning methods to fingerprint collection.
2. Critique known and unknown fingerprint collection methods.
3. Differentiate between systematic and nonsystematic methods of identification.
4. Apply proper identification techniques.
5. Defend fingerprint identification in a court room setting.

Assessment for lecture/discussion/lab LEARNING outcomes

Learning outcomes will be assessed by standard exam and quiz questions that are multiple choice or matching or essay format. Other objectives will be tested by lab practicals. Students are responsible for conducting an in-class research project that will overlap with all concepts learned throughout the semester. This resulting project will end with a scientific paper and presentation to the class. – This ties into the overarching program outcomes: 3.1 Written Expression and 4.1 Oral Expression.

Appendix D. FEPAC Accreditation standards

FEPAC accreditation standards comparison of current and proposed Forensic Science program

Standard	Current program	Proposed program
4.1.1a Natural science core At least one biology course with lab One year of physics At least 4 courses in chemistry with lab At least one course in calculus and stats	BIOL 1106 – Biological Principles II Physics 1101 and 1102 (or 1105 and 1106, which are calculus based) CHEM 1105, 2200, 2201, and 2202 MATH 1185 or 1190 and MATH 1113	BIOL 1106 – Biological Principles II Physics 1101 and 1102 (or 1105 and 1106, which are calculus based) CHEM 1105, 2200, 2201, and 2202 MATH 1185 or 1190 and MATH 1113
4.1.1b Specialized science courses Additional 12 semester hours of advanced chemistry or biology	BIOL 3360 - Biochemistry – 4 hours CHEM 2205 – Analytical Chemistry – 4 hours CHEM 3385 – Instrumental Analysis – 4 hours	BIOL 3360 - Biochemistry – 4 hours CHEM 2205 – Analytical Chemistry – 4 hours CHEM 3385 – Instrumental Analysis – 4 hours
4.1.1c Forensic Science courses A minimum of 15 hours, with at least 9 hours having a lab component	FORS 2201 – Intro to For. Sci. – 4 hours <u>FORS 2225 – Forensic Microscopy – 3 hours</u> FORS 4401 – Forensic Capstone – 3 hours FORS 4411 – Internship – 2 hours BIOL 4495 or CHEM 4403 – 2 hours	FORS 2201 – Intro to For. Sci. – 4 hours <u>FORS 2225 - Trace Analysis and Microscopy – 3 hours (new name)</u> FORS 3201 – Forensic Biology – 4 hours FORS 4411 – Internship – 2 hours FORS 4401 – Forensic Capstone – 3 hours
4.1.1d Additional courses A minimum of 19 semester hours of advanced, upper level course	BIOL 3380 – Genetics – 4 hours BIOL 3390 – Molecular Biotech. – 4 hours FORS3385 – Research – 3 hours Specialization electives BIOL or CHEM electives – 8 hours	BIOL 3380 – Genetics – 4 hours BIOL 3390 – Molecular Biotech. – 4 hours FORS 3385 – Research – 3 hours Specialization electives CHEM electives – 8 hours <u>FORS 3301 – Human Osteology – 4 hours (new)</u> <u>FORS 3305 – Forensic Anthropology – 4 hours (new)</u> <u>FORS 3225 – Forensic Taphonomy – 2 hours (new)</u> <u>FORS 3310 – Forensic Toxicology – 4 hours (new)</u> <u>FORS 3215 – Fingerprint Analysis – 2 hours (new)</u>

Appendix E. Registrar course number approval

Hi Professor Henson—

These course numbers are available as well.

Lori

From: Ransom, Laura
Sent: Tuesday, September 18, 2018 11:24 AM
To: FSU Office of the Registrar <registrar@fairmontstate.edu>
Cc: Gonzalez, Cheri <Cheri.Gonzalez@fairmontstate.edu>
Subject: RE: Request for Course Number availability

Hi Lori,

They are all available. Mark Flood and Kristy Henson sent the same list.

Laura

From: FSU Office of the Registrar
Sent: Tuesday, September 18, 2018 10:51 AM
To: Ransom, Laura <lransom@fairmontstate.edu>
Cc: Gonzalez, Cheri <Cheri.Gonzalez@fairmontstate.edu>
Subject: FW: Request for Course Number availability

Laura—

Can you check these courses as well?

Thanks, again!

Lori

From: Henson, Kristy
Sent: Tuesday, September 18, 2018 9:16 AM
To: FSU Office of the Registrar <registrar@fairmontstate.edu>
Subject: Re: Request for Course Number availability

Thank you Lori,

If you have time could you please check these FORS course numbers?

FORS 3301
FORS 3305
FORS 3310
FORS 3225
FORS 3215