*College of Liberal Arts and Sciences*
*Department of Anthropology*

# MCB 5428-04, ANTH 3095-04 &5305-32 FORENSIC HUMAN OSTEOLOGY

**Jacqueline Meier**

February 7-8, 2013: 6-8 pm
Feb 9-10, 2013: 10am-4pm (1 hr lunch)
1 credit
Beach Hall 452 "The Bone Lab"

This course will provide a concise overview of human skeletal anatomy from a morphological and functional perspective. Instructional format will include lecture and laboratory exercises.

Students will learn to:

- Identify the bones of the human skeleton
- Identify major anatomical landmarks
- Determine sex
- Estimate age at death
- Calculate stature
- Recognize effects of trauma and pathologies



ANTH 5305 Human Forensic Osteology 2012 February 7-10 Jacqueline Meier, Instructor

This class is intended to provide you with a brief introduction to the bones of the human body and to the application of forensic osteological techniques. As this course is short, the level of detail expected of you is much less then if this class was taken in full form, and may be repeated as ANTH 3702.

Modules will generally begin with a lecture (about 1 hr.) and be followed by a hands on laboratory for the remaining time in that module (about 1.5 hr.). **Grades will be evaluated based on your written responses on your lab forms as well as a quiz on the basics of human skeletal anatomy.** The lab forms are to be completed during the laboratory time and turned in at the end of the laboratory time for that module. This will require you to focus on the tasks, measurements and observations during lab time in order to complete them in a timely fashion.

Recommended Reading: Most of the necessary materials for the completion of this course are provided in you lab packet. Short readings will be provided for you to print or download on HuskyCT. You should purchase the following book for use in class and also to become familiar with use of this manual for future use in the field:

White, T. & Folkens, P. 2005. The Human Bone Manual. Academic Press. ISBN-13: **978-0120884674**

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**Ground Rules:**

Food and Drink: Water is the only drink allowed in the laboratory. Please be sure that it is in a sealed container. There will be absolutely no eating in the laboratory

Bones: You make pick up and examine the specimens; however. you are not to pick them up more than a few inches off the tables. You must NOT carry specimens from one table to another or ever hold them over the floor! Keep them over the padded tables at all times. Bones are tough, but they can break easily if dropped on the tile floor!!

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Daily Schedules: **Please skim all readings prior to class to prepare. I hope that you will use these references for continuing your studies after the course.**

Thursday, February 7:
Reading: Burns Chapter 13: Introduction to Forensic Lab Analysis, Bass "Human Osteology: Introduction"

Reference: White "Chap 6: Anatomical Terminology", Chs. 9-13

Schedule:
6:00 -8:00 pm Module 1: Introduction to the Bones of the Human Body: the axial skeleton, shoulder girdle, arm & hand.
Lab 1: The Bones Of The Body, Part 1

Friday, February 8:
Reading & Reference: Bass "Human Dentition" pgs 271-305 (lots of charts and useful images)

Reference: White Chs. 14-16

Schedule:
6:00 -8:00 pm Module 2: Introduction to the Bones of the Human Body: the pelvic girdle, leg, foot & skull (part 1)
Lab 2: The Bones Of The Body, Part 2

Saturday, February 9:
Reading & Reference: Schwartz 215-260 (Select pgs), White Ch. 19.3 (Age), Ch.19.4 (Sex), Bass Ageing and Sexing (Uploaded)

Schedule: 10:00-12:30 Module 3: Age at death and Skull (Part 2)

Bones of the Human Body Lab 3: Using the information provided and lecture notes you will determine the age at death for several individuals. Skull part 2 will focus on ageing techniques with the cranium and mandible.

12:30-1 :30 Lunch

1:30-4:00 Module 4: Determining the sex of a skeleton

Lab 4: Using information provided in your packet you will determine the sex of several specimens provided.

Sunday, Feb 10:

Reading & Reference: Klepinger "Stature Estimation" pgs.77-88, "Trauma" pgs.101-116, Burns Ch. 13 (Only section on trauma), White Ch. 17 (Trauma), Ch. 19.5 (Stature)

Schedule: 10:00-12:30 Module 5: Pathology and Trauma

Lab 6: Diagnosis of the type of trauma observed on several specimens and summary description of fate of individuals in the archaeological sample.

12:30-1 :30 Lunch

1:30-4:00 Module 6: Stature and **QUIZ**

Using the information provided and lecture notes estimate stature for several individuals.

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# I. SYLLABUS

## ANTH 3095-005/5305-034

## BOTANY AND MICROSCOPY

SATURDAY, MARCH 9 – SUNDAY, MARCH 10, 2012

9 AM – 5 PM

Lab Methods in Archaeological and Forensic Science

Archaeobotany and Microscopy Laboratory, Beach Hall 453

**Instructor: Thomas Hart**

Office: Beach Hall 403

E-mail: thomas.hart@uconn.edu

**Teaching Assistant: Breanne Clifton**

Office: Beach Hall 448

E-mail: breanne.clifton@uconn.edu.

**Macrobotanical Assistant Supervisor:**

**Madelynn von Baeyer**

Office: Beach Hall 407

E-mail: madelynn.von_baeyer@uconn.edu

**Course Description:**

Phytoliths and starch grains are microscopic plant remains that can survive for millions of years. The durability of these plant remains, along with the ability to identify them to the species level, allows researchers to answer questions relating to both modern and ancient plants. This course will provide an introduction to the taxonomy of identifiable plant remains (phytoliths and starch grains), the extraction and analysis of phytoliths and starch grains, and how they are used to answer archaeological and forensic questions in both the New and Old worlds. During this module, you will receive an introduction to basic optical microscopy, an introduction to phytolith and starch grain extraction from archaeological contexts, and learn how to create your own modern phytolith and starch grain comparative collection.

**Course Requirements:** The bulk of your grade will be determined by your lab performance (50%) as well as your participation (40%) during this course. The lab performance grade will consist of the successful completion of laboratory exercises such as microscope calibration and comparative phytolith mounting. At the end of the second day, there will be a "mini-practical" (10%) in which you will go around the room and answer questions at each station associated with different aspects of basic microscopy and microbotanical analysis covered in this course. Because of the truncated duration of this course there will be no required reading. However, it is recommended that you take a quick glance at the "Introduction to phytolith and starch grain analysis" handout in your information packet if you are interested expanding your understanding of the subject matter.

**Grade breakdown:**

Lab performance- 50% Mini-practical- 10%, Participation- 40%

**Course attire:** Because this is a lab course and you will be exposed to potentially harmful chemicals, appropriate laboratory attire must be worn at all times. Contact lenses are not allowed, even when worn under safety goggles. Closed toe shoes and long pants must be worn at all times while long hair must be tied back when around open flames. Proper laboratory safety equipment such as lab goggles, lab coats, nitrile gloves, and aprons will be provided.

**Useful websites:**

- **University of Sheffield Archaeobotany Wiki**
  - This is the best website for an introduction to phytolith and starch grain analysis
  - http://archaeobotany.dept.shef.ac.uk/wiki/index.php/Main_Page
- George Willcox homepage
  - http://g.willcox.pagesperso-orange.fr/first.htm
- Dorian Fuller downloads
  - http://www.homepages.ucl.ac.uk/~tcrndfu/downloads.htm
- The Society for Phytolith Research- Useful links
  - http://www.phytolithsociety.org/useful-links.html
- The Foundation for Archaeobotanical Research in Microfossils
  - http://www.fossilfarm.org/index.html
- PaleoResearch Institute
  - http://www.paleoresearch.com/mainsite/manuals/manual.html

**Academic Misconduct:**

Plagiarism or cheating of any kind will not be tolerated in this class. Please read Part VI from Uconn's student code below.

http://www.dosa.uconn.edu/Code2.html#top

**Part VI from UCONN's Student Code: Academic Integrity in Undergraduate Education and Research**

The following policy on undergraduate academic integrity was originally formulated by the Scholastic Standards Committee. It was revised and adopted at the (April 10,2000) meeting of the University Senate. This part of The Student Code describes the types of acts that shall be considered academic misconduct by undergraduates, and it presents the process for imposing sanctions for such acts.

## A. Academic Integrity

A fundamental tenet of all educational institutions is academic honesty; academic work depends upon respect for and acknowledgement of the research and ideas of others. Misrepresenting someone else's work as one's own is a serious offense in any academic setting and it will not be condoned.

Academic misconduct includes, but is not limited to, providing or receiving assistance in a manner not authorized by the instructor in the creation of work to be submitted for academic evaluation (e.g. papers, projects, and examinations); any attempt to influence improperly (e.g. bribery, threats) any member of the faculty, staff, or administration of the University in any matter pertaining to academics or research; presenting, as one's own, the ideas or words of another for academic evaluation; doing unauthorized academic work for which another person will receive credit or be evaluated; and presenting the same or substantially the same papers or projects in two or more courses without the explicit permission of the instructors involved.

A student who knowingly assists another student in committing an act of academic misconduct shall be equally accountable for the violation, and shall be subject to the sanctions and other remedies described in The Student Code.

**Lecture and lab schedule**

**Saturday, March 9:**

*9:00am–10:15- Lecture*

- *Course overview*
- *Introduction to archaeobotany*
- *Phytolith and starch grain basics*
- *Basic optical microscopy*

*10:15–10:35-* ***Break***

*10:30am–Noon- Lab*

- *Ice breakers*
- *Introduction to basic microscopy exercise*
- *Basics of phytolith and starch grain exercise*

***Noon–12:45pm- Lunch***

*12:45–1:45- Lecture*

- *Phytolith and starch grain distribution and identification*
- *Comparative phytolith and starch grain collection, extraction and analysis*
- *Archaeological phytolith and starch grain, collection, extraction and analysis*

***1:45–2:05- Break***

*2:05 – 5- Lab*

- *Introduction to lab basics/safety*
- *Starch grain comparative processing exercise*
- *Phytolith comparative processing exercise*

**Sunday, March 10**

*9:00–10:15 - Lab*

- *Continue with starch and phytolith comparative exercise if needed.*

*10:15am–Noon- Lecture*

- Phytolith and starch grain application

***Noon –12:45pm- Lunch***

*12:45–3:30- Lab*

- *Continue with phytolith comparative processing*
- *Processing of archaeological phytoliths and starch grains*
- *Examine comparative collection slides*

***3:30–3:45- Break***

*3:45–5:00*

- Lab mini-practical

# ANTH 3905/5305 Section 6: *Introduction to Stable Isotope Analysis*

CESE center, Annex 4 building, Seminar Room, Lab #10.

*Instructor:*

Dr. Gideon Hartman
Office: Beach Hall room 441
Email: gideon.hartman@uconn.edu

*Teaching assistant:*

David Leslie

*Schedule:*

Friday April 12th, 2013

| | |
|---|---|
| 4:00pm – 5:00pm | Welcome/Introduction to Stable isotopes and to the preparation laboratory |
| 5:00pm – 6:00pm | LAB Bone sampling and cleaning |

Saturday April 13th, 2013

| | |
|---|---|
| 9:00am – 10:00am | LECTURE Stable isotopes |
| 10:15am –12:00pm | LAB Bone demineralization in HCl |
| 12:00pm – 12:30pm | Lunch |
| 12:30pm – 1:30pm | LECTURE Stable isotope analysis of body tissues |
| 1:45pm – 4:00pm | LAB Collagen purification |

Sunday April 14th, 2013

| | |
|---|---|
| 9:00am – 9:45am | LECTURE How does the Isotopic Ratio Mass Spectrometer (IRMS) work? |
| 10:00am – 12:00pm | LAB Collagen freeze-drying (lyophilization) + collagen quantification |
| 12:00pm – 12:30pm | Lunch |
| 12:30pm – 2:00pm | LAB sample weighing |
| 2:15pm – 3:00pm | Quiz* |

*Lab notebooks and quizzes should be both submitted by 3:00pm.

*Module grading breakdown:* 40% Module Quiz

40% Lab notebook
20% participation

If anyone is interested in lab internships please feel free to contact me

## First General Note:

Due to the remote location of the CESE (30 minute walk from the Student Union building) you are asked to bring lunch for the next two days. There are water fountains in the facility.

## Basic behavior in the lab:

The lab environment can be extremely hazardous and corrosive. Protect your body, and expensive garments, by wearing a lab coat and close-toed shoes.

Protect your hands, and the samples you are processing, with gloves.

Handling of hazardous solutions requires the use of protective goggles

Don't enter food or drinks into the lab.

Don't use any solutions (acids, bases, solvents) before reading the appropriate safely data sheets.

The operation of lab equipment is only permitted after appropriate training.

## Lab Notebook

The lab notebook records every action to you take in the lab. It serves as a reference to sample processing procedures, in the same way a cookbook is used to recreate elaborate dishes. It also helps determine retrospectively what went wrong in case of erroneous results.

Leave the first four pages empty for a table of content that you will fill throughout your work in the lab.

Dedicate a new page to each step or procedure you start in the lab. Writing should be limited to the right page, leaving the left side for calculations/miscellaneous. Number each right page and don't forget to add a short title and page number into your table of content.

The lab notebook should be neatly organized because you are not the only person who will need to read through it.

The information recorded in the notebook remains in the lab and held as a 'black box' by the principal investigator. He is the person held accountable for the data used in publications resulting from research that has been performed in the lab. If questions arise regarding the validity of certain results – lab notebooks will be taken out from storage and used to falsify or validate the concern.

## Quiz

At the end of the module you will take a quiz that will include the material covered and practiced in the past two and a half days. You will be allowed to consult your lab notebook.

*College of Liberal Arts and Sciences*
*Department of Anthropology*

University of Connecticut

*Center for Applied Genetics and Technology*

College of Liberal Arts and Sciences

Department of Molecular and Cell Biology

***MCB 5428-001: Theory and Practice of Forensic Identification:***

***DNA Extraction***

***ANTH 3095/5305: Genetics I***

Beach Hall room 209

Instructor:

Sarah Trusiak - sarah.trusiak@uconn.edu

**Saturday, January 26th, 2013**

| | |
|---|---|
| 9:00 AM – 9:30 AM | Welcome / Introduction to lab equipment reagents |
| 9:30 AM – 10:30 AM | Learning to use micropipetters |
| 10:30 AM – 11:00 AM | Begin DNA extraction from Buccal swab until incubation step |
| 11:00 AM – 12:00 PM | Lecture on Genetics / DNA extractions |
| 12:00 PM – 1:00 PM | Lunch |
| 1:00 PM – 4:00 PM | DNA extraction / PCI cleanup / microcon |
| 4:00 PM – 5:00 PM | Written Exercise |

**Sunday, January 27th, 2013**

| | |
|---|---|
| 9:00 AM – 9:45 AM | Quantify DNA using nanodrop |

| | |
|---|---|
| 9:45 AM – 10:45 AM | Check quality of extracted DNA on agarose gel |
| 10:45 AM – 12:00 PM | Lecture on mitochondrial DNA and ancestry |
| 12:00 PM – 1:00 PM | Lunch |
| 1:00 PM – 2:00 PM | Exam review, work on notebook entries |
| 2:00 PM – 4:00 PM | Exam available to be taken |
| 5:00 PM | Deadline: Exam and notebook must be submitted |

**Grade Breakdown**

| | |
|---|---|
| Class Participation | 20% |
| Lab Notebook | 40% |
| Exam | 40% |

**Notebook Guidelines**

A proper laboratory notebook is a scientist's best friend. All notebooks should be kept in pen (non-erasable). Pictures and such may be taped into the notebook, but everything else must be handwritten. Lab protocols must be documented as they happen, so that anyone can come in, pick up your lab notebook, and repeat EXACTLY what you did. This includes steps that you may have done incorrectly. Take note: correctly remembering all the things that you did from the beginning of the module is very difficult if you rush to complete your notebook at the end of the class. So try to keep up with writing in your notebook. There will be several times during the class where we will have time to do so. Doing things incorrectly is not automatic grounds for losing points on the notebook. However, if you fail to document everything (including steps we may amend), points will be subtracted. The fundamental concern is that your notebook accurate records precisely what you did. You should be able to pick up your notebook a year from now and exactly repeat what you did during the module.

You can take notes in your notebook. Your notebook should also be legible—if we cannot read it, we cannot grade it. Your notebook is to be your own work. You should be able to write the steps you do from the protocols we give you in YOUR OWN WORDS. Doing this will help you understand the reasons we do all the steps. Remember, the exam will be open notebook and NOTHING ELSE. No lecture notes. No papers. No exceptions. Notebooks are to be handed in when you are ready to leave. Incomplete notebooks will be docked 10 points for each day they are late. Notebooks will be graded on a 40-point scale. Failure to meet any of the above mentioned guidelines are grounds for point loss.

**Notebook Requirements**

Your notebook must include:

- Name (initials) on each page
- Date on each page
- Purpose/Objective for each experiment
- All reagents and software used
- Any and all additional information given during the module

- Protocols (which include any errors made)

**Plagiarism Guidelines**

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**Class Participation Guidelines**

In order to receive full points for class participation, you must:

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- Follow all safety rules and regulation

University of Connecticut

*Center for Applied Genetics and Technology*

College of Liberal Arts and Sciences

Department of Molecular and Cell Biology

***MCB 5428-02: Theory and Practice of Forensic Identification:***

***PCR***

***ANTH 3095/5305: Genetics II***

Beach Hall room 209

Instructor:

Sarah Trusiak - sarah.trusiak@uconn.edu

**Saturday, February 23, 2013**

| | |
|---|---|
| 9:00 AM – 11:00 AM | Welcome / Lecture on DNA and PCR |
| 11:00 AM – 12:00 PM | Setup practice B-actin PCR |
| 12:00 PM – 1:15 PM | Lunch |
| 1:15 PM – 2:45 PM | Check PCR on agarose gel / Discuss results |
| 2:45 PM – 3:45 PM | Setup haplotype PCR |
| 3:45 PM – 5:00 PM | Written Exercise |

**Sunday, February 24, 2013**

| | |
|---|---|
| 9:00 AM – 10:45 AM | Check PCR on agarose gel / Discuss results |
| 10:45 AM – 11:45 AM | Lecture mitochondrial DNA, forensics, and ancestry |
| 11:45 AM – 1:00 PM | Lunch |
| 1:00 PM – 2:00 PM | Exam review, work on notebook entries |
| 2:00 PM – 4:00 PM | Exam available to be taken |
| 5:00 PM | Deadline: Exam and notebook must be submitted |

**Grade Breakdown**

| | |
|---|---|
| Class Participation | 20% |
| Lab Notebook | 40% |
| Exam | 40% |

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**Notebook Requirements**

Your notebook must include:

- Name (initials) on each page
- Date on each page

- Purpose/Objective for each experiment
- All reagents and software used
- Any and all additional information given during the module
- Protocols (which include any errors made)

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University of Connecticut

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College of Liberal Arts and Sciences

Department of Molecular and Cell Biology

***MCB 5428-003: Theory and Practice of Forensic Identification:***

***DNA Sequencing and Haplogroups***

***ANTH 3095/5305: Genetics III***

Beach Hall room 209

Instructor:

Sarah Trusiak - sarah.trusiak@uconn.edu

**Saturday, March 2, 2013**

| | |
|---|---|
| 9:00 AM – 10:30 AM | Welcome and lecture on DNA sequencing |
| 10:45 AM – 11:30 AM | PCR cleanup |
| 11:30 AM – 12:25 PM | Sequencing PCR setup |
| 12:15 PM – 1:30 PM | Lunch |
| 1:30 PM – 2:30 PM | Lecture on ancient DNA |
| 2:30 PM – 4:30 PM | Sequencing precipitation |

| | |
|---|---|
| 4:30 PM – 5:00 PM | Load samples onto ABI 3130XL sequencer (sequencing occurs overnight) |

**Sunday, March 3, 2013**

| | |
|---|---|
| 9:00 AM – 10:00 AM | Lecture on degraded samples and ancient DNA |
| 9:30 AM – 10:30 AM | Check validity of sequences |
| 10:30 AM – 12:00 PM | Sequence Analysis/Bioinformatics |
| 12:00 PM – 1:00 PM | Lunch |
| 1:00 PM – 2:00 PM | Exam review, work on notebook entries |
| 2:00 PM – 4:00 PM | Exam available to be taken |
| 5:00 PM | Deadline: Exam and notebook must be submitted |

**Grade Breakdown**

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|---|---|
| Class Participation | 20% |
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| Exam | 40% |

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