BSC 5406/CHS 4533C – Fall 2016

Forensic Biology/Forensic Biochemistry Applications

Meeting time/place: TU/TH, 11:00-12:15/CP 103.

Instructor: Jeffrey D. Wells, Ph.D., Department of Biological Sciences.

Office: OE 203, Voice: (305) 348-1320, E-mail: jedwell@fiu.edu.

Office hours: Tuesday 1-5 PM or by appointment. Please do not disturb me during the hour before class.

Prerequisite: Graduate status.

Textbook: Goodwin W, Linacre A, Hadi S. 2011. An Introduction to Forensic Genetics. Wiley-Blackwell, ISBN 9780470710197.

Learning objectives: Students will learn the history and technical details of DNA-based human identity and paternity testing as currently practiced in this country. They will become familiar with, and be able to apply, the basic population genetic principles and statistical models used to interpret genotype evidence in this context. Students will also learn how forensic analyses of human genotypes compare to those performed on non-human samples.

Grading

The grade scale will be based on the mean point total achieved by the top three students in the course. ≥90% of the highest total = A. ≥78% = B. ≥64% = C. ≥50% = D.

Mid-term Exam 1, **Sept. 13**, max = ~100 pts.

Mid-term Exam 2, **Oct. 11**, = ~100 pts.

Mid-term Exam 3, **Nov. 3**, = ~100 pts.

Mid-term Exam 4, **Nov. 22**, = ~100 pts.

Comprehensive Final Exam, **December 8**, 9:45AM - 11:45AM, ~300 pts.

Homework & in-class assignments = ~100 pts.

Extra credit points based of the assigned reading.

Other Important Date

-November 24. Thanksgiving holiday. No class.

Attendance

A student who misses an exam or who is late in turning in an assignment because of an authorized FIU or government activity will have the opportunity to take a make-up exam or turn the assignment in late. To be given this opportunity the instructor must be informed during the first two weeks of the semester. Consideration of other absences will be at the discretion of the instructor.

Students will not be allowed to leave the room and return during an exam session. Any student who arrives for an exam after another student has completed the exam and left the room will not be allowed to take the exam.

Lecture Topics

The tentative order of lecture topics and associated reading are shown below. Each may not correspond to a single lecture, **so please stay at least one topic ahead when doing the reading**. PDFs of the research papers or WWW news stories are posted on Blackboard. PDF files of lecture slides will be posted on Blackboard after each presentation. Website URLs are listed below, however these sites contain much more information than we will cover. The instructor will provide further information on what to study from this material.

SUBJECT	**Text Chapter + other**
History of DNA typing	1, Lander
The human genome	2
Human subpopulations	Tang et al.
Sample collection/characterization/storage	3
DNA extraction, quantitation, PCR	4, 5
Analysis of amplified fragment length	6, 7, McCord, Budowle et al. 2009
Multiplex kits	STRbase
Population genetics and genotype proportion	8
The weight of forensic evidence	9
Mixtures	Gill et al.
Paternity testing	11
DNA databases	10, Krane et al.
QA/QC concerns, validation	FSC, Butler, "Phantom killer" news stories 1&2
SNPs, SINES	12, Ray et al.
Y chromosome analysis	13
DNA sequence analysis	pp. 146-148, Metzker 2010, NCBI
Human mitochondrial DNA analysis	13, Budowle et al. 2003
Inferring phenotype	Debinski & Picard 2014
Familial searches	Gershaw et al. 2011
Non-human DNA	14, Tucker & Koblentz. WFW

Assigned scientific papers and web sites

Budowle, B. et al. 2003. Forensic mitochondrial DNA: applications, debates, and foundations. Annu Rev Genomics Hum Genet 4:119-141.

Budowle, B. et al. 2009. Validity of low copy number typing and applications to forensic science. Croat Med J. 50:207-17.

Butler JM. 2006. Debunking some urban legends surrounding validation within the forensic DNA community. Profiles in DNA (Promega Corporation). 9:3-6.

Debinski GR, Picard CJ. 2014. Evaluation of the IrisPlex DNA-based eye color prediction assay in a United States population. Forensic Science International: Genetics 9:111-117.

Forensic Science Communications (FSC) article "Quality Assurance Standards for Forensic DNA Testing Laboratories. DNA Advisory Board." web link: http://www.fbi.gov/about-us/lab/forensic-science-communications/fsc/july2000/index.htm/codispre.htm

Gershaw CJ, Schweighardt AJ, Rourke LC, Wallace MM. 2011. Forensic utilization of familial searches in DNA databases. Forensic Science International: Genetics 5:16-20.

Gill P, et al. 2006. DNA Commission of the International Society of Forensic Genetics: Recommendations on the interpretation of mixtures. Forensic Sci Int. 90-101

Krane DE. et al. 2009. Time for DNA disclosure. Science 326:1631-1632.

Lander ES. 1989. DNA fingerprinting on trial. Nature. 339:501-5.

McCord, B. 2003. Troubleshooting capillary electrophoresis systems. Profiles in DNA. 6:10-12.

Metzker ML. 2010. Sequencing technologies – the next generation. Nature Reviews Genetics 11:31-46.

"Phantom Killer" news articles 1 & 2.

Ray, DA. et al. 2005. Inference of human geographic origins using Alu insertion polymorphisms. Forensic Science International 153:117–124

Tang et al. 2005. Genetic structure, self-identified race/ethnicity, and confounding

in case-control association studies. Am J Hum Genet 76:268–275.

Tucker JB, Koblentz GD. 2009. The four faces of microbial forensics. Biosecur Bioterror. 7:389-97.

National Center For Biotechnology Information (NCBI) web site:

http://www.ncbi.nlm.nih.gov/

STRbase web site: http://www.cstl.nist.gov/strbase/

Witness for whales web site: http://dna-surveillance.fos.auckland.ac.nz:23060/page/whales/title