

DNA ACADEMY #12
JULY 27, 2009 – NOVEMBER 20, 2009
ALBANY, NEW YORK

Long weekends have been incorporated into this DNA Academy curriculum to give trainees a chance to explore the northeast: Boston, NYC, Montreal, the Adirondacks or perhaps Niagara Falls. Our hope is this will lessen the stresses of attending the intensive NERFI training and being away from home for an extended period of time.

MODULE 1

Molecular Biology and Forensic DNA Typing
 University at Albany, State University of New York
 July 27 – August 5, 2009

Starting	Ending	Course Title	Instructors	Comments
July 27	Aug 5	Molecular Biology and Forensic DNA Typing	NERFI staff	Lectures prepared from Watson et al Molecular Biology of the Gene 5 th edition, Butler 2 nd Edition, and primary scientific literature.

Module 1

Course Instruction and Description:

Primary Instructors: NERFI teaching staff and experts from the field of Forensic DNA Typing

Description: Topics in Molecular Biology and Forensic DNA Typing Discussion of nucleic acid structure and organization, chromatin and chromosome structures, mechanisms of replication and recombination, mechanisms of gene expression, regulation, and repair in eukaryotic cells. Emphasis is placed on unique features of eukaryotic systems with examples given from higher and lower eukaryotes. Where appropriate, Forensic DNA Typing applications based on principles from molecular biology are stressed in this course.

Lectures: Daily lectures on the theory and practice of Forensic Molecular Biology will be given from 8:00 am to 10:15 am & 12:30 pm to 2:30 pm.

Assignments: Each day during Module 1, trainees will have the opportunity to complete assigned readings and homework from 10:30 am to 12:00pm & 2:45 pm to 4:00 pm.

Primary Resources: Watson, JD. 2004. *Molecular Biology of the Gene*. 5th Ed. and primary scientific literature.

Additional Resources: Butler J. 2005. *Forensic DNA Typing*, 2nd Edition. Elsevier Academic Press. Burlington, MA (ISBN 0121479528) and scientific literature required by SWGDAM.

Attendance: **Mandatory** - unexcused absences on the trainee's part will result in a failing grade for all assignments that day.

Academic Integrity: See Graduate Bulletin for details. Deviations will be treated according to the University at Albany's academic regulations.

Final Grade for Module 1

Exam	50pts.
Assignments	25pts.
Participation	10pts.
Performance (Weekly Assessment Memo, Attitude, etc.)	15pts.
TOTAL POINTS	100pts.

Note: Each trainee must earn at least a grade of 80 to pass Module 1: Topics in Molecular Biology and Forensic DNA Typing.

Week 1: Molecular Biology and Forensic DNA Typing Schedule: Lectures may be via DVD.

Homework and assessment memos must be submitted via email.

	Monday July 27	Tuesday July 28	Wednesday July 29	Thursday July 30	Friday July 31
		Homework due	Homework due	Homework due	Homework due
8:30 – 10:15 am <i>LSB 1144</i>	<i>NERFI Welcome</i> Basic Genetics Central Dogma	Structure of DNA & RNA The Replication of DNA in Eukaryotes	Mechanisms of Transcription & Translation	DNA Quantitation Electrophoresis & Fluorescent DNA Detection	Homologous Recombination
10:30 – 12:00	Assigned Readings and Assignments	Assigned Readings and Assignments	Assigned Readings and Assignments	Assigned Readings and Assignments	Assigned Readings, Assignments and Review
12:30 – 2:30 pm <i>LSB 1144</i>	DNA Isolation	PCR DNA Amplification	History of Forensic DNA testing Quality Assurance & Quality Control	DNA Damage & Repair	Repetitive DNA & other DNA Polymorphisms used as Genetic Markers
2:45 – 4:30 pm	Assigned Readings and assignments	Assigned readings and assignments	Assigned readings and assignments	Assigned Readings and assignments	Assigned readings and assignments

MODULE 2

WEEK 2: Molecular Biology & Forensic DNA Typing (cont'd.)					
Date	Time	Morning	Time	Afternoon	Comments
8/3/09	8:00	<p>8:00 - Assessment memo 1 due</p> <p>10:30 - Study time for final exam</p>	12:30	<p>Last homework from Module 1 returned.</p> <p>12:30 - 7500 Instrumentation lecture</p> <p>2:30 - 3130xl Instrumentation lecture</p>	<p>During the 17 - week training, all trainees must submit weekly Assessment Memos (via e-mail) to the Jamie. Assessment Memos are due every Monday at 8:00am.</p> <p>Required Readings:</p> <ul style="list-style-type: none"> • Organic DNA Extraction • DNA Quantitation • DNA Amplification • Setting up the 310 • Setting up the 3130xl <p>Staffing:</p>
8/4/09	8:00	<p>8:30 - Question & Answer session for final exam</p> <p>10:00 University Biological Hazards Safety Training</p>	12:30	<p>12:30 - Study time for final exam</p> <p>4:00 - Last homework due</p>	
8/5/09	8:00	8:00 - Study time for final exam.	12:30	<p>12:30 - Final Exam</p> <p>4:00 - Pizza Party for trainees and staff</p>	
8/6/09	8:00	DAY OFF	12:30	DAY OFF	
8/7/09	8:00	DAY OFF	12:30	DAY OFF	

Notes

Trainees are expected to work on Sim Set and Sample Set reports as time allows during the day – while samples are centrifuging, quant'ing, amp'ing, or being analyzed, etc. – and at home as necessary to complete a total of 20 reports by the conclusion of the Academy.

For Competency Test, trainees must make their own master mixes and must not discuss techniques or results with other trainees. FOR COMP TESTS, ALL WORK MUST BE DONE INDEPENDENTLY, INCLUDING MASTER MIXES, QUANTITATION STANDARDS, etc. **NO BATCHING OF SAMPLES!**

Module 3 (Weeks 3, 4, 5 & 7 - 14): Forensic DNA Analysis Laboratory

IMPORTANT POINTS:

1. Software: GeneMapper ID 3.2 and Data Collection 3.0.
Platforms: ABI 7500, ABI 9700 & 9600, ABI 310 and ABI 3130XL
Kits: Human & Y Quantifiler, Profiler Plus, Cofiler and Identifier
2. SWGDAM Guidelines - as they apply to the 50 sample recommendation:
Section 5.5 of the Training Guidelines (Jan. 01) states the following: A new DNA laboratory trainee must complete a training notebook documenting his/her own experiences performing evidentiary or known sample analysis. The type of samples included must vary, reflecting the range, type, and complexity of casework or database analyses routinely handled by his/her laboratory duties. To assist in ensuring basic competency, this training notebook must document analysis of a minimum of 50 samples for nuclear DNA analysis.
3. SWGDAM Guidelines- as they apply to the 20 data set recommendation:
Section 6.4.2 of the Training Guidelines (Jan. 01) states the following: The trainee will review 20 sets of data representative of casework and provide a written interpretation of the data according to the laboratory policy. The trainer will review and assess the reports for accuracy. These data sets can be samples representative of typical casework or actual casework data. The laboratory can maintain a standard file of data sets or share sets with other laboratories.

Course Instruction and Description:

Primary Instructors: NERFI teaching staff and experts from the field of Forensic Science

Description: Trainees in Forensic DNA Analysis Laboratory will learn how to perform molecular analytical procedures that include organic DNA extraction, DNA quantification, PCR-based methods, multiplex amplification of STR loci, capillary electrophoresis of amplified products, and data analysis, interpretation, reporting of single source and mixture data samples and courtroom presentation.

Textbook: John Butler Forensic DNA Typing, 2nd Edition (ISBN 0121479528) and all pertinent literature required by SWGDAM. NRC II Report, David J. Balding Weight of Evidence for Forensic DNA Profiles, ABI User's Manuals as reference materials, and other readings from primary resources.

Attendance: Mandatory - unexcused absences on the trainee's part will result in a failing grade for all assignments that day.

Academic Integrity: See Graduate Bulletin for details. Deviations will be treated according to university regulations.

Final Grade for Module 3: Each trainee must earn a grade of at least 80 to pass Forensic DNA Analysis Laboratory.

Final Exam (30 pts.) -----	30pts.
Competency Exam (35pts.) -----	35pts.
Quizzes (2.5pts each. x 4) -----	10pts.
Performance (Weekly Assessment Memos, Attitude, etc.) -----	15pts.
Moot Court -----	<u>10pts.</u>
TOTAL POINTS	100pts.

Assessment Memos: Each trainee must submit, via e-mail, a weekly Assessment Memo to Jamie. Assessment Memos are due every Monday at 8:00 am unless a holiday falls on Monday. In that case, it is due the following day of instruction.

All Assessment Memos submitted must contain the following information:

1. Total number of samples extracted to date – please list them out by name (ie: Sample Sets: 1, 3, 5, and 10).
2. Total number of independent setups and operations on the AB 7500, AB 9700 and AB 3130XL. The definition of an “independent setup” will be discussed further.
3. Any comments, concerns and mistakes made during the week. In the "mistake" section students must include a description of what was done to correct each mistake and how to prevent the same mistake from re-occurring in the future. In addition, include specific comments about lessons learned, what they think they still need help with, what they feel they are improving on, what they feel proficient at, etc. In this section the trainee may also include suggestion for NERFI to improve the DNA academies.

Competency Exams: There will be one final laboratory competency exam that will be graded pass/fail. Those trainees failing this exam on the first try will be issued a second exam and allowed only one additional attempt to pass. Failure to pass the second competency exam will result in a failure for that exam.

Laboratory Attire: All trainees must wear all appropriate Personal Protective Equipment (PPE) when working in the DNA Laboratory. Eating and drinking are prohibited in the NERFI laboratories.

Performance Metrics: At the end of each week Jamie will update each trainee’s performance metric and send that report, via e-mail, to their home laboratory. The performance metric, along with a copy of the assessment memo, each week will allow the home lab’s supervisors a window into each trainee’s progress during the academy.

WEEK 3: Forensic DNA Analysis Laboratory					
Date	Time	Morning	Time	Afternoon	Comments
8/10/09	8:00	8:00 - Assessment memo 2 due Organic extraction demo	12:30	Organic extraction demo	Instructors will be in the laboratory during the first 2 Sample Set analyses to assist trainees with techniques and evaluate their skills Required Readings: <ul style="list-style-type: none"> • Quantifiler Manual • Pro/CO/Ident. Manual • DNA Training Bibliography Sample Set 1 consists of blood serial dilutions. Staffing:
8/11/09	8:00	Quantitation demo –Q-PCR 7500	12:30	Amplification demo (Identifiler)	
8/12/09	8:00	CE 3130xl demo	12:30	Extra time to bring all trainees to the same point.	
8/13/09	8:00	SAMPLE SET 1: sample prep, organic extraction	12:30	SAMPLE SET 1: organic extraction	
8/14/09	8:00	SAMPLE SET 1: Quantitation - setup	12:30	SAMPLE SET 1: Quantitation – results interpretation & amp calculations 4:00 - Friday meeting –	

WEEK 4: Forensic DNA Analysis Laboratory					
Date	Time	Morning	Time	Afternoon	Comments
8/17/09	8:00	8:00 - Assessment memo 3 due SAMPLE SET 1: Amplification – setup Sim Sets 1 & 2 assigned	12:30	12:30 - Order of case file lecture Work on Sample Set 1 case file	Instructors will be in the laboratory during the first 2 Sample Set analyses to assist trainees with techniques and evaluate their skills.
8/18/09	8:00	8:30 - GeneMapper ID lecture	12:30	12:30 - GeneMapper ID lecture	Oral quizzes will be worked in to impact lab work as minimally as possible.
8/19/09	8:00	SAMPLE SET 1: 3130xl CE – setup Work on Sample Set 1 case file	12:30	SAMPLE SET 2: setup differential ext for over night incubation Work on Sample Set 1 case file	Sample Sets 1 and 2, DO NOT require analytical reports, but still require a case file - allele charts only.
8/20/09	8:00	SAMPLE SET 2: complete differential ext	12:30	SAMPLE SET 2: complete differential ext Work on Sample Set 1 case file	Sample Set 2 consists of semen serial dilutions.
8/21/09	8:00	DAY OFF	12:30	DAY OFF	Staffing:

WEEK 5: Forensic DNA Analysis Laboratory					
Date	Time	Morning	Time	Afternoon	Comments
8/24/09	8:00	8:00 - Assessment memo 4 due Quiz 1: Oral quiz on laboratory procedures, extraction, quantitation, & QA - SAMPLE SET 2: Quantification-setup Work on Sample Set 1 case file	12:30	Quiz 1: Oral quiz on laboratory procedures, extraction, quantitation, & QA - 4:00 - Sample Set 1 case file due 4:00 - Friday meeting -	Sim Sets submitted with: <ul style="list-style-type: none"> • Case report • CODIS Upload Request Staffing:
8/25/09	8:00	SAMPLE SET 2: Amplification - setup 10:30 - Mixture Interpretation Lecture	12:30	12:30 - Mixture Interpretation Lecture	
8/26/09	8:00	SAMPLE SET 2: CE 3130xl - setup 10:30 - Population Genetics & Stats lecture	12:30	12:30 - Population Genetics & Stats lecture	
8/27/09	8:00	Work on Sample Set 2 case file 10:30 - CODIS lecture	12:30	Work on Sample Set 2 case file	
8/28/09	8:00	Work on Sample Set 2 case file	12:30	Work on Sample Set 2 case file 4:00 - Sample Set 2 case file due 4:00 - Friday meeting -	

WEEK 6: Forensic DNA Analysis Laboratory					
Date	Time	Morning	Time	Afternoon	Comments
8/31/09	8:00	8:00 - Assessment memo 6 due Sim Sets 1 & 2 reports due Sim Sets 3 & 4 assigned SAMPLE SET 3	12:30	SAMPLE SET 3	Staffing:
9/1/09	8:00	SAMPLE SET 3	12:30	SAMPLE SET 3	
9/2/09	8:00	SAMPLE SET 3	12:30	SAMPLE SET 3	
9/3/09	8:00	Quiz 2 - Written (diff extraction, quant, PCR) - SAMPLE SET 3	12:30	Quiz 2 - Written (diff extraction, quant, PCR) SAMPLE SET 3 4:00 - Friday meeting	
9/4/09	8:00	DAY OFF	12:30	DAY OFF	

WEEK 7: Forensic DNA Analysis Laboratory					
Date	Time	Morning	Time	Afternoon	Comments
9/7/09	8:00	DAY OFF - Labor Day	12:30	DAY OFF - Labor Day	Starting with the 3 rd sample set, the trainees will become more independent in the lab.
9/8/09	8:00	8:00 - Assessment memo 7 due Sim Sets 3 & 4 reports due Sim Sets 5 & 6 assigned SAMPLE SET 3	12:30	SAMPLE SET 3	Trainees continue to work on Sim Sets during down time.
9/9/09	8:00	SAMPLE SET 3	12:30	SAMPLE SET 3	Sample Set 3 consists of several high concentration samples as well as blanks to test for carry-over contamination.
9/10/09	8:00	SAMPLE SET 3	12:30	SAMPLE SET 3	
9/11/09	8:00	SAMPLE SET 4	12:30	SAMPLE SET 4 4:00 - Sample Set 3 report due 4:00 - Friday meeting	Staffing:

MODULE 3**WEEK 6: Forensic Statistics**

Date	Time	Morning	Time	Afternoon	Comments
9/14/09	8:00	8:00 - Assessment memo 5 due Probability, Statistics and Population Genetics Estimating the frequency of a DNA profile, Hardy-Weinberg Equilibrium Accuracy vs precision of statistical estimates Suspect population and relevance of defendant racial group Distribution of human genetic variation Probability axioms; frequentist vs. Bayesian probability	12:30	Heterozygosity as a measure of genetic discrimination Conditional probability; odds; likelihood ratio Sample size; hypothesis testing; goodness-of-fit tests Bootstrap, jackknife, permutation test, exact tests Permutation test for HWE exercise	Trainees continue to work on Sim Sets during down time
9/15/09	8:00	Applications to Transfer Evidence, Minimum allele frequency; database searches and calculations Calculations of relatives' genotypes; calculation of putative sibs Source attribution approaches (uniqueness)	12:30	NRC II recommendations; theta values; laboratory error Conditional DNA profile formulas Comparisons of formulas for profile frequency Counting method; Misinterpretation of random match probability	Sample Set 4 consists of challenging samples such as: gum, cig butt, feces, etc. Joanne Sguelgia will be lecturing this week.
9/16/09	8:00	Paternity and Missing Persons Likelihood ratio evidence; exclusion probability Applying theta to paternity calculations Simple two-person kinship calculations	12:30	Calculations for more extended pedigree data Errors of interpretation; transposed conditional Prosecutor's fallacy, Defense attorney's fallacy Example paternity calculation exercises	Staffing:
9/17/09	8:00	Mixtures and Presenting Statistics in Court Quantifying mixture interpretation Exclusion probability; likelihood ratio approach to mixture Example mixture calculation exercises	12:30	Review and discussion of exam Presenting quantitative evidence in court Defense issues and attacks	
9/18/09	8:00	DAY OFF	12:30	DAY OFF	

WEEK 9: Forensic DNA Analysis Laboratory					
Date	Time	Morning	Time	Afternoon	Comments
9/21/09	8:00	8:00 - Assessment memo 8 due Sim Sets 5 & 6 reports due Sim Sets 7 & 8 assigned SAMPLE SET 4	12:30	SAMPLE SET 4	Trainees continue to work on Sim Sets during down time. Lecture with Dr. Gonder Staffing:
9/22/09	8:00	SAMPLE SET 4	12:30	SAMPLE SET 4	
9/23/09	8:00	SAMPLE SET 4	12:30	SAMPLE SET 4	
9/24/09	8:00	SAMPLE SET 4	12:30	SAMPLE SET 4	
9/25/09	8:00	SAMPLE SET 4	12:30	SAMPLE SET 4 4:00 - Friday meeting -	

WEEK 10: Forensic DNA Analysis Laboratory					
Date	Time	Morning	Time	Afternoon	Comments
9/28/09	8:00	8:00 - Assessment memo 9 due Sim Sets 7 & 8 reports due Sim Sets 9 & 10 assigned SAMPLE SET 5	12:30	SAMPLE SET 5	Trainees continue to work on Sim Sets. Time in the evenings may be used to complete the Sim Sets. Sample Sets 5, 6 and the Competency Exam are mock cases, with scenarios that include partial profiles and mixtures. Staffing:
9/29/09	8:00	SAMPLE SET 5	12:30	SAMPLE SET 5	
9/30/09	8:00	SAMPLE SET 5	12:30	SAMPLE SET 5 Study time for quiz	
10/1/09	8:00	Quiz 3 - Oral (3130 CE, troubleshooting) - SAMPLE SET 5	12:30	Quiz 3 - Oral (3130 CE, troubleshooting) SAMPLE SET 5 4:00 - Sample Set 4 report due 4:00 - Friday meeting	
10/2/09	8:00	DAY OFF	12:30	DAY OFF	

WEEK 11: Forensic DNA Analysis Laboratory					
Date	Time	Morning	Time	Afternoon	Comments
10/5/09	8:00	8:00 - Assessment memo 10- due Sim Sets 9 & 10 reports due Sim Sets 11 & 12 assigned SAMPLE SET 5	12:30	SAMPLE SET 5	Trainees continue to work on Sim Sets. Time in the evenings may be used to complete the Sim Sets. Doug Lucas will be lecturing this week. Staffing:
10/6/09	8:00	SAMPLE SET 5	12:30	SAMPLE SET 5	
10/7/09	8:00	SAMPLE SET 5	12:30	SAMPLE SET 5	
10/8/09	8:00	SAMPLE SET 6	12:30	SAMPLE SET 6	
10/9/09	8:00	SAMPLE SET 6	12:30	SAMPLE SET 6 4:00 - Sample Set 5 report due 4:00 - Friday meeting	

WEEK 12: Forensic DNA Analysis Laboratory					
Date	Time	Morning	Time	Afternoon	Comments
10/12/09	8:00	DAY OFF - Columbus Day	12:30	DAY OFF - Columbus Day	Staffing:
10/13/09	8:00	8:00 - Assessment memo 11 due Sim Sets 11 & 12 reports due Sim Sets 13 & 14 assigned SAMPLE SET 6	12:30	SAMPLE SET 6	
10/14/09	8:00	SAMPLE SET 6	12:30	SAMPLE SET 6	
10/15/09	8:00	SAMPLE SET 6		SAMPLE SET 6	
10/16/09	8:00	SAMPLE SET 6	12:30	4:00 - Friday meeting -	

WEEK 13: Forensic DNA Analysis Laboratory					
Date	Time	Morning	Time	Afternoon	Comments
10/19/09	8:00	8:00 - Assessment memo 12 due Sim Sets 13 & 14 reports due Sim Set 15 assigned COMPETENCY TEST	12:30	COMPETENCY TEST	The 7 th Sample Set is the final Competency Exam. It will be analyzed from Extraction through the entire process. All procedures must be done independently by each trainee without assistance from any source. Two full weeks are allotted for the competency exam for this reason. Up until this point, the trainees often work together and batch their samples on the instruments, taking turns with independent setup. Staffing:
10/20/09	8:00	COMPETENCY TEST	12:30	COMPETENCY TEST	
10/21/09	8:00	COMPETENCY TEST	12:30	COMPETENCY TEST	
10/22/09	8:00	COMPETENCY TEST		COMPETENCY TEST	
10/23/09	8:00	COMPETENCY TEST	12:30	COMPETENCY TEST 4:00 - Sample Set 6 report due 4:00 - Friday meeting	

WEEK 14: Forensic DNA Analysis Laboratory					
Date	Time	Morning	Time	Afternoon	Comments
10/26/09	8:00	8:00 - Assessment memo 13 due Sim Set 15 report due COMPETENCY TEST	12:30	COMPETENCY TEST	John Butler will be lecturing this week. Staffing:
10/27/09	8:00	COMPETENCY TEST	12:30	COMPETENCY TEST	
10/28/09	8:00	COMPETENCY TEST	12:30	COMPETENCY TEST	
10/29/09	8:00	COMPETENCY TEST	12:30	COMPETENCY TEST report due	
10/30/09	8:00	Oral Quiz 4 - Stats, QC/QA	12:30	Oral Quiz 4 - Stats, QC/QA Friday meeting -	

WEEK 15: Forensic DNA Analysis Laboratory					
Date	Time	Morning	Time	Afternoon	Comments
11/2/09	8:00	8:00 - Assessment memo 14 due Sample/Sim Set completion and review	12:30	Sample/Sim Set completion and review	During this week the trainees are given time to wrap up all of their case file corrections and study for the final exam. Past trainees have expressed that this scheduling arrangement lessens their stress and allows them to focus on the upcoming moot court testimony. Staffing:
11/3/09	8:00	Sample/Sim Set completion and review	12:30	Sample/Sim Set completion and review	
11/4/09	8:00	Study time for final exam	12:30	Study time for final exam	
11/5/09	8:00	Questions & Answers for final exam	12:30	Study time for final exam	
11/6/09	8:00	Study time for final exam	12:30	12:30 - Final Exam 4:00 - Friday meeting	

MODULE 4

(WEEK 16): Moot Court Prep					
Date	Time	Morning	Time	Afternoon	Comments
11/9/09	8:00	8:00 - Assessment memo 15 due Moot Court Preparation Lecture	12:30	Moot Court Case File review	Staffing:
11/10/09	8:00	Study moot court case file Practice session for moot court	12:30	Study moot court case file Practice session for moot court	
11/11/09	8:00	DAY OFF - Veteran's Day Practice in the hotel ☺	12:30	DAY OFF - Veteran's Day Practice in the hotel ☺	
11/12/09	8:00	Study moot court case file Practice session for moot court	12:30	Study moot court case file Practice session for moot court	

11/13/09	8:00	Pre-Trials	12:30	Pre-Trials 4:00 - Friday meeting
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WEEK 17 Moot Court					
Date	Time	Morning	Time	Afternoon	Comments
11/16/09	8:00	8:00 - Assessment memo 16 due Study moot court case file Practice session for moot court	12:30	Study moot court case file Practice session for moot court	Staffing:
11/17/09	8:00	Study moot court case file Practice session for moot court	12:30	Study moot court case file Practice session for moot court	
11/18/09	8:00	Moot Court	12:30	Moot Court	
11/19/09	8:00	Lab Clean up	12:30	Final memo. Wrapping it all up!!!	
11/20/09	8:00	Completion of Training Binder including NERFI staff signatures, completion certificates, receive moot court feedback & final exam grades. Class photo. Final meeting and farewells.	11:30	AFTERNOON OFF	