



ANTH/BIO 3138 Intro DNA Molecular Methods
Anthropology/Biology- Lakehead University
Fall 2024

Instructor Information

Instructor: Felicia Joseph
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Office Hours: Mondays 7:30p-8:30p BB2002

Course Identification

Course Number: 3138
Course Name: Intro DNA Molecular Methods
Course Location: BB2002 (Lecture) & CB3012 (Labs)
Class Times: Lecture Mondays 5:30p-7:30p
Laboratory Fridays 11:30a-2:30p

Course Description/Overview - An introduction to methods used in molecular biology, biochemistry and molecular anthropology with emphasis on the techniques and their application. The laboratory component covers the analysis of nucleic acids particularly DNA, and includes basic techniques such as gel electrophoresis, DNA extraction, and the polymerase chain reaction. Methods of DNA data analysis and interpretation are also introduced, including forensic science, molecular anthropology, molecular biology and molecular archaeology.

Course Learning Objectives

Upon completion of this course, students should be able to understand:

1. The Nature of DNA and DNA Extraction
 - a. Different types of DNA
 - b. Human DNA extractions and problems that can arise
 - c. Physical, Chemical and Enzymatic extraction methods
2. DNA Quantification and Purification
3. Polymerase Chain Reaction
4. DNA Sequencing and STR Analysis
 - a. Statistical methods related to DNA testing and reporting
 - b. Sanger sequencing vs next generation sequencing
5. DNA Sampling

6. Case Studies

- a. Select Case Studies will be examined

7. Lab report write-ups

- a. How to write a comprehensive lab report and interpret data relating to DNA analysis
- b. Each lab will focus on a different aspect of DNA analysis

Course Resources

Course Website(s)

- myCourseLink

Required Course Text(s)

There is no required text for this course.

Selected web sites and electronic resources will comprise the reading materials for this course. Where possible, web links will be provided. Self-directed web investigation is required. Please contact the LU Library to take advantage of tips, workshops, and tutorials to improve online research skills.

Course Schedule/Outline

Assignments and Evaluations

Item	Due Date(s)	Value
Formal Laboratory Write-Ups		
Lab #2 DNA Extraction	October 11 th 2024	15%
Lab #3 PCR and Gel Electrophoresis	November 8 th 2024	10%
Research Paper	December 2 nd 2024	15%
Mini Labs		
Lab #1 Nature of DNA	September 27 th 2024	5%
Lab #4 DNA Sequencing	November 22 nd 2024	5%
Lab #5 STR Analysis	December 2 nd 2024	5%
Midterm	October 21 st 2024	20%
Final Exam	TBD	25%
Total		100

Late Assignments

Late assignments will be accepted but there will be a 5% deduction per day late. If you are handing in late, it is your responsibility to ensure that your lab reaches the person marking it.

Pre-Lab Assessments:

Analyzing and evaluating academic literature is an essential skill for scientific writing. To help develop this ability, you will need to submit a pre-lab assignment by the Monday after each lab session. Each pre-lab will be valued at 5-10 marks, depending on whether the lab spans two weeks. You will need to explore the literature and identify PRIMARY sources from SCIENTIFIC JOURNALS relevant to the topic of that week's lab to assist you in writing your lab report. Each article should be integrated into your lab report and may relate to some of the reagents or specific techniques used during the lab. These pre-lab assignments will be graded and the feedback available for you Friday of the same week. An example of this will be given to you during the first lecture.

The grade for the pre-lab assignment will be incorporated into the total grade for that particular lab.

Mini Labs

The Nature of DNA Mini-Lab #1: In order to help to prepare for laboratory write-ups, there will be a mini-lab to help make a template which will be used for your formal lab reports. This will include writing the introduction, materials, results and discussion for Lab #1 for assessment. The assignment and feedback received will help you understand the expectations that will be applied to Lab #2 and #3- The formal lab write ups.

Sequencing Mini-Lab #4: Lab #4 will focus on the use of sequence alignment programs to align multiple mtDNA sequences to identify polymorphisms. The mini-lab will include BLAST results, sequence alignments, polymorphism table and haplogroup determination.

STR Analysis Mini-Lab #5: STR Analysis is an important tool in Forensic Science, in this lab we will look at the mathematics used to determine statistical matches between individual suspects and evidence

Research Paper

Choose one of the following to complete. Choose a topic of interest which relates to DNA analysis and its uses in Forensics, anthropology, or various other fields.

Annotated Bibliography

An annotated bibliography is a list of citations to books, articles, and documents. Each citation is followed by a brief (usually about 150 words) descriptive and evaluative paragraph, the annotation. The purpose of the annotation is to inform the reader of the relevance, accuracy, and quality of the sources cited. This list is not expected to be 100% comprehensive. Minimum 12 references, maximum 25 references (Difficulty: Moderate, Time: Moderate)

Literature Review

A literature review is an account of what has been published on a topic by accredited

scholars and researchers. In writing the literature review, your purpose is to convey to your reader what knowledge and ideas have been established on a topic, and what their strengths and weaknesses are. As a piece of writing, the literature review must be defined by a guiding concept (e.g., your research objective, the problem or issue you are discussing, or your argumentative thesis). It is not just a descriptive list of the material available, or a set of summaries. (Difficulty: Low, Time: Very High)

Critique

An analytic or critical review of a book or article (note: one book or one article) is not primarily a summary; rather, it comments on and critically evaluates the work presented in the written material. Covering methodology, techniques, conclusions, discussion and in the light of specific issues and theoretical concerns in the specific area of research. (Difficulty: Hard, Time: Low)

On how to format these specific approaches to writing utilize a format that is provided by the journals themselves (particularly the Literature Review). These will be found by going to their website and checking in the Guides for Authors. Alternatively go to a variety of web sites by typing in the format you have chosen to write under. There are many guidelines on the web for the structure and content of these particular styles of writing.

Regulations

“It is the responsibility of each student registered at Lakehead University to be familiar with, and comply with all the terms, requirements, regulations, policies and conditions in the Lakehead University Academic Calendar. This includes, but is not limited to, Academic Program Requirements, Academic Schedule of Dates, University and Faculty/School Policies and Regulations and the Fees and Refund Policies and Schedules.”

Collaboration/Plagiarism

Plagiarism is defined in [University Regulation IX](#) with additional examples in Article I, Section 1 of The Code. Sanctions associated with Academic Misconduct are defined in Article II of The Code and Enforcement Procedures are outlined in Article III of The Code.

Students wishing to learn more about Academic Misconduct are encouraged to read the [University and relevant Faculty Regulations](#) and The Code (noted above) and access other resources on the [Teaching Commons](#) website.

University Policies – all University Policies can be found [here](#). Pay particular attention to those found under the Category of “Regulations” and “Student-Related”. If you have a question, please let me know by email or in-class. If you have a question, it is likely that at least a few others in the class are wondering the same thing.

Supports for Students – there are many resources available to support our students. These include but are not limited to:

- [Health and Wellness](#)
- [Student Success Centre](#)
- [Student Accessibility Centre](#)
- [Library](#)
- [Academic Support Zone](#) (Writing and Math Tutoring Centre)

Lakehead University is committed to achieving full accessibility for persons with disabilities. Part of this commitment includes arranging academic accommodations for students with disabilities and/or medical conditions to ensure they have an equitable opportunity to participate in all of their academic activities. If you are a student with a disability and think you may need accommodations, you are strongly encouraged to contact Student Accessibility Services (SAS) and register as early as possible. For more information, please contact Student Accessibility Services <http://studentaccessibility.lakeheadu.ca> (SC0003, 343-8047 or sas@lakeheadu.ca)