CHEM 4620 - WINTER 2020
BIOCHEMISTRY OF NUCLEIC ACIDS

Instructor
Dr. Ellert Nichols
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Office hours by appointment

Location
Monday, Wednesday, Friday at 9:30-10:20 AM
Buller Building, Room 306

Prerequisites
CHEM 2370 or CHEM 2371 (MBIO 2370 or MBIO 2371)

Lecture Notes
There is no textbook associated with the course. All lecture notes will be provided in class. All course announcements will be available to registered students through the UM Learn website. Material presented in class takes precedence over all other material.

Evaluation
Midterm #1 Wednesday, February 26, 2020 20%
Midterm #2 Wednesday March 25, 2020 20%
Final Exam TBA 60%

• There is no deferred midterm exam.
• A medical certificate stating the reason for the missed exam must be presented within one week of the missed exam.
• If a midterm examination is missed for a valid reason, the associated marks will be prorated onto the final examination. If no medical certificate is provided, the midterm grade will be 0%.

• Should major disruptions to University activities occur as a result of a pandemic, the course content, marks breakdown, and other provisions of this document may be adjusted as the circumstances warrant.
Mark Breakdown

A+ 90-100%
A  80-89%
B+ 75-79%
B  70-74%
C+ 65-69%
C  57-64%
D  50-56%
F  0-49%

Academic Dishonesty
In the case of academic dishonesty, the exam or paper in question will be given a grade of 0% and the student reported to the appropriate authorities for further punishment. It is up to the student to understand the rules of cheating and plagiarism. Please refer to the University of Manitoba General Academic Regulations and Requirements, Section 7: Academic Integrity: (http://webapps.cc.umanitoba.ca/calendar10/regulations/).

Course Outline

1) Origins of Nucleic Acids Research

2) Nucleosides and Nucleotides
   a) Structure and Chemistry of Nucleosides and Nucleotides
   b) Biosynthesis of Nucleosides and Nucleotides

3) Nucleic Acid Structure
   a) “Simple”/Static DNA structures
   b) Real DNA Structures
   c) Drug-DNA Interactions
   d) Dynamics of Nucleic Acid Structures
   e) Histone Proteins and Nucleosomes
   f) RNA Structures

4) Methods for Studying Nucleic Acids
   a) Synthesis of Oligonucleotides
   b) Biochemical Approaches
   c) Size/Shape/Dynamics
   d) Structural Techniques

5) Principles of Protein-DNA Interactions
   a) Physical Chemistry of Protein-Nucleic Acid Interactions
   b) Recognition of DNA Sequence Motifs
   c) DNA binding proteins
   d) Specificity of DNA Enzymes
6) RNA Structure and Functions
   a) RNA World Hypothesis
   b) Ribozymes and Riboswitches
   c) RNA-protein Interactions
   d) RNA Interference/CRISPR-Cas9
   e) RNA processing and Modification
   f) Protein Translation