



**I. COURSE DESCRIPTION:**

A course designed for students in Nursing to develop an appreciation, largely on the basis of case studies, for the relationship between various common diseases, the underlying biochemistry and the clinical tests used in their diagnosis.

**II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:**

An appreciation of the practice of laboratory medicine and an understanding of clinical chemistry provides valuable information that can be used in nursing practice. The aim of this course is to enable you to begin to relate a client's clinical signs and symptoms to underlying biochemical and physiological phenomena and these in turn to results provided by the clinical laboratory. Concepts relating to structure, properties and function of the major biological molecules are developed in sufficient detail to permit a qualitative understanding of these substances and their behaviour in living organisms.

**Unit 1 :**

In this unit the student will develop an understanding of :

- The role of the laboratory in the patient care cycle;
- The pre-analytical, analytical and post-analytical criteria considered in the evaluation of appropriateness of patient's test result;
- The Internal Quality Control process within the clinical laboratory and analytical variation;
- Test characteristics such as sensitivity, specificity, efficiency, predictive value of positive and negative results, False positive rate etc;
- Definitions of reference interval, discriminator values, critical values;
- The statistical methods for establishing reference values, discriminator values;
- Decision trees;

**Unit 2 :**

Upon completion of this unit the student will be able to :

- List the major categories of organic molecules in the human body.
- Identify the monomer units for proteins, carbohydrates and nucleic acids
- Define the terms primary, secondary, tertiary and quaternary structure of proteins.
- List the three weak forces that determine the three dimensional structure of proteins.
- Determine the net change in the charge of a protein due to amino acid substitution.
- Describe some of the essential properties of carbohydrates and lipids.
- Explain how physical properties of triglycerides are affected as a function of increasing numbers of double bonds.
- Describe the double helical structure of DNA.
- Describe the structural and functional differences between DNA and RNA.
- Assess the biological impact of a single base substitution in a codon.
- Describe the steps in the replication of DNA.
- Describe the key steps in protein synthesis.
- List the types of mutations that can affect a physiological outcome.
- Be capable of assessing the physiological impact of a single base substitution.

**Unit 3 :**

Topics covered in this section include:

- Cell structure and function in which the basic cell organelles are discussed with particular attention to the plasma membrane.
- The role of membrane proteins in the transport of molecules in and out of cells as well as receptors for regulation extracellular molecules such as hormones.
- Cell compartmentalization
- Organization of cells into organ systems and tissues
- Cell injury and death
- Cancer

**Unit 4 :**

When the student has completed this unit they will be able to do the following:

- Define the term metabolism.
- Define what is meant by a catabolic or anabolic process.
- Explain the biological role of ATP.
- Demonstrate an understanding of the interaction between pathways by explaining how the end-product of one pathway is the initial substrate for another.
- Define each of the pathways as to the initial substrate, final product, and its overall function as catabolic or anabolic.
- List the regulatory mechanisms that help regulate metabolism.

**Unit 5 :**

When the student has completed this unit, they will be able to do the following:

- Identify three categories of enzymes in serum with an example of at least one enzyme in each category.
- Explain why intracellular enzymes may be elevated in serum and how this may be useful in the diagnosis of disease.
- Describe at least two properties of CK isoenzymes that can be used for their identification and quantitative determination.
- Name the CK isoenzymes, at least one tissue that is a major source of each of these, and five clinical conditions in which CK is elevated.
- Explain the pathophysiology of myocardial infarction.
- Illustrate diagrammatically the changes of at least three cardiac markers over the time course of a week following the onset of symptoms of MI.
- Explain the inadequacy of CK-MB as a marker for MI in the first few hours after the onset of MI.
- Interpret clinical enzyme data with respect to the diagnosis of MI.
- List suggested Enzyme Profiles for various organ systems.

**III. TOPICS:**

1. Unit One: Patient Care Cycle
2. Unit Two: Important Biochemical Molecules and Macromolecules
3. Unit Three: Cell Structure and Function
4. Unit Four: Metabolism and Metabolic Regulation
5. Unit Five: Enzymes and their Application to the Diagnosis of Disease

**Christmas Break**

**III. Topics cont**

6. Unit Six: Endocrine System
7. Unit Seven: Carbohydrate Metabolism: Regulation and Clinical Application
8. Unit Eight: Nutrition, Digestion, Absorption
9. Unit Nine: Liver and Biliary Tract Disease
10. Unit Ten: Function and Diseases of the Kidney

**IV. REQUIRED RESOURCES / TEXTS/MATERIALS:**

Mazzuchin, A. (2003). *Clinical Chemistry Student Resource Package & Case History Manual*.

Tortora, G.J., & Grabowski, S.R. (2003). *Principles of anatomy and physiology* (10<sup>th</sup> ed. slipcase edition). New York: John Wiley & Sons, Inc. (*from Year 1*)

Fischbach, F. (2002). *Nurses' quick reference to common laboratory and diagnostic tests* (3<sup>rd</sup> ed.). Philadelphia: Lippincott Williams & Wilkins. (*from Year 1*)

Any MedSurg text

**V. EVALUATION PROCESS/GRADING SYSTEM:****Semester 3 and 4**

Tests (4 – 2 from fall, 2 from winter) = 25%

Case studies (4 – 2 from fall, 2 from winter) = 20%

Mid year (from fall) = 25%

Final = 30%

1. **The pass mark for this course is 50%.** It is composed of Unit quizzes, Case studies, a mid-term exam and a final exam.
2. Students missing the Unit tests for any reason will **not** be able to write them at any other date.
3. Students missing the mid-term exam or final exam because of illness or other serious reason must phone the professor **before** the exam to inform her/him (759-2554, Ext. 635). Those students who have notified the professor of their absence, according to policy, will be eligible to arrange an opportunity as soon as possible to write the exam at another time. Those students who **do not notify** the professor will receive a zero for that exam.
4. Students receiving borderline marks (49, 59, 69, 79, 89) will have their mark advanced to the next category if they have attended at least 80% of the classes.

The following semester grades will be assigned to students in postsecondary courses:

<u>Grade</u>	<u>Definition</u>	<u>Grade Point Equivalent</u>
A+	90 – 100%	4.00
A	80 – 89%	4.00
B	70 - 79%	3.00
C	60 - 69%	2.00
D	50 – 59%	1.00
F (Fail)	49% and below	0.00
CR (Credit)	Credit for diploma requirements has been awarded.	
S	Satisfactory achievement in field /clinical placement or non-graded subject area.	
U	Unsatisfactory achievement in field/clinical placement or non-graded subject area.	
X	A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course.	
NR	Grade not reported to Registrar's office.	
W	Student has withdrawn from the course without academic penalty.	

**Note:** For such reasons as program certification or program articulation, certain courses require minimums of greater than 50% and/or have mandatory components to achieve a passing grade.

It is also important to note, that the minimum overall GPA required in order to graduate from a Sault College program remains 2.0.

## VI. SPECIAL NOTES:

### Special Needs:

If you are a student with special needs (e.g. physical limitations, visual impairments, hearing impairments, or learning disabilities), you are encouraged to discuss required accommodations with your instructor and/or the Special Needs office. Visit Room E1101 or call Extension 2703 so that support services can be arranged for you.

### Retention of course outlines:

It is the responsibility of the student to retain all course outlines for possible future use in acquiring advanced standing at other postsecondary institutions.

Plagiarism:

Students should refer to the definition of “academic dishonesty” in the *Student Code of Conduct*. Students who engage in “academic dishonesty” will receive an automatic failure for that submission and/or such other penalty, up to and including expulsion from the course/program, as may be decided by the professor/dean. In order to protect students from inadvertent plagiarism, to protect the copyright of the material referenced, and to credit the author of the material, it is the policy of the department to employ a documentation format for referencing source material.

Course outline amendments:

The Professor reserves the right to change the information contained in this course outline depending on the needs of the learner and the availability of resources.

Substitute course information is available in the Registrar's office.

**VII. PRIOR LEARNING ASSESSMENT:**

Students who wish to apply for advanced credit in the course should consult the professor. Credit for prior learning will be given upon successful completion of a challenge exam or portfolio.

**VIII. DIRECT CREDIT TRANSFERS:**

Students who wish to apply for direct credit transfer (advanced standing) should obtain a direct credit transfer form from the Dean's secretary. Students will be required to provide a transcript and course outline related to the course in question.