ORIGINAL COURSE IMPLEMENTATION DATE:	September 2022
REVISED COURSE IMPLEMENTATION DATE:	
COURSE TO BE REVIEWED: (six years after UEC approval)	November 2027
Course outline form version: 09/15/14	

OFFICIAL UNDERGRADUATE COURSE OUTLINE FORM

Note: The University reserves the right to amend course outlines as needed without notice.

Course Code and Number: BIO 412	**Number of Credits:** 3 Course credit policy (105)
Course Full Title: Advanced Metabolism **Course Short Title (if title exceeds 30 characters):**	
Faculty: Faculty of Science	**Department (or program if no department):** Biology

Calendar Description:

Provides a detailed examination of selected primary and secondary metabolic pathways and their relationship to human health and disease.

Note: This course is offered as BIOC 412 and BIO 412. Students may take only one of these for credit.

Prerequisites (or NONE):	BIO 320/BIOC 320. Note: 6 credits of 200-level or higher Chemistry are recommended.
Corequisites (if applicable, or NONE):	NONE
Pre/corequisites (if applicable, or NONE):	NONE

Equivalent Courses (cannot be taken for additional credit)

Former course code/number: **BIOC 402**

Cross-listed with: **BIOC 412**

Equivalent course(s):

Note: Equivalent course(s) should be included in the calendar description by way of a note that students with credit for the equivalent course(s) cannot take this course for further credit.

Transfer Credit

Transfer credit already exists: ☐ Yes ☒ No

Transfer credit requested (OReg to submit to BCCAT):
☐ Yes ☒ No (if yes, fill in transfer credit form)

Resubmit revised outline for articulation: ☐ Yes ☐ No

To find out how this course transfers, see **bctransferguide.ca.**

Total Hours: 45

Typical structure of instructional hours:

Lecture hours	45
Seminars/tutorials/workshops	0
Laboratory hours	
Field experience hours	
Experiential (practicum, internship, etc.)	
Online learning activities	
Other contact hours:	
Total	**45**

Special Topics

Will the course be offered with different topics?
☐ Yes ☒ No

If yes, different lettered courses may be taken for credit:
☐ No ☐ Yes, repeat(s) ☐ Yes, no limit

Note: The specific topic will be recorded when offered.

Maximum enrolment (for information only): 24

Expected frequency of course offerings (every semester, annually, every other year, etc.): annually

Department / Program Head or Director: Gregory Schmaltz	**Date approved:**	February 10, 2021
Faculty Council approval	**Date approved:**	April 30, 2021
Undergraduate Education Committee (UEC) approval	**Date of meeting:**	November 26, 2021

Learning Outcomes

Upon successful completion of this course, students will be able to:

1. Explain the role of the pentose phosphate pathway and its primary role in anabolism and nucleotide biosynthesis.
2. Describe nucleotide biosynthesis and nucleotide catabolism pathways as well as the regulatory steps involved.
3. Explain the role of *de novo* nucleotide biosynthesis and nucleotide synthesis via salvage pathways.
4. Discuss the role of mutations and enzymatic deficiencies in metabolic pathways and their effects on human health and disease.
5. Describe tissue-specific metabolism in humans and how each tissue plays a specific role in metabolic processes.
6. Describe hormonal regulation and its overall effects on fuel metabolism.
7. Discuss the biochemical and hormonal regulation of body mass and obesity.
8. Analyze metabolic data sets collaboratively with other students through problem-based learning (PBL) sessions.
9. Predict the metabolic consequence of a defect in a specific biochemical pathway.
10. Discuss the "genomic revolution" and the impact of genetic-based drugs on human health and disease.

Prior Learning Assessment and Recognition (PLAR)

☒ Yes ☐ No, PLAR cannot be awarded for this course because

Typical Instructional Methods (guest lecturers, presentations, online instruction, field trips, etc.; may vary at department's discretion)

Lectures, problem sets, group research and presentation assignments

Grading system: Letter Grades: ☒ Credit/No Credit: ☐ Labs to be scheduled independent of lecture hours: Yes ☐ No ☐

NOTE: The following sections may vary by instructor. Please see course syllabus available from the instructor.

Typical Text(s) and Resource Materials (if more space is required, download Supplemental Texts and Resource Materials form)

	Author (surname, initials)	Title (article, book, journal, etc.)	Current ed.	Publisher	Year
1.	Berg et al.	Biochemistry 9th Edition	☒	Freeman	2019
2.	Nelson and Cox	Lehninger: Principles of Biochemistry 7th Edition	☒	Freeman	2017
3.			☐		
4.			☐		
5.			☐		

Required Additional Supplies and Materials (software, hardware, tools, specialized clothing, etc.)

Typical Evaluation Methods and Weighting

Final exam:	30%	Assignments:	10%	Midterm exam:	30%	Practicum:	%
Quizzes/tests:	10%	Lab work:		Field experience:	%	Shop work:	%
Group projects:	20%	Other:	%	Other:	%	Total:	100%

Details (if necessary): Team work is evaluated as part of group project and is based upon peer evaluation, team workload plan, and the quality of the final report.

Typical Course Content and Topics

- Course introduction and role of pentose phosphate pathway on anabolism
- Nucleotide anabolism and catabolism in humans (*de novo* pathways and salvage pathways)
- Regulation of nucleotide biosynthesis; case studies on gout, Lesch-Nyhan syndrome, and orotic aciduria
- Tissue-specific metabolism
- Hormonal regulation and fuel metabolism
- Biochemical and hormonal regulation of body mass and obesity
- Analysis of metabolic data sets and PBL sessions
- Oral presentations: The genomic revolution: genetic-based drugs and their future on human health and disease