



UNIVERSITY OF CALGARY
FACULTY OF SCIENCE
DEPARTMENT OF BIOLOGICAL SCIENCES
COURSE OUTLINE

1. **Course:** BCEM 443, Metabolism and Basic Nucleic Acid Biochemistry -- Fall 2018

Instructor Name	Email	Phone	Office	Hours
<i>L01: (MWF 11:00 - 11:50 in TI FORUM)</i>				
Ian Lewis	ian.lewis2@ucalgary.ca	403 220 4366	BI 472	Tuesday and Wednesday 4:00 pm to 5:00 pm in Biological Sciences room 472
Vanina Zaremberg	vzaremb@ucalgary.ca	(403) 220-4298	BI390	TBA

Course Site:

D2L: BCEM 443 L01-(Fall 2018)-MetbolismBasicNucleicAcidBCEM

Department of Biological Sciences:

Office: BIO 186
Phone: 403 220-3140
Email: biosci@ucalgary.ca

Note:

Students must use their U of C account for all course correspondence.

2. **Requisites:**

See section [3.5.C](#) in the Faculty of Science section of the online Calendar.

Prerequisite(s): One of Chemistry 353 or 355; and Biochemistry 341 or 393.

Notes: Not required for majors in the Biochemistry program. Biochemistry 393 and 443 are the recommended courses for students wishing to take only two biochemistry courses.

3. **Grading:**

The University policy on grading and related matters is described in [F.1](#) and [F.2](#) of the online University Calendar. In determining the overall grade in the course the following weights will be used:

(8%) Laboratory - 2 reports (VZ) worth 4% each
(8%) Homework - 2 homeworks (IL) worth 4% each
(6%) Tutorial short assignments-3 (MM) worth 2% each
(4%) Quizzes - 2 quizzes (IL) worth 2% each
(2%) Tutorial short report (VZ) 2%
(2%) Tutorials - participation worth 2%

EXAMS

(22%) Midterm Examinations I (in class 50 min) 22% (IL)
(22%) Midterm Examinations II (in class 50 min) 22% (MM)
(26%) Final Examination (2 hours) 26% (VZ+labs)

Each piece of work (reports, assignments, quizzes, midterm exam(s) or final examination) submitted by the student will be assigned a grade. The student's grade for each component listed above will be combined with the indicated weights to produce an overall percentage for the course, which will be used to determine the course letter grade.

The conversion between a percentage grade and letter grade is as follows.

	A+	A	A-	B+	B	B-	C+	C	C-	D+	D
Minimum % Required	95 %	90 %	85 %	80%	75%	70 %	65 %	60%	55%	53 %	50 %

This course has a registrar scheduled final exam.

A passing grade is required for the tutorial/ laboratory component of BCEM443. A fail (F grade) will be considered to be 64% or lower in the tutorial/lab component. Attendance in the labs and tutorials (and submission of reports and assignments) is mandatory in BCEM 443. You need to pass the tutorials/labs to pass the course.

4. **Missed Components of Term Work:**

The regulations of the Faculty of Science pertaining to this matter are found in the Faculty of Science area of the Calendar in [Section 3.6](#). It is the student's responsibility to familiarize himself/herself/themself with these regulations. See also [Section E.3](#) of the University Calendar.

5. **Scheduled out-of-class activities:**

There are no scheduled out of class activities for this course.

6. **Course Materials:**

Recommended Textbook(s):

JOH L. TYMOCZKO JEREMY M BERG, LUBERT STRYER, *Biochemistry A short Course*: W H FREEMAN & COMPANY
A MACMILLAN EDUCATION .

7. **Examination Policy:**

Only non-programmable calculators are allowed for use on the exams.

Students should also read the Calendar, [Section G](#), on Examinations.

8. **Approved Mandatory and Optional Course Supplemental Fees:**

There are no mandatory or optional course supplemental fees for this course.

9. **Writing across the Curriculum Statement:**

For all components of the course, in any written work, the quality of the student's writing (language, spelling, grammar, presentation etc.) can be a factor in the evaluation of the work. See also [Section E.2](#) of the University Calendar.

10. **Human & living organism studies statements:**

See also [Section E.5](#) of the University Calendar.

STUDIES IN THE BIOLOGICAL SCIENCES INVOLVE THE USE OF LIVING AND DEAD ORGANISMS. Students taking laboratory- and field-based courses in these disciplines can expect involvement with and experimentation on such materials. Students perform dissections on dead or preserved organisms in some courses. In particular courses, students experiment on living organisms, their tissues, cells, or molecules. Sometimes field work requires students to collect a variety of living materials by many methods, including humane trapping.

All work on humans and other animals conforms to the Helsinki Declaration and to the regulations of the Canadian Council on Animal Care. The Department strives for the highest ethical standards consistent with stewardship of the environment for organisms whose use is not governed by statutory authority. Individuals contemplating taking courses or majoring in one of the fields of study offered by the Department of Biological Sciences should ensure that they have fully considered these issues before enrolling. Students are advised to discuss any concern they might have with the Undergraduate Program Director of the Department.

Students are expected to be familiar with [Section SC.4.1](#) of the University Calendar.

11. **Reappraisal of Grades:**

A student wishing a reappraisal, should first attempt to review the graded work with the Course coordinator/instructor or department offering the course. Students with sufficient academic grounds may request a

reappraisal. Non-academic grounds are not relevant for grade reappraisals. Students should be aware that the grade being reappraised may be raised, lowered or remain the same. See [Section I.3](#) of the University Calendar.

1. **Term Work:** The student should present their rationale as effectively and as fully as possible to the Course coordinator/instructor within **15 days** of either being notified about the mark, or of the item's return to the class. If the student is not satisfied with the outcome, the student shall immediately submit the Reappraisal of Graded Term work form to the department in which the course is offered. The department will arrange for a re-assessment of the work if, and only if, the student has sufficient academic grounds. See sections [I.1](#) and [I.2](#) of the University Calendar
2. **Final Exam:** The student shall submit the request to Enrolment Services. See [Section I.3](#) of the University Calendar.

12. OTHER IMPORTANT INFORMATION FOR STUDENTS:

- a. **Mental Health** The University of Calgary recognizes the pivotal role that student mental health plays in physical health, social connectedness and academic success, and aspires to create a caring and supportive campus community where individuals can freely talk about mental health and receive supports when needed. We encourage you to explore the mental health resources available throughout the university community, such as counselling, self-help resources, peer support or skills-building available through the SU Wellness Centre (Room 370, MacEwan Student Centre, [Mental Health Services Website](#)) and the Campus Mental Health Strategy website ([Mental Health](#)).
- b. **SU Wellness Center:** The Students Union Wellness Centre provides health and wellness support for students including information and counselling on physical health, mental health and nutrition. For more information, see www.ucalgary.ca/wellnesscentre or call [403-210-9355](tel:403-210-9355).
- c. **Sexual Violence:** The University of Calgary is committed to fostering a safe, productive learning environment. The Sexual Violence Policy (<https://www.ucalgary.ca/policies/files/policies/sexual-violence-policy.pdf>) is a fundamental element in creating and sustaining a safer campus environment for all community members. We understand that sexual violence can undermine students' academic success and we encourage students who have experienced some form of sexual misconduct to talk to someone about their experience, so they can get the support they need. The Sexual Violence Support Advocate, Carla Bertsch, can provide confidential support and information regarding sexual violence to all members of the university community. Carla can be reached by email (svsa@ucalgary.ca) or phone at [403-220-2208](tel:403-220-2208).
- d. **Misconduct:** Academic misconduct (cheating, plagiarism, or any other form) is a very serious offence that will be dealt with rigorously in all cases. A single offence may lead to disciplinary probation or suspension or expulsion. The Faculty of Science follows a zero tolerance policy regarding dishonesty. Please read the sections of the University Calendar under [Section K](#). Student Misconduct to inform yourself of definitions, processes and penalties. Examples of academic misconduct may include: submitting or presenting work as if it were the student's own work when it is not; submitting or presenting work in one course which has also been submitted in another course without the instructor's permission; collaborating in whole or in part without prior agreement of the instructor; borrowing experimental values from others without the instructor's approval; falsification/fabrication of experimental values in a report. **These are only examples.**
- e. **Assembly Points:** In case of emergency during class time, be sure to FAMILIARIZE YOURSELF with the information on [assembly points](#).
- f. **Academic Accommodation Policy:** Students needing an accommodation because of a disability or medical condition should contact Student Accessibility Services in accordance with the procedure for accommodations for students with disabilities available at [procedure-for-accommodations-for-students-with-disabilities.pdf](#).

Students needing an accommodation in relation to their coursework or to fulfill requirements for a graduate degree, based on a protected ground other than disability, should communicate this need, preferably in writing, to the Associate Head, Undergraduate of the Department of Biological Sciences, Heather Addy by email addy@ucalgary.ca or phone 403 220-6979. Religious accommodation requests relating to class, test or exam scheduling or absences must be submitted no later than **14 days** prior to the date in question. See [Section E.4](#) of the University Calendar.

- g. **Safewalk:** Campus Security will escort individuals day or night (See the [Campus Safewalk](#) website). Call [403-220-5333](tel:403-220-5333) for assistance. Use any campus phone, emergency phone or the yellow phones located at most parking lot pay booths.
- h. **Freedom of Information and Privacy:** This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIPP). Students should identify themselves on all written work by

placing their name on the front page and their ID number on each subsequent page. For more information, see [Legal Services](#) website.

- i. **Student Union Information:** [VP Academic](#), Phone: [403-220-3911](#) Email: suvpaca@ucalgary.ca. SU Faculty Rep., Phone: [403-220-3913](#) Email: sciencerep@su.ucalgary.ca. Student Ombudsman, Email: suvpaca@ucalgary.ca.
- j. **Internet and Electronic Device Information:** Unless instructed otherwise, cell phones should be turned off during class. All communication with other individuals via laptop, tablet, smart phone or other device is prohibited during class unless specifically permitted by the instructor. Students that violate this policy may be asked to leave the classroom. Repeated violations may result in a charge of misconduct.
- k. **Surveys:** At the University of Calgary, feedback through the Universal Student Ratings of Instruction ([USRI](#)) survey and the Faculty of Science Teaching Feedback form provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses. Your responses make a difference - please participate in these surveys.

TENTATIVE SCHEDULE BCEM443-F18

NOTE: LECTURES in the Taylor Institute (FORUM room) MWR 11:00-11:50

Instructors: Dr Ian Lewis (IL), Dr Mark Mahadeo (MM), Dr Vanina Zarembeg (VZ)

Week	Month	Day	Instructor	Description of Lectures	Tutorials/ Labs
1	Sept	7	IL-MM-VZ	Introduction to the Course	NO TUTORIALS/ LABS
2	Sept	10	IL	Metabolic intro	All tutorial sections Sept 11-12-13 <i>Organic and glycolysis</i>
2	Sept	12	IL	Organic review	
2	Sept	14	IL	Quiz 1 (2%) - Glycolysis structures; Glycolysis	
3	Sept	17	IL	Glycogenesis/glycogenolysis and Homework 1 intro	All tutorial sections Sept 18-19-20 <i>TCA and diseases</i>
3	Sept	19	IL	PPP - Chrebp	
3	Sept	21	IL	Quiz 2 (2%) - TCA Structures; TCA cycle	
				Homework-1 (4%) due Sept 24	
4	Sept	24	IL	Flux Homework 2 intro	All tutorial sections Sept 25-26-27 <i>Flux and disease</i>
4	Sept	26	IL	Cancer metabolism	
4	Sept	28	IL	Transporter- insulin, diabetes; Homework 1 due	
				Homework-2 (4%) due Oct 5	
5	Oct	1	IL	Metabolomics	All tutorial sections Oct 2-3-4 <i>Intro to Maven and review</i>
5	Oct	3	IL	review	
5	Oct	5	IL	Midterm exam-in class (50 min) ROOM TBA	
6	Oct	8		Thanksgiving (no lecture)	All tutorial sections Oct 9-10-11 <i>N metabolism #1</i> Assignment (2%) due Oct 16-17-18
6	Oct	10	MM	Cytoplasmic NADH in aerobic glucose metabolism	
6	Oct	12	MM	Mitochondrial transport processes	
7	Oct	15	MM	Intro to Nitrogen metabolism	All tutorial sections Oct 16-17-18 <i>N metabolism #2</i> Assignment (2%) due Oct 23-24-25
7	Oct	17	MM	Urea cycle	
7	Oct	19	MM	Amino acid biosynthesis	
8	Oct	22	MM	Amino acid biosynthesis	All tutorial sections Oct 23-24-25 <i>N metabolism #3</i> Assignment (2%) due Oct 30-31-Nov1
8	Oct	24	MM	Nucleic acid biosynthesis	
8	Oct	26	MM	Purine biosynthesis	
9	Oct	29	MM	Pyrimidine biosynthesis	All tutorial sections Oct 30-31 Nov 1 REVIEW
9	Oct/ Nov	31	MM	Deoxyribonucleic acid biosynthesis	
9	Nov	2	VZ	Introduction to lipids and lipid structure	
9	Nov	5	VZ	Biophysical properties of lipids/ membranes	All tutorial sections Nov 6-7-8 <i>Lipids 1</i> Short report (2%) due Nov 20-21-22
9	Nov	7	VZ	Lipid metabolism FA synthesis	
9	Nov	9	MM	Review	
10	Nov	11-17	*****	Fall break-No lectures-	No tutorials/labs
11	Nov	19	MM	Midterm exam-in class (50 min) ROOM TBA	All tutorial sections Nov 20-21-22 Lab-1 report 4% due Nov 27-28-29
11	Nov	21	VZ	Lipid metabolism- FA oxidation	
11	Nov	23	VZ	Lipid metabolism-glycerolipids	
12	Nov	26	VZ	Lipid metabolism-neutral lipid	All tutorial sections Nov 27-28-29 Lab-2 report 4% due Dec 4-5-6
12	Nov	28	VZ	Lipid signaling	
12	Nov	30	VZ	Lipid metabolism-sphingolipids	

13	Dec	3	VZ	Lipid metabolism-sterols	REVIEW
13	Dec	5	VZ	Lipid metabolism-gene exp reg SREBP	
13	Dec	8	VZ	Integration/review	
Exam period	Dec	TBA	VZ	FINAL exam scheduled by the Registrar (2 hours) ROOM & DATE TBA	

Department Approval:

Electronically Approved

Date: 2018-09-11 09:18

Course Outcomes

- Analyze and rationalize cellular strategies for maintenance of carbon, nitrogen and lipid homeostasis
- Understand the common reaction mechanisms used in central carbon metabolism.
- Diagram the flow of carbon through glycolysis, pentose phosphate pathway, glycogen, tricarboxylic acid cycle, and related pathways.
- Understand metabolic flux and be able to use flux balance analysis to describe metabolic steady state.
- Identify critical metabolic steps where crosstalk between different metabolic pathways occurs
- Understand basic regulatory mechanisms that maintain homeostasis
- Recognize that alterations of cellular homeostasis lead to metabolic diseases and appreciate how this is studied using modern approaches.
- Know how to interpret data, how to label scientific figures and tables, and how to write a lab report.