



UNIVERSITY OF
CALGARY

DEPARTMENT OF BIOLOGICAL SCIENCES
COURSE OUTLINE

1. **Course:** BIOCHEMISTRY 443 – METABOLISM AND BASIC NUCLEIC ACID BIOCHEMISTRY

Lecture Section(s): L01 MWF 11:00-11:50 ST 135 Fall 2015

Instructor(s): Dr. E. Lohmeier-Vogel BI 039 220-8281 lohmeier@ucalgary.ca

Course website or Desire 2 Learn (D2L): BCEM 443 L01 - (Fall 2015) - Metabolism and Basic Nucleic Acid Biochemistry

Biological Sciences Department BI 186 403-220-3140 biosci@ucalgary.ca

2. **Prerequisites:** One of Chemistry 353 or 355; and Biochemistry 341 or 393
See section 3.5.C in the Faculty of Science section of the online Calendar
www.ucalgary.ca/pubs/calendar/current/sc-3-5.html

3. **Grading:** The University policy on grading and related matters is described sections F.1 and F.2 of the online University Calendar. In determining the overall grade in the course the following weights will be used:

Laboratory (5 wet labs; 5 reports worth 4% each)	20 %
Laboratory bioinformatics lab session	2%
Midterm Examination I (2 hours)	22 %
Midterm Examination II (2 hours)	22 %
Final Examination (3 hours)	34 %

There will be a final exam scheduled by the Registrar's office.

A passing grade is required for the laboratory component of BCEM443. For labs, a fail (F grade) will be considered to be 64% or lower in the lab component.

“Each piece of work (assignment, laboratory report, midterm test or final examination) submitted by the student will be assigned a percentage score. The student's average percentage score for the various components 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, bearing in mind that a failing grade (F) will result if the student does not pass the laboratory component.”

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 with these regulations. See also [Section E.6](#) of the University Calendar
5. **Scheduled out-of-class activities:** Dates and times of approved class activities held outside of class hours.

MT Exam 1: Tuesday, October 13;	19:00 – 21:00;	ICT 102
MT Exam 2: Tuesday, November 10;	19:00 – 21:00;	ICT 102

REGULARLY SCHEDULED CLASSES HAVE PRECEDENCE OVER ANY OUT-OF-CLASS-TIME-ACTIVITY. If you have a clash with this out-of-class-time-activity, please inform your instructor as soon as possible so that alternative arrangements may be made for you.

6. **Course Materials:** **RequiredText*:** “Voet, Voet and Pratt. Wiley 4th Edition, This text is the same as was used in BCEM 393.

Other information: Lecture notes and laboratory information will be uploaded onto the Blackboard site for BCEM 443. Please print off this material before class (or lab) time.

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. **Writing across the curriculum statement:** e.g. “In this course, the quality of the student's writing in laboratory reports will be a factor in the evaluation of those reports. See also [Section E.2](#) of the University Calendar.

9. **Human studies statement:** indicating whether students in the course may be expected to participate as subjects or researchers. See also [Section E.5](#) of the University Calendar.

ETHICS IN THE BIOLOGICAL SCIENCES

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.

10. OTHER IMPORTANT INFORMATION FOR STUDENTS:

(a) **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

(b) **Assembly Points:** In case of emergency during class time, be sure to FAMILIARIZE YOURSELF with the information on [assembly points](#).

(c) **Student Accommodations:** 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 http://www.ucalgary.ca/policies/files/policies/procedure-for-accommodations-for-students-with-disabilities_0.pdf.

Students needing an Accommodation in relation to their coursework or to fulfil requirements for a graduate degree, based on a Protected Ground other than Disability, should communicate this need, preferably in writing, to the Associate Head of Biological Sciences, Dr. H. Addy by email addy@ucalgary.ca or phone 403 220-3140..

(d) **Safewalk:** Campus Security will escort individuals day or night (<http://www.ucalgary.ca/security/safewalk/>). Call 220-5333 for assistance. Use any campus phone, emergency phone or the yellow phones located at most parking lot pay booths.

(e) **Freedom of Information and Privacy:** This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIPPA). As one consequence, 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 also

(f) <http://www.ucalgary.ca/secretariat/privacy>.

(g) **Student Union Information:** VP Academic Phone: 403 220-3911 Email: suvpaca@ucalgary.ca
SU Faculty Rep. Phone: 403 220-3913 Email: science1@su.ucalgary.ca, science2@su.ucalgary.ca and science3@su.ucalgary.ca;
Student Ombuds Office: 403 220-6420 Email: ombuds@ucalgary.ca; <http://ucalgary.ca/provost/students/ombuds>

(h) **Internet and Electronic Device Information:** You can assume that in all classes that you attend, your cell phone should be turned off unless instructed otherwise. Also, communication with other individuals, via laptop computers, Blackberries or other devices connectable to the Internet is not allowed in class time unless specifically permitted by the instructor. If you violate this policy you may be asked to leave the classroom. Repeated abuse may result in a charge of misconduct.

(i) At the University of Calgary, feedback provided by students through the Universal Student Ratings of Instruction (USRI) survey provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses (www.ucalgary.ca/usri). Your responses make a difference - please participate in USRI Surveys.

Department Approval _____ ORIGINAL SIGNED _____ Date _____

Associate Dean's Approval for
out of regular class-time activity: _____ ORIGINAL SIGNED _____ Date: _____
C443 F15: 8/19/2015 2:47 PM

BIOCHEMISTRY 443

METABOLISM AND BASIC NUCLEIC ACID BIOCHEMISTRY

TERM: Fall 2015

SECTION NO: 01

PREREQUISITE(S): One of Chemistry 353 or 355; and Biochemistry 341 or 393.

A student may not register in a course unless he/she has a grade of at least C- in each prerequisite course.

COURSE AND LAB COORDINATOR Dr. E. Lohmeier-Vogel BI 039 220-8281 lohmeier@ucalgary.ca

LAB TECHNICIAN: Spomenka Curic BI 136

LECTURES: M W F 11:00 - 11:50 50 min ST 135

LABS:

M	(B01, B02)	17:30, 13:00	BI 136
T	(B03, B04)	13:00, 17:30	BI 136
W	(B05, B06)	14:00, 18:30	BI 136
R	(B07, B08)	13:00, 17:30	BI 136
F	(B09, B10)	13:00, 17:30	BI 136

TA contact information and office hours will be uploaded on D2L

TEXT: **RequiredText:*** "Voet, Voet and Pratt. Wiley 4th Edition, This text is the same as was used in BCEM 393.

This text will be stocked by the Bookstore and should be available at the start of classes.

Other information:

Lecture notes and laboratory information will be uploaded onto the Blackboard site for BCEM 443. Please print off this material before class (or lab) time.

MARK DISTRIBUTION:

A. Composition of Final Grade

Laboratory (5 wet labs; 5 reports worth 4% each)	20 %
Laboratory bioinformatics lab session	2%
Midterm Examination I (2 hours)	22 % Oct. 13/15
Midterm Examination II (2 hours)	24 % Nov 10/15
Final Examination (3 hours)	34 %

B. Final Exam

There will be a Final Examination scheduled by the Registrar's Office.

C. Grading scale and components of course for which a passing grade is essential(*)

A+: superior performance in all course components; A: 86%; A-: 82%; B+: 78%;

B: 74%; B-: 70%; C+: 66%; C: 62%; C-: 58%; D+: 54%; D: 50%; F: below 50%;

Attendance in the labs (and submission of lab reports) is mandatory in BCEM 443. You need to pass the labs to pass the course. The same grade scale applies as is described above.

The last day of Fall Lectures is Tuesday, December 8, 2015 and the final examination period is December 11-22, 2015.

BIOCHEMISTRY 443

FALL 2015 LECTURE SCHEDULE

Lecture#	Lab #	Date	Topic
1		September 9	Course introduction and organic chemistry of CH ₄ , NH ₃ , H ₂ O and ethane
2		11	Nucleic acid bases and derivatives; nucleosides
3		14	Nomenclature, nucleotides, dinucleotides, oligonucleotides
4		16	Traditional and non-traditional base pairing, B-DNA and stacking energies
5		18	Synthesis and methylation of DNA, DNA packaging in the cell
6	1	21	Purification and quantification of genomic and plasmid DNA
7	1	23	Effect of pH and temperature on purified nucleic acid structures
8	1	25	Temperature denaturation studies and Cot curve analysis
9		28	Other DNA structures in the cell
10		30	RNA synthesis, and post-transcriptional processing
11		October 2	RNA structure and function
12	2	5	Digestion of nucleic acids, nucleases
13	2	7	Putting it all together: Gene cloning
14	2	9	Digestion of carbohydrates and transport of monosaccharides
		12	Thanksgiving holiday (no lecture)
		13	Midterm 1; 7-9 pm;
15		14	Insulin signaling, glycogen synthesis
16		16	Glucagon signaling, glycogen degradation.
17	3	19	Coordinate regulation of glycogen metabolism, glycolysis review
18	3	21	Carbohydrate nutrition, gluconeogenesis (review) and the Cori cycle
19	3	23	Fructose utilization (insulin vs glucagon); the oxidative pentose phosphate pathway (PPP)
20		26	The non-oxidative PPP and its regulation
21		28	Mitochondrial transporters
22		30	Mitochondrial shuttles for cytoplasmic NADH; transaminases
23	4	November 2	Lipids: The tricarboxylate transport system, fatty acid biosynthesis
24	4	4	Elongation and desaturation of fatty acids
25	4	6	Fatty acids, synthesis of triacylglycerol and exit from liver
26		9	Synthesis of phospholipids
		10	Midterm 2; 7-9 pm;
		11	Remembrance Day (no lecture)
		12+13	Reading Days (no lecture)
27		16	Sphingolipids, cholesterol synthesis and transport
28		18	Bile salts, reverse cholesterol transport, lipases, digestion of dietary TAG
29		20	Mobilization of TAG from adipose tissue for energy production in muscle (glucagon/epinephrine), carnitine cycle, β-oxidation of fatty acids
30	5	23	Unsaturated fatty acids, odd chain fatty acids, coordinate regulation of fatty acid metabolism.
31	5	25	Nitrogen metabolism: protein digestion and amino acid uptake

32	5	27	The urea cycle
33	6	30	Human amino acid biosynthesis
34	6	December 2	Purine biosynthesis
35	6	4	Pyrimidine biosynthesis
37		7	Ribonucleotide reductase and the synthesis of dTMP
		TBA	Final exam – date scheduled by the Registrar