

## DRAFT

# "Cellular Metabolism & Human Disease" Syllabus/Lecture Schedule

*Updated: 10/28/2011*

**Course Director:** Arrel Toews, PhD  
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**Classes meet:** Tuesdays & Thursdays, 9:30-10:40 AM

**Credit:** 2 hours

**Room Location:** 3095 GMB

**Dates of classes:** Jan. 10, 2012 - April 24, 2012

**Course Description:** This graduate-level course involves lectures, critical readings, and discussions on various aspects of cellular metabolism in both normal and abnormal (diseased) states. Fundamentals of normal metabolism, as well as how metabolism is altered in select diseased states will be covered. New cutting-edge approaches to investigating metabolism as well as recent advances in better understanding altered metabolism in specific diseases will be emphasized whenever possible. Topics include proteomics/metabolomics, carbohydrate and lipid metabolism and dysregulation of their control in metabolic syndrome/Type II diabetes, cholesterol and lipoprotein metabolism and atherosclerosis, alterations in signal transduction pathways, metabolic alterations in cancer, mitochondrial abnormalities, biochemistry of autism, eicosanoid metabolism in health and disease, metabolism in extremophiles, and primitive metabolism (first reactions of life).

**Prerequisites:** Undergraduate or graduate level course in biochemistry or cell biology, or permission of instructor.

**Format:** Each Tuesday there will be a lecture presentation by various lecturers on some aspect of cellular metabolism, often in relation to some associated disease or condition. The following Thursday will usually be a discussion of relevant published papers, problem-solving sessions, &c.

**Homework:** There may be study questions to be answered in advance to help you understand the material. There will also be homework assignments from each instructor, usually consisting of one or more questions on that week's topic, to be turned in each Friday. We will strive to make assigned papers available on Sakai.

**Grading:** Homework, study questions, in-class participation, exam(s)--**TBD**.

**Expectations:** Students are expected to attend all classes, read all assigned materials before class, participate meaningfully in any in-class discussions, and complete homework by the due dates. Please make an effort to ask questions during classes and actively participate in any group discussions. You should feel free to seek assistance from your instructors and/or the course director any time you are having difficulty with any of the material.

**Very Tentative Spring, 2012 Class Schedule: (still to be determined)**

(make MTC GUTS lectures on carbohydrates, lipids - and others? - available)

(record or use preexisting online lectures for background information??)

Week	Dates	Instructor	Topic
1	Tue, Jan 10 Thu, Jan 12	Arrel Toews (Metabolism is not boring)	Introduction to course Overview of Metabolism
2	Tue, Jan 17 Thu, Jan 19	Steve Chaney	Carbohydrate/energy metabolism Basic lipid metabolism
3	Tue, Jan 24 Thu, Jan 26	Coleman or Chaney	Lipid metabolism - $\beta$ -ox of FA? (obesity; hyperlipidemia?)
4	Tue, Jan 31 Thu, Feb 2	Chaney or Coleman	Dysregulation of carb/lipid metab (Metabolic Syndrome/DM-II)
5	Tue, Feb 7 Thu, Feb 9	Beverly Errede	Signaling pathway alterations (adipokines, $\text{TNF}\alpha$ , insulin/glucagons/DM-II)
6	Tue, Feb 14 Thu, Feb 16	Jeff MacDonald Xian Chen [probably expand to 2 weeks]	metabolomics/proteomics (incl. tour of facility?)
7	Tue, Feb 21 Thu, Feb 23	Yue Xiong	asic cancer biology, oncogenes tumor suppressors
8	Tue, Feb 28 Thu, Mar 1	Yue Xiong	Warburg effect and cell growth; myc, PKM2
no class	Tue, Mar 6 Thu, Mar 8	SPRING BREAK	
9	Tue, Mar 13 Thu, Mar 15	Yue Xiong	IDH1 & $\alpha$ -ketoglutarate- dependent dioxygenases acetylation, SIRT, and lifespan
10	Tue, Mar 20 Thu, Mar 22	Mohanesh Deshmukh	mitochondria and their disorders
11	Tue, Mar 27 Thu, Mar 29	Patricia Maness	biochemistry of autism

12.	Tue, Apr 3 Thu, Apr 5	Mehmet Kesimer	organic/amino acidopathies/ peroxisomal Ds/neonatal screening
13	Tue, Apr 10 Thu, Apr 12	Wolfenden/Carter	Extremophile metabolism (&/or early primitive metabolism/origin of life)
14	Tue, Apr 17 Thu, Apr 19	Arrel Toews	Eicosanoid metabolism in health and disease
15	Tue, Apr 24	Arrel Toews	Reflections/Review/New Ideas (no assignments!)

**Other potential topics:**

[Muge Calikoglu](#) - pediatric genetic disorders and their diagnosis/treatments

Give [Mehmet](#) 2 weeks? - specific Ds, then neonatal screening 2<sup>nd</sup> week?

Lysosomal storage disorders (mucopolysaccharidoses/sphingolipidoses/I-cell Ds/&c)

Orphan metabolic Ds (adrenoleukodystrophy, Refsum's Ds, peroxisomal Disorders)

**Everyone suggest more!**