

BCHM 43400-001
Medical Topics in Biochemistry
CRN: 12998
Course Credit Hours: 3
Spring, 2021
T/TH 9:00-10:15 am, NLSN 1195

INSTRUCTOR: James Forney
Office: BCHM 208
Phone: 494-1632
email: forney@purdue.edu (please use the subject heading: **BCHM 434**)
Office hours: After class or by appointment

INSTRUCTIONAL MODALITY: Face-to-Face, Lecture/Small Group Activity

COURSE OBJECTIVES

The overall objective of this course is to apply the fundamental principles of biochemistry and metabolic control to understand the pathophysiology, diagnosis and treatment of human diseases. The course will emphasize biochemistry relevant to diabetes mellitus (type I and type II), liver disease and blood disorders.

LEARNING OUTCOMES ADDRESSED BY THIS COURSE

- Students will develop an understanding of mechanisms that regulate metabolic pathways within individual cells, tissues and organ systems in healthy and disease patients.
- Students will be able to predict biochemical and clinical effects given specific defects in a pathway.
- Students will have an appreciation of ethical issues facing life science professionals who perform research involving humans or human tissues.
- Students will communicate scientific knowledge effectively to non-scientists.

PREREQUISITES

One prior course in biochemistry (e.g. BCHM 361, BCHM307, BCHM 561) or cell biology (BIOL 231) is required for this course. Exceptions must be approved by the instructor.

TEXTBOOK

No textbook is required, but you will need access to a biochemistry textbook or online biochemistry text. The medical biochemistry page is one option:

<http://themedicalbiochemistrypage.org>

This website is maintained by Michael King, PhD, an Instructor for the Molecules to Cells and Tissues course at Indiana University School of Medicine, Terre Haute.

CLASS TIME AND PLACE

Tuesday and Thursday 9:00-10:15, NLSN 1195

BRIGHTSPACE

The syllabus for the course, lecture notes, readings and grading keys will be available via the Purdue University Brightspace site at:

<https://purdue.brightspace.com/d2l/login>

PURDUE HONOR PLEDGE

“As a boilermaker pursuing academic excellence, I pledge to be honest and true in all that I do. Accountable together - we are Purdue.”

ASSESSMENT

The assessments for this course will include:

Exam I	100 points
Exam II	100 points
Team Based Learning	40 points
Paper (1.5 page)	30 points
Group project	30 points
Final Exam	100 points
Total	400 points

The cutoff values for letter grades are as follows:

360 points	90%	A
320 points	80%	B
280 points	70%	C
240 points	60%	D
239 points and below		F

Team Based Learning (TBL): Team based learning will require reading an assignment or listening to a power point presentation prior to class. A list of learning objectives will be provided for each TBL. At the beginning of class each student will take a quiz, after it is submitted they will take the same quiz with a small group of other students. The group will decide answers collectively then use Immediate Feedback Assessment Cards (scratch-off cards) to check their answers. Points will be assigned for both the individual quiz and group quiz. Most TBLs will include additional application questions that will require written responses but are not graded. Five TBL quizzes will be scored in the course, the top four TBL scores will count toward the final grade.

Exams

Exam will be a combination of multiple choice and short answer questions. Missing an exam will result in a grade of 0 being recorded unless documented justification for the absence is presented. The Instructor must be contacted in advance via email. Any request to be excused from a class or exam must include official documentation (doctor's note, request from academic advisor, COVID restriction, etc) explaining why the exam was or will be missed. Makeup exams will be scheduled in consultation with the instructor.

Final Exam and Grade Improvement

The final will be comprehensive. *It will count for 100 points unless the Final Exam score is greater than your score on Exam I or Exam II, in which case the Final Exam score will be doubled and your lowest semester Exam score will be dropped.*

Paper – disease short summary

Each student will be assigned a disease to explain in a short article (1.5 pages) for a general-scientific audience. The first page should include a summary of the disease and at least one illustration. The second page should include a short statement about the prospects for treatments and what strategies might be possible. A rubric will be provided prior to the assignment.

Group project – novel disease treatment

Groups of 3-4 students will select a disease from an instructor provided list. This could include one of the diseases covered by the disease summary assignment described above. Groups will investigate the biochemical defect causing their disease and then propose a hypothetical "magic bullet" treatment. The group will present their findings in a 10-minute presentation that will be followed by a 5-minute question/answer session. A rubric used for grading will be provided.

If you have any disagreements with the way your exam or assignment has been graded, please attend the post-exam review (usually the next session after the exam) and then submit a written explanation for why the score should be changed. Requests for re-grades must be submitted no later than one week after the graded test or assignment has been returned.

EXTRA CREDIT

There will be no opportunity for extra credit.

OBTAINING HELP

Dr. Forney will be available to answer your questions after class or by appointment (best arranged via e-mail). Alternatively, you can submit questions by e-mail. I will do my best to answer the question by return e-mail or alternatively in the next class period.

ACADEMIC MISCONDUCT

Academic integrity is one of the highest values that Purdue University holds. Individuals are encouraged to alert university officials to potential breaches of this value by either emailing integrity@purdue.edu or by calling 765-494-8778. While information may be submitted anonymously, the more information that is submitted provides the greatest opportunity for the university to investigate the concern. Information on Purdue's policies with regard to academic misconduct can be found at:

<http://www.purdue.edu/odos/osrr/academic-integrity/index.html>

You should familiarize yourself with these policies, particularly if you are new to US academic institutions. All apparent violations of these policies will be referred to the Office of the Dean of Students (ODOS).

"Purdue prohibits "dishonesty in connection with any University activity. Cheating, plagiarism, or knowingly furnishing false information to the University are examples of dishonesty." [Part 5, Section III-B-2-a, [University Regulations](#)] Furthermore, the University Senate has stipulated that "the commitment of acts of cheating, lying, and deceit in any of their diverse forms (such as the use of substitutes for taking examinations, the use of illegal cribs, plagiarism, and copying during examinations) is dishonest and must not be tolerated. Moreover, knowingly to aid and abet, directly or indirectly, other parties in committing dishonest acts is in itself dishonest." [University Senate Document 72-18, December 15, 1972]

More specifically, the following are a few examples of academic dishonesty which have been discovered at Purdue University.

- paying someone else to write a paper and submitting it as one's own work
- giving or receiving answers by use of signals during an exam
- copying with or without the other person's knowledge during an exam
- doing class assignments for someone else
- plagiarizing published material, class assignments, or lab reports
- turning in a paper that has been purchased from a commercial research firm or obtained from the internet
- obtaining an unauthorized copy of a test in advance of its scheduled administration
- using unauthorized notes during an exam
- obtaining a test from the exam site, completing and submitting it later
- altering answers on a scored test and submitting it for a regrade

Plagiarism is a special kind of academic dishonesty in which one person steals another person's ideas or words and falsely presents them as the plagiarist's own product. This is most likely to occur in the following ways:

- using the exact language of someone else without the use of quotation marks and without giving proper credit to the author
- presenting the sequence of ideas or arranging the material of someone else even though such is expressed in one's own words, without giving appropriate acknowledgment
- submitting a document written by someone else but representing it as one's own

CLASS ATTENDANCE AND COVID COMPLICATIONS

BCHM 434 will include problem solving and group activities during class so failure to attend could place students at a disadvantage. Slides from the instructor will be available on Blackboard after class along with recordings of the instructor's voice, but these may not capture all the relevant information (e.g. discussions). If you have a valid reason for missing class such as a University-sponsored activity, religious observances, illness, or family emergency, then please inform me as soon as possible. I will do my best to accommodate you but it may not be possible to replicate all information missed in class. The official university policy can be found here:

<http://catalog.purdue.edu/content.php?catoid=6&navoid=2035>

If students feel ill, have any symptoms associated with COVID-19, or suspect they have been exposed to the virus, they should stay home and contact the Protect Purdue Health Center (496-INFO). Students should continue to engage with the course content on Brightspace even if they are in quarantine or isolation. Additional methods to continue progress through the course will be discussed depending upon the session that is missed by the student.

In the current context of COVID-19, in-person attendance cannot be a factor in the final grades. However, timely completion of alternative assessments can be part of the final grade. Students need to inform the instructor of any conflict that can be anticipated and will affect the timely submission of an assignment or the ability to take an exam.

Only the instructor can excuse a student from a course requirement or responsibility. When conflicts can be anticipated, such as for many University-sponsored activities and religious observations, the student should inform the instructor of the situation as far in advance as possible. For unanticipated or emergency conflicts, when advance notification to an instructor is not possible, the student should contact the instructor as soon as possible by email, through Brightspace, or by phone. In cases of bereavement, quarantine, or isolation, the student or the student's representative should contact the Office of the Dean of Students via email or phone at 765-494-1747. Brightspace includes a link to the Dean of Students under 'Campus Resources'.

GRIEF ABSENCE POLICY FOR STUDENTS

Purdue University recognizes that a time of bereavement is very difficult for a student. The University therefore provides the following rights to students facing the loss of a family member through the Grief Absence Policy for Students (GAPS). GAPS Policy: *Students will be excused for funeral leave and given the opportunity to earn equivalent credit and to demonstrate evidence of meeting the learning outcomes for missed assignments or assessments in the event of the death of a member of the student's family.*

COPYRIGHT

We use many materials (e.g. figures, patient cases) that are derived from published sources. As such, they cannot be sold or bartered without express written permission from the authors. Please do not provide these materials to shared websites outside of Blackboard. This is especially true for patient cases. Posting these materials will jeopardize the opportunity to use these materials.

NON-DISCRIMINATION POLICY

Nondiscrimination -- Purdue University is committed to maintaining a community which recognizes and values the inherent worth and dignity of every person; fosters tolerance, sensitivity, understanding, and mutual respect among its members; and encourages each individual to strive to reach his or her own potential. In pursuit of its goal of academic excellence, the University seeks to develop and nurture diversity. The University believes that diversity among its many members strengthens the institution, stimulates creativity, promotes the exchange of ideas, and enriches campus life.

Purdue University prohibits discrimination against any member of the University community on the basis of race, religion, color, sex, age, national origin or ancestry, marital status, parental status, sexual orientation, disability, or status as a veteran. The University will conduct its programs, services and activities consistent with applicable federal, state and local laws, regulations and orders and in conformance with the procedures and limitations as set forth in (http://www.purdue.edu/purdue/ea_eou_statement.html) which provides specific contractual rights and remedies.

Anti-Harassment Policy -- Purdue University is committed to maintaining an environment that recognizes the inherent worth and dignity of every person; fosters tolerance, sensitivity, understanding and mutual respect; and encourages its members to strive to reach their potential. The most effective way to work toward preventing Harassment is through education that emphasizes respect for every individual.

Harassment in the workplace or the educational environment is unacceptable conduct and will not be tolerated. Purdue University is committed to maintaining an educational and work climate for faculty, staff and students that is positive and free from all forms of Harassment. This policy addresses Harassment in all forms, including Harassment toward individuals with legally protected status for reasons of race, gender, religion, color, age, national origin or ancestry, genetic information or disability and Harassment toward individuals for other reasons such as sexual orientation, gender identity, gender expression, marital status or parental status. The University will not tolerate Harassment of its faculty, staff or students by persons conducting business with or visiting the University, even though such persons are not directly affiliated with the University.

Purdue Anti-Harassment Policy (III.C.1): <http://www.purdue.edu/policies/ethics/iic1.html>

EMERGENCIES



In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances beyond the instructor's control. Relevant changes to this course will be posted onto the course website or can be obtained by contacting the instructors or TAs via email or phone. You are expected to read your @purdue.edu email on a frequent basis.

EMERGENCY NOTIFICATION PROCEDURES are based on a simple concept – if you hear a fire alarm inside, proceed outside. If you hear a siren outside, proceed inside.

- **Indoor Fire Alarms** mean to stop class or research and immediately evacuate the building.
 - Proceed to your Emergency Assembly Area away from building doors. **Remain outside** until police, fire, or other emergency response personnel provide additional guidance or tell you it is safe to leave.
- **All Hazards Outdoor Emergency Warning Sirens** mean to immediately seek shelter (**Shelter in Place**) in a safe location within the closest building.
 - “Shelter in place” means seeking immediate shelter inside a building or University residence. This course of action may need to be taken during a tornado, a civil disturbance including a shooting or release of hazardous materials in the outside air. Once safely inside, find out more details about the emergency*. **Remain in place** until police, fire, or other emergency response personnel provide additional guidance or tell you it is safe to leave.

**In both cases, you should seek additional clarifying information by all means possible...Purdue Emergency Status page, text message, email alert, TV, radio, etc...review the Purdue Emergency Warning Notification System multi-communication layers at http://www.purdue.edu/ehps/emergency_preparedness/warning-system.html*

EMERGENCY RESPONSE PROCEDURES:

- Review the **Emergency Procedures Guidelines**
https://www.purdue.edu/emergency_preparedness/flipchart/index.html
- Review the **Building Emergency Plan** (available on the Emergency Preparedness website or from the building deputy) for:
 - evacuation routes, exit points, and emergency assembly area
 - when and how to evacuate the building.
 - shelter in place procedures and locations

EMERGENCY PREPAREDNESS AWARENESS VIDEOS

"Shots Fired on Campus: When Lightning Strikes," is a 20-minute active shooter awareness video that illustrates what to look for and how to prepare and react to this type of incident. See: <http://www.purdue.edu/securePurdue/news/2010/emergency-preparedness-shots-fired-on-campus-video.cfm> (Link is also located on the EP website)

MORE EMERGENCY INFORMATION

Reference the Emergency Preparedness web site for additional information:
https://www.purdue.edu/ehps/emergency_preparedness/

ADAPTIVE PROGRAMS AND ACCOMMODATIONS

Purdue University strives to make learning experiences as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, you are welcome to let me know so that we can discuss options. You are also encouraged to contact the Disability Resource Center at: drc@purdue.edu or by phone: 765-494-1247.

Purdue University is committed to advancing the mental health and well-being of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of support, services are available. For help, such individuals should contact Counseling and Psychological Services (CAPS) at (765)494-6995 and <http://www.purdue.edu/caps/> during and after hours, on weekends and holidays, or through its counselors physically located in the Purdue University Student Health Center (PUSH) during business hours.

BCHM 434 CLASS SCHEDULE

(Exam dates will not change, but topics on specific dates may change in response to instructor observations and student feedback)

Meeting	Topic	Assignment Due
January 19	Glucose, sources of fuel, key metabolic tissues, intro to Type 1 diabetes	
January 21	Overview of metabolism, fed vs. fasting state	
January 26	Overview of metabolism (continued)	
January 28	fatty acid catabolism/ketone bodies/adaptation to starvation	
February 2	blood pH/ketoacidosis/acidosis/Type I diabetes	TBL in class (10 pt)
February 4	glycogen synthesis and breakdown diseases	
February 9	insulin, glucagon	
February 11	Fructose metabolism, is fructose poison?	TBL in class (10 pt)
February 16	Review	
February 18	EXAM I	EXAM (100 pt)
February 23	lipid metabolism overview	
February 25	Type 2 diabetes, insulin resistance (fatty acids and hexosamine signaling)	
March 2	Complications and treatment of diabetes (e.g. insulin, metformin)	
March 4	Ethanol metabolism (alcoholism, Wernicke-Korsakoff)	TBL in class (10 pt)
March 9	Patient case (part 1, problem based learning)	
March 11	Patient case (part 2, problem based learning)	
March 16	Liver disease (biochemistry of symptoms, bilirubin)	
March 18	NO CLASS: READING DAY	
March 23	Hemolytic anemia and reactive oxygen species	paper 1st draft (optional)
March 25	Review	
March 30	EXAM II	EXAM (100 pt)
April 1	Biochemistry of blood (heme synthesis and porphyrias)	
April 6	Biochemistry of blood (hemostasis, blood clotting)	TBL in class (10 pt)
April 8	Biochemistry of blood (iron deficiency anemia)	Paper due (30 pt)
April 13	NO CLASS: READING DAY	
April 15	Biochemistry of blood (sickle cell anemia)	TBL in class (10 pt)
April 20	Steroid biosynthesis and function	
April 22	Ethical conduct, human subjects (case study discussion)	
April 27	Review	
April 29	Group presentations (novel disease treatment)	presentation (30 pt)
FINALS WEEK	FINAL EXAM	EXAM (100 pt)