HUGEN 2040: Molecular Basis of Human Inherited Disease, Fall 2019

General information

Meeting time: Tuesdays and Thursdays, 2:00-3:25 PM
Location: A719 Public Health
Credit Hours: 3

Instructors

Name	Office	email	phone	Office hours
Beth Roman, PhD	3132 PUBHL	romanb@pitt.edu	412.624.7006	T Th 3:30-4:30
Zsolt Urban, PhD	3130 PUBHL	urbanz@pitt.edu	412.648.8269	By appointment
David Finegold, PhD	3134 PUBHL	dnf@pitt.edu	412.624.7854	By appointment

CourseWeb access

Login through the Pitt portal, http://my.pitt.edu, with your standard Pitt username and password.
If you are already logged into my.pitt.edu, you can access directly at http://courseweb.pitt.edu
On the right hand side, under "My Courses", click on the course title,
2201_HUGEN_2040_SEC1070_MOL BASIS OF HUMN INHERITED DS.

Catalogue Description

This course will provide an overview of selected human inherited disorders and integrate clinical descriptions with recent genetic, molecular genetics and biochemical insights. Current state of the art molecular genetics methodologies will be integrated into the overviews.

Course rationale

Human molecular genetics establishes cause-effect connections between mutations and variants within the human genome and changes in proteins, metabolites, traits and disease phenotypes. Understanding of the molecular and cellular basis of human inherited diseases informs their diagnosis, management and treatment. Rapid development of genomic technologies has greatly accelerated the discovery of disease genes and led to the appreciation of the complex interactions between genes. This course will introduce you to the historical core of human molecular genetics and the latest breakthroughs in this rapidly developing discipline.

Learning Objectives

By the end of this course, each student will be able to:

- Explain the structural components of genes, the organization of the human genome, and how gene expression is regulated.
- Apply knowledge of cell biology, signaling pathways, and model systems to perform or understand research relating to human genetic diseases.
- Interpret pedigrees, explain how disease genes are identified, and predict how mutations affect protein function.
- Distinguish select inherited diseases based on the molecular mechanisms and clinical manifestations
- Evaluate different treatment approaches to select inherited diseases
- Recognize unique human populations that harbor alleles for select inherited disorders
- Compile and disseminate clinical, molecular, diagnostic and treatment information on inherited diseases

Prerequisites

No prerequisites are required, but students will find the course easier if they had some prior undergraduate or graduate coursework in Molecular and Cell Biology and Genetics. For English as a Second Language students, a general academic writing course is also recommended.

Teaching Philosophy

This is a core course for Human Genetics graduate students that emphasizes active participation, critical thinking, and problem solving. We value your ability to think independently, creatively, and critically and to see connections between seemingly disparate topics. The classes will include lectures, discussions, problem solving exercises, and peer-to-peer teaching.

Required Textbooks/Articles/Readings

- Strachan T, Read A, (2011) Human Molecular Genetics 4th Ed. ISBN 978-0-8153-4149-9
  We strongly recommed this text. While we realize that this is an older text, it nicely complements our first and part of our second module. You can purchase this text via online retailers such as Amazon for a relatively low price.

Supplemental Readings/Other resources

- Metabolic and Molecular Bases of Inherited Disease (MMBID) – 8th Edition – http://ommbid.mhmedical.com, on Pitt campus or through Pulse Secure VPN
- Molecular Biology of the Cell (Alberts)
  4th edition available from NCBI Bookshelf, https://www.ncbi.nlm.nih.gov/books/NBK21054/
- Online Mendelian Inheritance in Man, OMIM: https://www.omim.org/
- Genetics Home Reference: https://ghr.nlm.nih.gov/
- Additional papers relevant to lectures

CourseWeb Organization

All readings and course material will be found on the CourseWeb site for this class. All information can be accessed via the course menu on the left-hand side of the home page.

Course Documents houses all PowerPoint presentations, handouts, supplemental readings, homework, answer keys, etc. Each module has its own subfolder within the *Course Documents* folder.

Printed handouts will not be available in class. Although you may wish to use a laptop to view the PowerPoint presentation during class, we strongly encourage you to take hand-written notes.

Ground Rules for Class

Please be on time and turn off your cell phone. If you choose to use a laptop during class, make sure that the sound is off. Please stay focused: no texting or online chatting, game playing, or browsing during class.

Student Performance Evaluation (Assessments and Weights)

Midterm exams: There will be 3 midterm exams. You will be allowed to bring handwritten or typed notes with you (two 8.5 x 11 inch pages; minimum font size 10 pts). Exams will require you to problem solve, so you must study if you hope to score well and complete the exam well in a timely fashion. Each exam is worth 100 points. No exams can be dropped.

Homework: Homework assignments will each cover two lectures, for a total of 11 assignments. Assignments will require synthesis of lecture information and problem solving. Homework must be submitted by the beginning of class and will be graded for completion only. Each homework is worth 5

points, and 1 homework will be dropped. Late homework will be docked: 1-24 hrs late, worth 3 points; 24-48 hrs late, worth 2 points; later, no credit.

Quizzes: Quizzes will consist of 1-2 questions (total 5-10 minutes) and will be formatted similar to and cover the same material as the homework assignments due that day. Each quiz is worth 7.5 points and will be graded for correctness. One quiz will be dropped.

Project: You will be asked to choose a disease from a given list, generate a brief disease fact sheet (~3 pages), and teach a small group of your peers (10-minute presentation) about this disease. You will receive a separate handout detailing this assignment and grading rubric. The project is worth 75 points. Late submissions will be docked: 1-24 hrs late, docked 5%; 24-48 hrs late, docked 10%; 2-7 days late, docked 25%; later, no credit.

	Number	Points (each)	Points (total)	Percent of grade
Midterm exams	3	100	300	60
Homework	10 (of 11; can drop 1)	5	50	10
Quizzes	10 (of 11: can drop 1)	7.5	75	15
Project	1	75	75	15
Total for course			**500**	100

Grading Scale

If the class mean for all completed work at the end of the semester is below 85% (B), the mean will be linearly adjusted to 85% and individual grades recalculated accordingly. *Grades on individual exams or assignments will not be adjusted.* The grading scale (below) will then be used to determine final grades.

A+	97-100%	A	93-96.99%	A-	90-92.99%
B+	87-89.99%	B	83-86.99%	B-	80-82.99%
C+	77-79.99%	C	73-76.99%	C-	70-72.99%
D+	67-69.99%	D	63-76.99%	D-	60-62.99%
F	59.99% and below				

Accommodation for Students with Disabilities

If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and Disability Resources and Services, 140 William Pitt Union, 412-648-7890 as early as possible in the term.

Academic Integrity

All students are expected to adhere to the school's standards of academic honesty. Cheating/plagiarism will not be tolerated. The Graduate School of Public Health's policy on academic integrity, which is based on the University policy, is available online in the Pitt Public Health Academic Handbook www.publichealth.pitt.edu/home/academics/academic-requirements. The policy includes obligations for faculty and students, procedures for adjudicating violations, and other critical information. Please take the time to read this policy.

Sexual Misconduct, Required Reporting, and Title IX Statement

The University is committed to combatting sexual misconduct. As a result, you should know that University faculty and staff members are required to report any instances of sexual misconduct, including harassment and sexual violence, to the University's Title IX office so that the victim may be provided appropriate resources and support options. What this means is that as your professor, I am

required to report any incidents of sexual misconduct that are directly reported to me, or of which I am somehow made aware.

There are two important exceptions to this requirement about which you should be aware:
A list of the designated University employees who, as counselors and medical professionals, do not have this reporting responsibility and can maintain confidentiality, can be found here: www.titleix.pitt.edu/report/confidentiality

An important exception to the reporting requirement exists for academic work. Disclosures about sexual misconduct that are shared as part of an academic project, classroom discussion, or course assignment, are not required to be disclosed to the University's Title IX office.

If you are the victim of sexual misconduct, Pitt encourages you to reach out to these resources:

- *Title IX Office: 412-648-7860*
- *SHARE @ the University Counseling Center: 412-648-7930 (8:30 A.M. TO 5 P.M. M-F) and 412-648-7856 (AFTER BUSINESS HOURS)*

If you have a safety concern, please contact the University of Pittsburgh Police, 412-624-2121.
Other reporting information is available here: www.titleix.pitt.edu/report-0

Statement from the Department of Gender, Sexuality, and Women's Studies
[This statement was developed by Katie Pope, Title IX Coordinator, in conjunction with GSWS instructors.]

Diversity Statement

The University of Pittsburgh Graduate School of Public Health considers the diversity of its students, faculty, and staff to be a strength and critical to its educational mission. Pitt Public Health is committed to creating and fostering inclusive learning environments that value human dignity and equity. Every member of our community is expected to be respectful of the individual perspectives, experiences, behaviors, worldviews, and backgrounds of others. While intellectual disagreement may be constructive, no derogatory statements, or demeaning or discriminatory behavior will be permitted.
If you feel uncomfortable or would like to discuss a situation, please contact any of the following:

- *the course instructor*
- *the Pitt Public Health Associate Dean for Diversity at 412-624-3506 or nam137@pitt.edu;*
- *the University's Office of Diversity and Inclusion at 412-648-7860 or https://www.diversity.pitt.edu/make-report/report-form (anonymous reporting form).*

Accessibility

CourseWeb/Blackboard is ADA Compliant and has fully implemented the final accessibility standards for electronic and information technology covered by Section 508 of the Rehabilitation Act Amendments of 1998. Please note that, due to the flexibility provided in this product, it is possible for some material to inadvertently fall outside of these guidelines.

Copyright Notice

Course material may be protected by copyright. United States copyright law, 14 USC section 101, et sec., in addition to University policy and procedures, prohibit unauthorized duplication or retransmission of course materials. See Library of Congress Copyright Office and the University Copyright Policy.

Statement on Classroom Recording

To ensure the free and open discussion of ideas, students may not record classroom lectures, discussion and/or activities without the advance written permission of the instructor, and any such recording properly approved in advance can be used solely for the student's own private use.

Library and Writing Center Services

As a University of Pittsburgh student, a wealth of resources for researching your project is available through the Health Sciences Library (www.hsls.pitt.edu) and the school's dedicated librarian (Barb Folb - https://www.hsls.pitt.edu/staff/barbara-folb). In addition, writing assistance is available through the University Writing Center (www.writingcenter.pitt.edu/).

MODULE 1: BASICS OF MOLECULAR GENETICS					
Date	**Lecture**	**Topic**	**Reading**	**Assignment**	**Lecturer**
8/27/19	1	Nucleic acids and proteins	Strachan Ch. 1		Roman
8/29/19	2	Human genome organization	Strachan Ch. 2.3, 9		Roman
9/03/19	3	Regulation of gene expression I	Strachan Ch. 11	HW/quiz 1	Roman
9/05/19	4	Regulation of gene expression II	Strachan Ch. 11		Roman
Deadline for add/drop 9/6/19					
9/10/19	5	Technical approaches to molecular analysis	Strachan Ch. 6.4;7.1-7.3; 8.1, 8.4' Box 11.3	HW/quiz 2	Roman
9/12/19	6	Cell biology	Strachan Ch. 4.1-4.2		Roman
9/17/19	7	Signaling pathways	Strachan Ch. 4.3	HW/quiz 3	Roman
9/19/19	8	Laboratory models of genetic disease	Strachan Ch. 10.1-10.2, 12.3, 20		Roman
9/24/19	9	Application and problem solving		HW/quiz 4	Roman
9/26/19		**EXAM 1**			

MODULE 2: MECHANISTIC BASIS OF MENDELIAN DISEASES					
Date	**Lecture**	**Topic**	**Reading**	**Assignment**	**Lecturer**
10/01/19	10	Inheritance patterns	Strachan Ch. 3.1-3.2		Urban
10/03/19	11	Mutational mechanisms and consequences	Strachan Ch.13		Urban
10/08/19	12	Identifying disease genes	Strachan Ch. 8, 14, 16	HW/quiz 5	Urban
10/10/19	13	Variant interpretation			Urban
10/15/19	14	Intracellular trafficking diseases (e.g. CF, lysosomal storage diseases)		HW/quiz 6	Urban
10/17/19	15	Mitochondrial diseases			Urban
10/22/19	16	Repeat expansion diseases (e.g. Huntington's, Friedrich's ataxia)		HW/quiz 7	Urban
10/24/19	17	Splicing error diseases (e.g. MD)			Urban
Deadline for monitored withdrawal 10/25/19					
10/29/19	18	Application and problem solving		HW/quiz 8	Urban
10/31/19		**EXAM 2**			

MODULE 3: MENDELIAN DISEASES OF METABOLISM AND ORGAN SYSTEM FUNCTION					
Date	**Lecture**	**Topic**	**Reading**	**Assignment**	**Lecturer**
11/05/19	19	PKU and amino acidurias			Finegold
11/07/19	20	Glycogen storage disorders			Finegold
11/12/19	21	Kidney		HW/quiz 9	Subramanya
11/14/19	22	Neurological disorders			Padiath
11/19/19	23	Heart		HW/quiz 10	Becker
11/21/19	24	Vascular		Disease summary due	Roman
11/26/19		*Thanksgiving*			*No class*
11/28/19		*Thanksgiving*			*No class*
12/03/19	25	Connective tissue disorders		HW/quiz 11	Urban
12/05/19		**EXAM 3**			
12/10/19	26	Student presentations I		Presentations I	Finegold/Urban/Roman
12/12/19	27	Student presentations II		Presentations II	Finegold/Urban/Roman