

**G716 Molecular Biology and Genetics**  
**Fall Semester 2017**  
**MWF 9:00 AM - 10:00 AM**  
**Glick 103**

**1. Course Description:**

G716 is an introductory course for graduate students enrolled in the Indiana University School of Medicine BioMedical Gateway (IBMG) program. The course emphasizes molecular biology, genetics, bioinformatics and molecular techniques that is central to biomedical research. Within most lectures, faculty will incorporate discussion of genetic mutations and medical genetic disorders related to the molecular biology & genetics topic for that lecture.

**2. Course Organization:**

Drs. Ron Wek and Brittney-Shea Herbert serve as co-directors for the course. The G716 course has lectures organized into three blocks with the full schedule provided at the end of the syllabus. Review sessions will be held at the end of each block of lectures before each exam. *Many of the course lectures will involve discussions of journal articles; therefore, students will be expected to be prepared to have read the assigned articles.*

**A) DNA and the Genome: Replication, Recombination and Repair:**

Fundamentals of structure of DNA structure. DNA replication and repair, and the role of recombination in generating DNA diversity. Introduction to genomics and transposable elements.

**B) Gene Expression: Transcription/Translation:**

Gene expression in prokaryotes and eukaryotes, with an emphasis on transcriptional control, RNA processing, micro RNAs and gene expression, translation, protein degradation, and protein targeting. Introduction into bioinformatic and molecular tools for analyzing gene organization and expression.

**C) Genetics and Medicine:**

Introduction to genetics, emphasizing human inheritance, yeast and mouse model systems, and a broad application of molecular biology to medicine, with an emphasis on cancer biology.

**3. Lectures, Canvas (One.iu.edu), and PowerPoint presentations:**

Lectures will be in Glick 103 unless otherwise noted. Faculty participating in the course will be from the Departments of Biochemistry and Molecular Biology, Cellular and Integrative Physiology, Medical and Molecular Genetics, Microbiology & Immunology, and Medicine. Lectures will include PowerPoint presentations and PowerPoint files will be available on Canvas prior to the lecture; printouts of the slides can be available to students upon request.

The IU Canvas online curriculum management system is accessible to enrolled students and will require the IUSM student username and password. Students can access the PowerPoint slides of lectures under the "Files" section of the Canvas site, and audio recordings will be provided via links (however, because of occasional technical issues, we **CANNOT** guarantee that each lecture recording will be available). Additionally the Canvas site will provide a calendar of lecture dates, email communications, and exam grading information. Presentations and discussions of journal articles and reviews will also be posted onto Canvas as PDFs or citations.

**4. Examinations and grading:**

Student grades in the course will be determined by three examinations. Examination questions will be derived from topics covered in the lecture presentations and will include short essay style questions, along with homework examinations. Each examination will contribute to a third of the final grade. Some lectures will be evaluated by homework questions that will be provided in advance in lieu of

exam questions. The homework should be completed by individuals in their own words, to be returned at the indicated due date. There will be no comprehensive final examination. Prior examination keys will be available on the Canvas File site.

### 5. Suggested textbook:

Molecular Cell Biology. Seventh Edition by Harvey Lodish, Arnold Berk, Chris A. Kaiser, Monty Krieger, Anthony Bretscher, Hidde Ploegh, and Angelika Amon, Seventh edition. Publisher W.H. Freeman and Company.

Books are available for purchase at the university bookstore or on-line, and a limited number of reference textbooks are on reserve in the Medical Library. Older versions of this book or related books, e.g. Molecular Biology of the Cell by Bruce Alberts et al., will also suffice. The fourth edition of Molecular Cell Biology is available online by a topic search basis through Bookshelf-NCBI-NIH.

### 6. Course Participants:

A list of faculty lecturers is provided below. Drs. Herbert and Wek will serve as course directors, and will coordinate lectures and examinations and assist students. Faculty will remain after each lecture for questions and will be available in review sessions. Appointments may also be made with individual faculty members. Questions submitted by e-mail will be answered by faculty. Drs. Herbert and Wek will be available before or after class, and by email and office appointments.

Lecturer	Department	Office address	E-mail
Aldred, Micheala	Medicine	TBD	TBD
Day, Richard	Physiology	MS 333	rnday@iu.edu
Georgiadis, Millie	Biochemistry	MS 4032D	mgeorgia@iu.edu
Guo, Haitao	Micro & Immunology	MS 420	haitguo@iupui.edu
Herbert, Brittney-Shea	MMGE	AOC 6129	brherber@iu.edu
Morrall, Nuria	MMGE	MS 0042	nmorralc@iu.edu
Mosley, Amber	Biochemistry	MS 1021H	almosley@iu.edu
Turchi, John	Medicine, Biochemistry	R3 C562	jturchi@iu.edu
Wek, Ronald	Biochemistry	MS 4067A	rwek@iu.edu
White, Kenneth	MMGE	MS 5010	kenewhit@iu.edu

Teaching Assistant: Sarah Peck (MS1021A; sapeck@iupui.edu)

Administrative Assistant (course/lecturer evaluations): Joan Charlesworth ([jocharle@iu.edu](mailto:jocharle@iu.edu))

# Course Schedule:

Note all lectures in Glick 103, except otherwise noted

<u>Class #</u>	<u>Block/Topic</u>	<u>Lecturer</u>	<u>Date</u>
1	Overview, Objectives, and Introduction	Ron Wek/B. Herbert	8/21/2017 (Mon)
	<i>DNA and the Genome: Replication, Recombination &amp; Repair</i>		
2	DNA Replication 1	John Turchi	8/23/2017 (Wed)
3	DNA Replication 2: <b>Homework assignment</b>	John Turchi	8/25/2017 (Fri)
4	Recombination & Meiosis	John Turchi	8/28/2017 (Mon)
5	DNA Replication at End of Chromosomes	Brittney-Shea Herbert	8/30/2017 (Wed)
6	DNA Damage & Repair 1	John Turchi	9/1/2017 (Fri)
	<i>Labor Day: No class</i>		9/4/2017 (Mon)
7	DNA Damage & Repair 2	John Turchi	9/6/2017 (Wed)
8	Transposons & the Genome	Millie Georgiadis	9/8/2017 (Fri)
9	LINEs & SINEs	Millie Georgiadis	9/11/2017 (Mon)
10	Bioinformatics: Databases and Practice Sets	Amber Mosley (IB226/227)	9/13/2017 (Wed)
11	Bioinformatics, cont'd; <b>Homework</b>	Amber Mosley	9/15/2017 (Fri)
12	Molecular Genetic Techniques	Ron Wek	9/18/2017 (Mon)
13	Review		9/20/2017 (Wed)
	<b>EXAM 1: Lectures 1-12</b>		9/22/2017 (Fri)
	<i>Gene Expression: Transcription/Translation</i>		
14	Genome Organization & Plasticity	Richard Day	9/25/2017 (Mon)
15	Prokaryotic Gene Expression	Ron Wek	9/27/2017 (Wed)
16	CRISPR/Cas-9 Paper discussion and <b>Homework</b>	TA: Sarah Peck	9/29/2017 (Fri)
17	Eukaryotic Gene Expression 1	Richard Day	10/2/2017 (Mon)
18	Eukaryotic Gene Expression 2	Richard Day	10/4/2017 (Wed)
19	Epigenetics	Richard Day	10/6/2017 (Fri)
20	RNA Splicing & Processing	Ron Wek	10/9/2017 (Mon)
21	Bioinformatics: RNA-Seq ( <b>Homework</b> )	Amber Mosley	10/11/2017 (Wed)
22	Micro RNAs, noncoding RNAs	Ron Wek	10/13/2017 (Fri)
	<i>Fall Break: No class</i>		10/16/2017 (Mon)
23	Genetic Code & tRNAs	Ron Wek	10/18/2017 (Wed)
24	Protein Synthesis 1	Ron Wek	10/20/2017 (Fri)
25	Protein Synthesis 2	Ron Wek	10/23/2017 (Mon)
26	Protein Targeting	Ron Wek	10/25/2017 (Wed)
27	Review		10/27/2017 (Fri)
	<b>EXAM 2: Lectures 14-26</b>		10/30/2017 (Mon)

	<i>Genetics and Medicine</i>		
28	Genetics & Medicine 1: Inheritance	Micheala Aldred	11/1/2017 (Wed)
29	Genetics & Medicine 2: Sequencing	Micheala Aldred	11/3/2017 (Fri)
30	Genetics & the Era of Genomics	Brittney-Shea Herbert	11/6/2017 (Mon)
31	Yeast Genetics and Yeast Model Systems: <b>Homework</b>	Amber Mosley	11/8/2017 (Wed)
32	Bioinformatics: Systems Biology ( <b>Homework</b> )	Amber Mosley (IB226/227)	11/10/2017 (Fri)
33	Viral Genetics	Haitao Guo	11/13/2017 (Mon)
34	Viral Genetics: Gene Transfer and Therapy	Nuria Morral	11/15/2017 (Wed)
35	Mouse Genetics & Methodologies	Ken White	11/17/2017 (Fri)
36	Molecular Biology & Cancer	Brittney-Shea Herbert	11/20/2017 (Mon)
	<i>No Class: Thanksgiving holiday</i>		11/22/2017 (Wed)
	<i>No Class: Thanksgiving holiday</i>		11/24/2017 (Fri)
	<i>No Class</i>		11/27/2017 (Mon)
37	Molecular Biology & Cancer: <b>Paper Discussion</b>	Brittney-Shea Herbert	11/29/2017 (Wed)
38	Molecular Biology & Medicine: Nuclear Hormone Receptors & Gene Expression	Ron Wek	12/1/2017 (Fri)
39	Molecular Biology & Medicine: Ancient DNA & Human History	Ron Wek	12/4/2017 (Mon)
40	<b>Review</b>		12/6/2017 (Wed)
	<b>EXAM 3: Lectures 28-39</b>		12/8/2017 (Fri)

## Additional Campus Policies:

### IUPUI Policy on Disability Accommodations<sup>1</sup>

Students in need of accommodations because of disability must register with Adaptive Educational Services and complete the appropriate forms issued by AES before accommodations will be given. The AES office is located in Taylor Hall, UC 100. You can also reach the office by calling 317-274-3241. Visit <http://aes.iupui.edu/> for more information.

### IUPUI Policy on Religious Holidays<sup>2</sup>

IUPUI respects the right of all students to observe their religious holidays and will make reasonable accommodation, upon request, for such observances. Students seeking accommodation for religious observances must submit a request in writing to the course instructor by the end of the second week of the semester and should use the [Request for Course Accommodation Due to Religious Observance Form](#). Note that campus policy does not require instructors to offer accommodations for travel time before or after a religious holiday, since most religions are represented in the Indianapolis area and provisions can be made for appropriate observances here if necessary. However, campus policy does allow instructors to grant accommodations for a few hours immediately after a holiday if its observance includes fasting. More information on the IUPUI Policy on Religious Holidays is available here: <http://registrar.iupui.edu/religious.html>.

### IUPUI Policy on Academic Integrity:<sup>3</sup>

The IU Code of Student Rights, Responsibilities, and Conduct states that students must uphold and maintain academic and professional honesty and integrity; the code defines academic misconduct as any activity that tends to undermine the academic integrity of the institution. Students engaging in academic misconduct may therefore receive penalties from their course instructor and disciplinary action from the university. Policies against academic misconduct apply to *all* course-, department-, school-, and university-related activities. Academic misconduct may involve human, hard-copy, or electronic resources and includes but is not limited to the following: cheating, fabrication, plagiarism, interference, violation of course rules, and facilitating academic dishonesty. For definitions of these activities, visit <http://studentcode.iu.edu/responsibilities/academic-misconduct.html>. For information on how faculty and students are expected to handle cases involving academic misconduct, visit <http://registrar.iupui.edu/misconduct.html>. Additional information about the rights and responsibilities of IU students is available at <http://studentcode.iu.edu/>.

### IUPUI Policy on Sexual Misconduct

IU does not tolerate acts of sexual misconduct, including sexual harassment and all forms of sexual violence. If you have experienced sexual misconduct, or know someone who has, the University can help. Federal regulations and University policy require faculty to promptly report complaints of potential sexual misconduct known to them to their campus Deputy Title IX Coordinator(s) to ensure that appropriate measures are taken and resources are made available. The University will work with you to protect your privacy by sharing information only with those who need to know it in order to ensure that the University can respond and assist. If you are seeking help and would like to speak to someone confidentially, you can make an appointment with a Mental Health Counselor on campus: <http://stopsexualviolence.iu.edu/help/confidential.html>. Please visit <http://stopsexualviolence.iu.edu/> to find more information about sexual violence, including campus and community resources.<sup>4</sup>

<sup>1</sup> These statements on disability accommodations were taken from <http://aes.iupui.edu/faculty.htm>.

<sup>2</sup> This statement on religious holidays is an abbreviation of language found at <http://registrar.iupui.edu/religious.html>.

<sup>3</sup> This short version of the academic integrity statement is a modified abbreviation of language found at <http://studentcode.iu.edu/responsibilities/academic-misconduct.html>.

<sup>4</sup> This language is based on language found at <http://registrar.iupui.edu/sexual-misconduct-title-ix.html>

## Emergency Procedures Grid

Faculty, staff, and students should review these procedures and keep the grid handy in case of emergencies. [IUPUI Print Version](#)

[IUPUI Web Version](#)

## Other Policies

A number of campus-wide policies govern the conduct of students taking courses at IUPUI. These policies can be found at [http://registrar.iupui.edu/course\\_policies.html](http://registrar.iupui.edu/course_policies.html)

## IUPUI Policy on Dropping and Adding Courses<sup>5</sup>

Students may make changes to their schedules online from the time of their initial registration up through the end of the first day of the second week of a major term or through the end of the third day of the two major summer sessions. For more information about dropping and adding courses, please visit <http://registrar.iupui.edu/drop.html>.

## Statement Regarding Changes to the Syllabus<sup>6</sup>

Please note that this syllabus is subject to revision at any time by the instructor as he or she deems necessary for ensuring student success. The instructor may announce any such changes verbally or in writing, and students are responsible for knowing and abiding by those changes.

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<sup>5</sup> This statement on dropping and adding courses is take from <http://registrar.iupui.edu/drop.html>.

<sup>6</sup> The language of this statement was written by James Gregory, CTL.