
Term Information

Effective Term Autumn 2014

General Information

Course Bulletin Listing/Subject Area Biochemistry
Fiscal Unit/Academic Org Chemistry - D0628
College/Academic Group Arts and Sciences
Level/Career Graduate
Course Number/Catalog 6701
Course Title Advanced Biochemistry: Molecular Biology
Transcript Abbreviation AdvBiochm-MolBiol
Course Description An advanced treatment of the biochemical principles of gene and genome function
Semester Credit Hours/Units Fixed: 3

Offering Information

Length Of Course 14 Week, 7 Week
Flexibly Scheduled Course Never
Does any section of this course have a distance education component? No
Grading Basis Letter Grade
Repeatable No
Course Components Lecture
Grade Roster Component Lecture
Credit Available by Exam No
Admission Condition Course No
Off Campus Never
Campus of Offering Columbus

Prerequisites and Exclusions

Prerequisites/Corequisites Prereq: Biochem5615, MolGen4500
Coreq: Biochem6761
Exclusions Micro6080; MolGen5701; Micro6010

Cross-Listings

Cross-Listings Not open to students with credit for MolBioc6701

Subject/CIP Code

Subject/CIP Code 26.0202
Subsidy Level Doctoral Course
Intended Rank Masters, Doctoral

Requirement/Elective Designation

The course is an elective (for this or other units) or is a service course for other units

Course Details

Course goals or learning objectives/outcomes

- 1. Acquire advanced knowledge of biochemical principles of the enzymes and processes that participate in DNA replication, RNA transcription and protein synthesis, and the regulation of these processes.
- 2. Develop an understanding of the theory and application of molecular biology techniques used to study gene and genome function.

Content Topic List

- Chromosome structure and function
- Cell cycle
- Replication
- Mitosis and Meiosis
- DNA repair
- Transcription
- RNA processing
- Translation- synthetases and genetic code
- Translation- ribosome and regulation
- Protein modification/targeting
- Recombination

Attachments

- Biochem 6701 Syllabus - Final.pdf: Syllabus
(Syllabus. Owner: Turro, Claudia)
- osbp 6701 letter of concurrence.pdf: OSBP Concurrence
(Concurrence. Owner: Turro, Claudia)
- Mico_concurr.pdf: Micro Concurrence
(Concurrence. Owner: Turro, Claudia)
- MolGen conc.pdf: MolGen Concurrence
(Concurrence. Owner: Turro, Claudia)

Comments

- The concurrence letter from Molecular Genetics refers to an exclusion of MolGen 5601; however, it appears that the MolGen 5701 is the more appropriate course (as submitted by the initiator). *(by Hadad, Christopher Martin on 04/18/2014 03:41 PM)*

Workflow Information

Status	User(s)	Date/Time	Step
Submitted	Turro, Claudia	04/18/2014 12:12 PM	Submitted for Approval
Approved	Turro, Claudia	04/18/2014 12:13 PM	Unit Approval
Approved	Hadad, Christopher Martin	04/18/2014 03:41 PM	College Approval
Pending Approval	Vankeerbergen, Bernadette Chantal Nolen, Dawn Jenkins, Mary Ellen Bigler Hogle, Danielle Nicole Hanlin, Deborah Kay	04/18/2014 03:41 PM	ASCCAO Approval

Biochem 6701
Advanced Biochemistry: Molecular Biology- Fall 2014
Tues- Thurs 9:35-10:55

Course coordinator:

Jane E. Jackman
740 Biological Sciences Bldg, 7-8097
Jackman.14@osu.edu

Course guest instructors:

Various instructors from faculty mentors in Ohio State Biochemistry Program

Textbook (required):

Molecular Biology: Principles of Genome Function
Craig, Cohen-Fix, Green, Greider, Storz and Wohlberger
Oxford Press, 2010

Course format:

Each week will begin with a Tuesday lecture on the topic, followed by a Thursday problem solving/group work session focused on the new material. Weekly quizzes will also take place during Thursday classes.

Grading:

Total grades will be out of 300 points. Each quiz is worth 10 points (13 total quizzes), and the cumulative final examination will be worth 130 points. Class participation/discussion will be counted for up to 40 points toward the final grade.

Course policies:

Attendance at all classes is required. Medical emergencies must be documented with a note from the attending physician. Two unexcused absences will result in a reduction of one letter grade in the final course grade (i.e., A to A-, B+ to B, etc).

Tentative Syllabus:

8/28: Course introduction; brief review of nucleic acids, introduction to genes and genomes (Ch. 1-3)

9/2 and 9/4: Chromosome structure and function (Ch. 4)

9/9 and 9/11: Cell cycle (Ch. 5)

9/16 and 9/18: Replication (Ch. 6)

9/23 and 9/25: Mitosis and meiosis (Ch. 7)

9/30 and 10/2: DNA repair (Ch.12)

10/7 and 10/9: Transcription (Ch. 8)

10/14 and 10/16: RNA processing (Ch. 9)

10/21 and 10/23: Translation: synthetases and genetic code (Ch. 10)

10/28 and 10/30: Translation: the ribosome and regulation (Ch. 10)

11/4 and 11/6: Protein modification/targeting (Ch. 11)

11/11: No class (Veteran's day)

11/13 and 11/18: Recombination (Ch. 13)

11/20 and 11/25: Tools and techniques: model organisms and gene expression (Ch. 15 and 16)

11/27: No class (Thanksgiving)

12/2 and 12/4: Tools and techniques: genome-wide approaches (Ch. 16)

12/9: Final examination

Statements on Academic Misconduct (including plagiarism) and Disability Services

Academic Misconduct:

The Ohio State University and the Committee on Academic Misconduct (COAM) expect that all students have read and understand the University's *Code of Student Conduct*, and that all students will complete all academic and scholarly assignments with fairness and honesty.

Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination. Ignorance of the University's *Code of Student Conduct* is never considered an "excuse" for academic misconduct, so it is recommended that you review the Code of Student Conduct and, specifically, the sections dealing with academic misconduct.

If a student is suspected of committing academic misconduct in this course, I am obligated by University Rules to report my suspicions to the Committee on Academic Misconduct. If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact me.

Disability Statement:

Any student who feels that s/he may need an accommodation based on the impact of a disability should contact me privately to discuss specific needs, as soon as possible. We rely on the assistance of the Office for Disability Services (ODS) (292-3307, Room 150 Pomerene Hall) to verify the need for accommodations and to develop accommodation strategies. You are encouraged to contact ODS if you feel it may be necessary, if you have not previously done so.

Expanded Topic List: (examples of topics to be covered, at level and depth of required text)

Chromosome structure and function

- Packaging chromosomal DNA
 - Covalent modification of histones
 - Nucleosome remodeling complexes
 - Elements required for chromosome function
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- Cell cycle
 - Steps in the eukaryotic cell cycle
 - Cyclins and cyclin-dependent kinases
 - Cell cycle regulation and checkpoints
 - Cell cycle and cancer
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- Replication
 - DNA polymerases: structure, function, fidelity and processivity
 - Specialized polymerases
 - DNA replication accessory proteins (helicases, clamp, clamp loader)
 - Regulation DNA replication
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- Mitosis and Meiosis
 - The stages of mitosis
 - Meiosis: generating haploid gametes from diploid cells
 - Chromosome segregation in bacteria
-
- DNA repair
 - DNA repair systems (mismatch, base excision, nucleotide excision, translesion synthesis)
 - DNA damage response in bacteria vs. eukaryotes
 - DNA damage and cell death in mammalian cells
-
- Transcription
 - RNA polymerases: core components and mechanism
 - Stages of transcription (initiation, elongation, termination)
 - Transcriptional regulation in eukaryotes- mechanisms, signaling cascades
-
- RNA processing
 - mRNA processing (end maturation, splicing)
 - RNA stability pathways- degradation of normal, foreign and defective RNAs
 - tRNA and rRNA processing (end maturation, splicing, modification)

- Translation- synthetases and genetic code
 - Aminoacyl-tRNA synthetases (mechanism and fidelity)
 - Degenerate decoding and recoding (programmed frameshift/stop codon readthrough)
 - Expanding the genetic code (unnatural amino acid technology)

- Translation- ribosome and regulation
 - Structure of the ribosome and translation cycle
 - Protein factors: initiation, elongation, termination (bacteria and eukaryotes)
 - Regulation of translation via 5'- and 3'-UTR

- Protein modification/targeting
 - Chaperone-assisted protein folding
 - Protein targeting
 - Modification: lipids, glycosylation, phosphorylation, acetylation, methylation
 - Ubiquitination and sumoylation/protein degradation

- Recombination
 - Homologous recombination/ds break repair
 - Mechanism of strand pairing and exchange
 - Transposable elements- mechanisms and adaptive immunity
 - Retrotransposons

- Tools and techniques: model organisms and gene expression
 - Cultured cells and viruses
 - Cloning and amplification of DNA/RNA sequences
 - Isolation, separation and detection of biological molecules (protein, DNA, RNA)

- Tools and techniques: genome manipulation and genome-wide approaches
 - Genome manipulation
 - Imaging cells and molecules
 - Obtaining and analyzing a complete genome sequence
 - Mapping human disease genes



April 18, 2014

Claudia Turro, Ph.D.
Professor and Vice Chair for Graduate Studies
Department of Chemistry & Biochemistry
The Ohio State University
Columbus, Ohio 43210

Dear Claudia:

On behalf of the Graduate Studies Committee of the Ohio State Biochemistry Program, I am writing this letter to support the creation of Biochem 6701 Advance Biochemistry: Molecular Biology. As you know, the biological division of the department has created this class in consultation with OSBP. This course will be accepted by OSBP for the core molecular biology class, and we support its place as an elective in the Chemistry and Biochemistry graduate curricula.

We have created this class because there is no ideal graduate molecular biology class for incoming students with the background we typically see in OSBP and the Chemistry biological division, and with the breadth of topics needed for biochemistry labs across the campus. This class will fill that void, and will also be a cohort-building class, as it would be the only class in the OSBP curriculum that is exclusively taken by first-year biochemistry students.

We also support the cross-listing of this course with Molecular & Cellular Biochemistry.

Sincerely,

Thomas J. Magliery, Ph.D.
Associate Professor, Department of Chemistry & Biochemistry
Director and Graduate Studies Chair, Ohio State Biochemistry Program
1043 Evans Laboratory | Phone (614) 247-8425
magliery.1@osu.edu



March 24, 2014

To Whom It May Concern,

I am writing this letter of concurrence to support the development of Bicochemistry 6701: Advanced Biochemistry: Molecular Biology, as taught by Dr. Jane Jackman. This course will address learning objectives distinct from those offered to students via courses taught within the Microbiology graduate program.

Sincerely,

Michael Ibba, Ph.D.
Professor and Chair
Department of Microbiology



THE OHIO STATE UNIVERSITY

College of Arts and Sciences
Department of Molecular Genetics
105 Biological Sciences Building
484 West Twelfth Avenue
Columbus, OH 43210--1292

614-292-8084 Phone
614-292.4466 Fax
molgen.osu.edu

March 31, 2014

RE: Concurrence for BioChem 6701

Thomas Magliery, CBC
Associate Professor, Department of Chemistry & Biochemistry
Director and Graduate Studies Committee Chair, Ohio State Biochemistry Program
The Ohio State University
1043 Evans Lab
100 West Eighteenth Ave.
Columbus, OH 43210-1185

Dear Tom:

Per your request MG is providing concurrence for your new course BioChem/MolBiol6701. As you know, MG teaches a course, MG5601, that has some overlapping content, but our course is analysis focused and your new course is survey focused. Therefore we do not foresee that creation of BioChem6701 would have significant negative effects on the enrollment in MG5601. Please list MG classes as exclusionary with your request to the administration.

Sincerely,

Anita K. Hopper
Professor and Chair
Dept. Molecular Genetics

