

BIOL3301 Syllabus

Course Information

BIOL3301 Classical and Molecular Genetics Fall 2007

Professor Contact Information

Dr. Dennis Miller
Office: Founders 3.218
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Office Hours: Immediately after class, by appointment,
or just drop by without an appointment.

Dr. Ernie Hannig
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Office hours: Thursdays, 3 pm until ?? and by appointment

Course Pre-requisites, Co-requisites, and/or Other Restrictions

Pre-requisite:
BIOL2311 Introduction to Modern Biology I
CHEM2323 Introductory Organic Chemistry I

Course Description

The following areas of genetics will be discussed:
The phenomenon of heredity, its cytological and molecular basis; gene expression and transfer of genetic information, with major focus on bacterial and model eukaryotic systems; genetic recombination and chromosome mapping; tetrad analysis; mutations and mutagenesis; genetic interactions; application of recombinant DNA techniques to genetic analysis..

Student Learning Objectives/Outcomes

This course seeks to teach students the principles of transmission genetics in prokaryotic and eukaryotic systems. We then build upon this foundation with a consideration of molecular genetics without losing sight of the application of transmission genetics to modern genetic analysis. The goal of this course is to both educate students in the principles of classical and molecular genetics and, perhaps more importantly, to teach students how to apply these principles to problem solving in genetics. That is, they must begin to think and apply what they have learned in class.

Upon completion of this course, students should:

1. Be able to discuss basic and more advanced areas of transmission and molecular genetics.
2. Be able to apply this knowledge to real-world problem solving in transmission and molecular genetics.
3. Begin to appreciate the intimate relationship between the various sciences (e.g., genetics and biochemistry) that lead to a more complete understanding of various biological problems through reading science material and by participating in discussions

Required Textbooks and Materials

Required texts:

Russel, P. J. *iGenetics: a Mendelian Approach* (2006). Pearson Education/Benjamin Cummings (pub.) ISBN 0-8053-4666-X

Russel, P. J. and Chase, B. *Study Guide and Solutions Manual for iGenetics: a Mendelian Approach* (2006). Pearson Education/Benjamin Cummings (pub.) ISBN 0-8053-4675-9

Recommended materials:

Companion Student CD-ROM; Benjamin Cummings (pub.) ISBN 0-8053-4668-6.

Scientific American Current Issues in Cell and Molecular Biology and Genetics (Scientific American); Benjamin Cummings (pub.) ISBN 0-8053-0568-8

Assignments & Academic Calendar

Date	<u>Meeting</u> no.	Topic	<u>Text</u> Chapter
Aug. 16	1	<i>Introduction to Genetics</i> (overview)	Ch. 1
Aug. 21	2	<i>Mendelian Genetics</i>	Ch. 2
Aug. 23	3	<i>Chromosomal Basis of Inheritance</i>	Ch. 3
Aug. 28	4	<i>Extensions of Mendelian Principles</i>	Ch. 4
Aug. 30	5	<i>Linkage Analysis in Eukaryotes</i>	Ch. 6
Sept. 4	6	<i>Advanced Linkage Analysis in Eukaryotes</i>	Ch. 7
Sept. 6	7	Catch-up/Review for first examination	
Sept. 11	8	EXAM I (Tuesday)	Ch. 1, 2, 3, 4, 6
Sept. 13	9	Var. in Chromosome Structure and Number*	Ch. 8
Sept. 18	10	<i>Genetics of Bacteria and Bacteriophage I</i>	Ch. 9
Sept. 20	11	<i>Genetics of Bacteria and Bacteriophage II</i>	Ch. 9
Sept. 25	12	<i>DNA: The Genetic Material</i>	Ch. 10
Sept. 27	13	<i>Gene Function</i>	Ch. 12
Oct. 2	14	Catch up and review for second examination	
Oct. 4	15	Dr. Miller's first lecture	
Oct. 9	16	EXAM II (Tuesday)	4Ch. 7, 8, 9, 10, 12

<u>Date</u>	<u>Topic</u>	<u>Transparency No.</u>	<u>Chapter, pages in R</u>
Oct. 5	Central Dogma of Molecular Biology DNA replication	Handout 1: 1 - 29	Ch. 11 (p. 281 - 298)
Oct. 9	Exam 2		
Oct. 11	Transcription, <i>E. coli</i> Polymerase <i>E. coli</i> Promoter, <i>Lac</i> Operon	Handout 2: 1 - 12	Ch. 13 (p. 331 - 336) Ch. 19 (p. 515 - 528)
Oct. 16	Operons, Coordinate Regulation Attenuation	Handout 2: 13 - 33	Ch. 19 (p. 528 - 532)
Oct. 18	Alternate Promoters Regulation of Gene Expression in Phage Lambda	Handout 3: 31 - 44	Handout 1 – Temporal Control Handout 2 – Phage Lambda Ch. 19 (p. 533 - 535)
Oct. 23	Chromatin Structure and Remodeling Eukaryotic Polymerases, Promoters	Handout 4: 45 - 63	Ch. 10 (p. 267 – 270) Ch. 20 (p. 547 - 548) Ch. 13 (p. 337 - 339)
Oct. 25	Enhancers, General Transcription Factors, Regulation of Gene Expression	Handout 5: 64 - 79	Ch. 20 (p. 543 - 546, 549 - 556)
Oct. 30	EXAM 3		Ch. 10 (267 - 270), Ch. 11 (p. 281 - 298), Ch. 13 (p. 331 - 339), Ch. 19 (p. 515 - 535), Ch. 20 (p. 543 - 556), Handouts 1 & 2
Nov. 1	RNA Processing, RNA splicing, Introns, Exons, Spliceosomal Splicing	Handout 6: 80 - 90	Ch. 13 (p. 339 - 343) Ch. 20 (p. 561 - 562)
Nov. 6	Group I, Group II, tRNA Introns, tRNA, rRNA, mRNA maturation	Handout 6: 91 - 106	Ch. 13 (p. 341 - 342, 344 - 350)
Nov. 8	Ribosomes, tRNAs, Genetic Code	Handout 7: 107 – 125	Ch. 13 (p. 346, 349 - 350) Ch. 14 (p. 355 – 363)
Nov. 13	Protein Synthesis	Handout 8: 138 – 157	Ch. 14 (p. 363 - 370)
Nov. 15	Recombinant DNA, Restriction Enzymes Vectors, Selection/Screening	Handout 9: 159 - 173 189 – 191, 223	Ch. 16 (p. 419 - 427)
Nov. 20	DNA libraries, cDNA, <i>in situ</i> screening, Hybridization probes, , Gene Fusions, Restriction Mapping, DNA sequencing Southern blotting PCR, RT-PCR, RFLPs, DNA typing, DNA fingerprints Haplotype, Genetic Diseases	Handout 10: 174 - 188 224 Handout 11: 192 - 199 200 - 206 Handout 12: 207 - 212 213 – 217 226 - 229, 231	Ch. 16 (p. 427 - 431) Ch. 16 (p. 431 - 436) Ch. 16 (p. 436 - 444) Ch. 16 (p. 444 – 447) Ch. 17 (p. 457 - 462, 468 - 472) Ch. 17 (p. 462 - 468)
Nov. 27	EXAM 4 (11:00am – 2:00pm)		Ch. 13 (339 - 350), Ch.14 (p.355 – 370), Ch. 16 (419 – 448), Ch. 17 (p. 457 – 472), Ch. 20 (p. 561 – 562)

Grading Policy

Final course grade will primarily be the average of the four exam grades. Exams will be generally non-cumulative in detail, but you will be expected to retain some basic general concepts in subsequent exams. Letter grade assignment is based on standard deviation from class numerical average.

Course & Instructor Policies

Attendance. Attendance is strongly encouraged. Attendance and class participation is part of your responsibility as a student in this class. It will affect your grade in the course and your involvement in the course material. Additionally, it will help you prepare for the exams by giving you an idea of what will be emphasized in the exams. The text and lectures will supplement one another. We will cover some material not covered (or not covered in depth) in the texts, and conversely, we will not discuss some material covered in the reading assignments.

Make-up exams. If you know you're going to be out of town for an exam, make arrangements well in advance with the instructor. On rare occasions where the instructor has not been given previous notice of the absence, a make-up exam will be allowed at the discretion of the instructor. The grade for an exam given as a make-up exam cannot represent the highest of the four exam grades. In addition, the format of the make-up exam is at the discretion of the instructor. *Under no conditions will make-up exams be given after the results of the exam are available to the rest of the class.*

Field Trip Policies

Off-campus Instruction and Course Activities

Off-campus, out-of-state, and foreign instruction and activities are subject to state law and University policies and procedures regarding travel and risk-related activities. Information regarding these rules and regulations may be found at the website address http://www.utdallas.edu/BusinessAffairs/Travel_Risk_Activities.htm. Additional information is available from the office of the school dean. Below is a description of any travel and/or risk-related activity associated with this course.

Student Conduct & Discipline

The University of Texas System and The University of Texas at Dallas have rules and regulations for the orderly and efficient conduct of their business. It is the responsibility of each student and each student organization to be knowledgeable about the rules and regulations which govern student conduct and activities. General information on student conduct and discipline is contained in the UTD publication, *A to Z Guide*, which is provided to all registered students each academic year.

The University of Texas at Dallas administers student discipline within the procedures of recognized and established due process. Procedures are defined and described in the *Rules and Regulations, Board of Regents, The University of Texas System, Part 1, Chapter VI, Section 3*, and in Title V, Rules on Student Services and Activities of the university's *Handbook of Operating Procedures*. Copies of these rules and regulations are available to students in the Office of the Dean of Students, where staff members are available to assist students in interpreting the rules and regulations (SU 1.602, 972/883-6391).

A student at the university neither loses the rights nor escapes the responsibilities of citizenship. He or she is expected to obey federal, state, and local laws as well as the Regents' Rules, university regulations, and administrative rules. Students are subject to discipline for violating the standards of conduct whether such conduct takes place on or off campus, or whether civil or criminal penalties are also imposed for such conduct.

Academic Integrity

The faculty expects from its students a high level of responsibility and academic honesty. Because the value of an academic degree depends upon the absolute integrity of the work done by the student for that degree, it is imperative that a student demonstrate a high standard of individual honor in his or her scholastic work.

Scholastic dishonesty includes, but is not limited to, statements, acts or omissions related to applications for enrollment or the award of a degree, and/or the submission as one's own work or material that is not one's own. As a general rule, scholastic dishonesty involves one of the following acts: cheating, plagiarism, collusion and/or falsifying academic records. Students suspected of academic dishonesty are subject to disciplinary proceedings.

Plagiarism, especially from the web, from portions of papers for other classes, and from any other source is unacceptable and will be dealt with under the university's policy on plagiarism (see general catalog for details). This course will use the resources of turnitin.com, which searches the web for possible plagiarism and is over 90% effective.

Email Use

The University of Texas at Dallas recognizes the value and efficiency of communication between faculty/staff and students through electronic mail. At the same time, email raises some issues concerning security and the identity of each individual in an email exchange. The university encourages all official student email correspondence be sent only to a student's U.T. Dallas email address and that faculty and staff consider email from students official only if it originates from a UTD student account. This allows the university to maintain a high degree of confidence in the identity of all individual corresponding and the security of the transmitted information. UTD furnishes each student with a free email account that is to be used in all communication with university personnel. The Department of Information Resources at U.T. Dallas provides a method for students to have their U.T. Dallas mail forwarded to other accounts.

Withdrawal from Class

The administration of this institution has set deadlines for withdrawal of any college-level courses. These dates and times are published in that semester's course catalog. Administration procedures must be followed. It is the student's responsibility to handle withdrawal requirements from any class. In other words, I cannot drop or withdraw any student. You must do the proper paperwork to ensure that you will not receive a final grade of "F" in a course if you choose not to attend the class once you are enrolled.

Student Grievance Procedures

Procedures for student grievances are found in Title V, Rules on Student Services and Activities, of the university's *Handbook of Operating Procedures*.

In attempting to resolve any student grievance regarding grades, evaluations, or other fulfillments of academic responsibility, it is the obligation of the student first to make a serious effort to resolve the matter with the instructor, supervisor, administrator, or committee with whom the grievance originates (hereafter called "the respondent"). Individual faculty members retain primary responsibility for assigning grades and evaluations. If the matter cannot be resolved at that level, the grievance must be submitted in writing to the respondent with a copy of the respondent's School Dean. If the matter is not resolved by the written response provided by the respondent, the student may submit a written appeal to the School Dean. If the grievance is not resolved by the School Dean's decision, the student may make a written appeal to the Dean of Graduate or Undergraduate Education, and the dean will appoint and convene an Academic Appeals Panel. The decision of the Academic Appeals Panel is final. The results of the academic appeals process will be distributed to all involved parties.

Copies of these rules and regulations are available to students in the Office of the Dean of Students, where staff members are available to assist students in interpreting the rules and regulations.

Incomplete Grade Policy

As per university policy, incomplete grades will be granted only for work unavoidably missed at the semester's end and only if 70% of the course work has been completed. An incomplete grade must be resolved within eight (8) weeks from the first day of the subsequent long semester. If the required work to complete the course and to remove the incomplete grade is not submitted by the specified deadline, the incomplete grade is changed automatically to a grade of **F**.

Disability Services

The goal of Disability Services is to provide students with disabilities educational opportunities equal to those of their non-disabled peers. Disability Services is located in room 1.610 in the Student Union. Office hours are Monday and Thursday, 8:30 a.m. to 6:30 p.m.; Tuesday and Wednesday, 8:30 a.m. to 7:30 p.m.; and Friday, 8:30 a.m. to 5:30 p.m.

The contact information for the Office of Disability Services is:

The University of Texas at Dallas, SU 22

PO Box 830688

Richardson, Texas 75083-0688

(972) 883-2098 (voice or TTY)

Essentially, the law requires that colleges and universities make those reasonable adjustments necessary to eliminate discrimination on the basis of disability. For example, it may be necessary to remove classroom prohibitions against tape recorders or animals (in the case of dog guides) for students who are blind. Occasionally an assignment requirement may be substituted (for example, a research paper versus an oral presentation for a student who is hearing impaired). Classes enrolled

students with mobility impairments may have to be rescheduled in accessible facilities. The college or university may need to provide special services such as registration, note-taking, or mobility assistance.

It is the student's responsibility to notify his or her professors of the need for such an accommodation. Disability Services provides students with letters to present to faculty members to verify that the student has a disability and needs accommodations. Individuals requiring special accommodation should contact the professor after class or during office hours.

Religious Holy Days

The University of Texas at Dallas will excuse a student from class or other required activities for the travel to and observance of a religious holy day for a religion whose places of worship are exempt from property tax under Section 11.20, Tax Code, Texas Code Annotated.

The student is encouraged to notify the instructor or activity sponsor as soon as possible regarding the absence, preferably in advance of the assignment. The student, so excused, will be allowed to take the exam or complete the assignment within a reasonable time after the absence: a period equal to the length of the absence, up to a maximum of one week. A student who notifies the instructor and completes any missed exam or assignment may not be penalized for the absence. A student who fails to complete the exam or assignment within the prescribed period may receive a failing grade for that exam or assignment.

If a student or an instructor disagrees about the nature of the absence [i.e., for the purpose of observing a religious holy day] or if there is similar disagreement about whether the student has been given a reasonable time to complete any missed assignments or examinations, either the student or the instructor may request a ruling from the chief executive officer of the institution, or his or her designee. The chief executive officer or designee must take into account the legislative intent of TEC 51.911(b), and the student and instructor will abide by the decision of the chief executive officer or designee.

These descriptions and timelines are subject to change at the discretion of the Professor.