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## *Molecular Genetics*

Biology 304X – Spring 2007  
Class Meetings: Tuesdays and Thursdays  
Meeting Time: 08:30–09:45 AM  
Thomas Beam Engineering Complex (TBE) A107

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### INSTRUCTOR

#### **Dr. Andrew Andres**

Office: Juanita Greer White Hall (WHI), Room 212  
Office hours: after class = T, Th 10:00 AM–11:30 AM; also by appointment through e-mail

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### COURSE DESCRIPTION

#### **Course Description/Purpose:**

BIOL 304x is primarily intended for biological-sciences majors interested in obtaining a broad background in molecular biology. This course is designed to cover the basic principles of molecular genetics including topics in the following areas: Structure/function of genes, genome organization, protein synthesis, regulation of gene expression, chromatin structure, epigenetic effects, and genetic engineering. Enrollment requires attendance of two 75-minute lectures per week totaling 3 credits.

BIOL 304x is an intensive course in which students must acquire a firm conceptual understanding of several basic principles. The content has been standardized by the Integrative Cell Biology and Microbiology affinity group within the School of Life Sciences. Thus, it must provide the necessary foundation for the majority of the upper division courses in this major area, and to be on par with similar introductory courses at major Universities in the US. The course material is very straight forward, but because of the breath of material covered, the pace is demanding. For that reason it is essential that the student be adequately prepared for this class and that he/she allot sufficient time for study. **It is strongly suggested that students complete the relevant text readings prior to attending class. When preparing for lectures/exams and allocating study time, consider the following:**

- Student-faculty contact in and out of class is an important factor in student motivation/involvement/success. In other words, don't be afraid to ask questions in class and during office hours—you will learn more!

- According to education researchers, we learn only about 50% of what we read, hear, and see (equivalent to reading the textbook and attending lecture). The most effective learning strategy involves talking to the instructor and classmates about what you've learned from the lecture and the text, writing about it, relating it to past experiences and applying it to your daily lives.
- A full-time course-load is a full-time job that requires 40 or more hours per week. This class represents about 1/4 of a full course load, and thus requires that you set aside about 10-15 hours per week to attend lectures, read the text, meet with study groups, transcribe class notes, and STUDY those notes.

This class will emphasize a conceptual understanding of several biological phenomena. Successful completion of this course will require the ability to think logically and to apply basic chemical, physical, and mathematical principles to an understanding of how genes function at the molecular level.

**Prerequisites:**

Biology 196 or equivalent or permission of instructor.

**Required Class Materials:**

- 1) *Essential Genes* (1st edition, 2006), by Benjamin Lewin. Available at the UNLV bookstore.
- 2) An **i-clicker™** Remote. Available at the UNLV bookstore (be sure to buy the remove for the i-clicker system, other remotes are not compatible with this system).

**Suggested Class Materials:**

- 1) *The Strongest Boy in the World: How Genetic Information is Reshaping Our Lives* (1st edition, 2006), by Philip Reilly. Available new and used from online booksellers.

**Course Web Site:**

linked from <http://biology.unlv.edu/faculty/andres.html>

**COURSE POLICIES**

**Lecture exams:**

Three lecture exams will consist of 20 multiple-choice questions and 20 short answers. These exams will be based upon lecture material reinforced from readings in the text. A **comprehensive final** will be given during finals week: 40 questions will be derived from the

last quarter of the class, and 20 questions derived from earlier material. Study guides will be provided to aid students in preparing for lecture exams.

Attendance at exams is **absolutely required**, and an absence will result in a **ZERO** for that exam. Only two exceptions are provided: (1) The student provides the instructor with written notification **PRIOR** to the exam for religious holidays and **Official** extracurricular activities (see below). (2) The student provides written documentation of his/her absence on **official letterhead** by a **physician or legal authority** within one week of the missed exam date. With excused absences, a missed exam will be dealt with by assigning a score for the missed exam that is equal to the average of the other three lecture exams. Students who miss an exam without being excused are encouraged to drop the class, since it is almost mathematically impossible to pass the course when a zero has been added as one exam grade. However, before doing so, please make an appointment with the instructor concerning the circumstances of the absence. Regardless of circumstances, a student who misses more than one exam during the term will have to drop the class or earn a failing grade for the course. Additionally, a student who misses the final exam will earn a failing grade or an incomplete if the final exam is missed due to a documented absence (see above). Finally, remember it is the student's responsibility to physically drop the class. A failure to attend lectures and exams does not result in an administrative drop. Failure to drop a class usually results in an "F" on the student transcript.

### **Computer Accounts and Class Notes:**

Class outlines and Study guides for the lecture exams will be available online at the instructor's web page (linked from <http://biology.unlv.edu/faculty/andres.html>) as will the course syllabus and lecture schedule. All students will need online access to view the materials on the BIOL 304x website. In addition, the class outlines will be available **only** in PDF format. Computer accounts may be acquired for free upon request at any of the computer labs on campus. Basic computer training is available in the library computer labs. Computer lab locations are:

Beam Hall, rooms 114-116  
Main Library, First Floor

CBC Building, Room B133  
Carlson Education Building, Room 309

### **Grading:**

Final grades are based on the combined numerical scores from lecture exams. Letter grades will not be assigned to individual examinations. To evaluate your performance as the semester progresses, the following cutoffs can be used: 90% for A, 80% for B, 70% for C, 60% for D, 59% or below for F. **Note that these cutoffs are based on past performances of the class and are subject to change at the discretion of the instructor. In the past, final grades have not drastically differed from these cutoffs.**

**Remember that early drop deadline is January 22, 2007 at 5:00 PM.**

**Late drop deadline is March 30, 2007 at 5:00 PM**

### **Grade distribution:**

3 lecture exams = 67%  
1 final exam = 33%  
100%

### **Class Attendance of Lectures:**

Attendance of the lecture classes strongly advised. Past experiences have demonstrated that there is a very high degree of correlation between students who do well (receive As or Bs) in the course with those who attend the lecture classes. Lecture exams will be based almost entirely on the material presented in class. The required reading of the textbook is designed to clarify concepts in class and provide more background. Most lectures will follow the book closely, but often newer and more relevant material will be provided in class that is not available in the book. **Download the outlines, come to class, and take good notes!** As an added incentive, students who attend lectures will be provided with complete lecture notes via e-mail and a maximum of 5 points can be added to the final grade if they attend all lectures. Class roll call will be conducted through the i-clicker™ system. Students must have to have access to an MS-Powerpoint application and a valid UNLV e-mail account to receive complete notes.

### **Class Courtesies:**

As your instructor I want you to do well in this class and I will do everything I can to help you. Please visit my office hours or make an office appointment if you are having trouble comprehending the course material or studying for exams. These problems can often be corrected and will help you avoid receiving an unsatisfactory grade.

Because this class encompasses so much material, it is important that we start promptly at 8:30 AM. Please make every effort to come to class on time. If you **MUST** be late, please be considerate of your classmates when entering the room after instruction has begun. **Having a cell phone or other electronic device go off in class is extremely rude!** Please remember to turn off your gear before class starts. You do not want to be that person who disrupts the class while the instructor stops to take your call.

### **Other absentee policies:**

- 1. Observance of religious holidays:** Students who miss lecture exams or laboratory sessions because of observance of religious holidays will be allowed to make up missed work. According to UNLV policy, students are responsible for notifying the instructor by Feb 01 of their intention to participate in religious holidays that do not fall on state holidays or periods of class recess. This policy shall not apply in the event that the make-up work at an alternate time would impose an undue hardship on the instructor or the University that could not reasonably have been avoided.

2. **Official extracurricular activity:** Students who represent UNLV at any extracurricular activity shall have the opportunity to make up assignments and exams, but the student must provide official written notification to the instructor no less than one week prior to the missed class(es).

### **Disability Assistance:**

A student who has a documented disability that may require assistance will need to contact Disability Services to coordinate his/her academic accommodations. Disability Services is located within Learning Enhancement Services (LES), in the Reynolds Student Services Center (SSC), Room 137. The phone number is 895-0866 or TDD 895-0652. Additional information is available at <http://www.unlv.edu/studentlife/disability/syllabus3.html>.

### **Classroom Conduct:**

The University requires that all students behave in class and in libraries in ways that do not interfere with the right of other students to learn or of instructors to teach. Behaviors such as talking or reading newspapers or magazines during lecture, late and/or disruptive arrival, early and/or disruptive departure, or any other actions that compromise the classroom learning environment will subject first-time offenders to public reprimand, which may include some good-hearted ridicule and embarrassment. Serial offenders face stiffer consequences, which may include administrative withdrawal from the course.

### **Academic Dishonesty:**

All exams and written assignments are to be done individually. Evidence to the contrary will be deemed as academic dishonesty (=cheating, which includes plagiarism, and deceptive use of a classmate's i-clicker) and will immediately result in expulsion from the course, a grade of "F" for the entire course, and possible additional disciplinary action as outlined in the Nevada System of Higher Education document *Rules and Disciplinary Procedures for Members of the University Community*. The instructor maintains a zero-tolerance policy on academic dishonesty, which is a very serious offense that will be treated as such. Additional information regarding UNLV's policies on academic dishonesty can be found in the *Fall 2006 - Spring 2008 Undergraduate Catalog* in the section "Student Academic Misconduct Policy" (page 63). This policy can also be found online at <http://www.unlv.edu/pubs/catalogs/undergraduate/pdf/main/acadpol.pdf>.

The following actions are examples of academic dishonesty:

- Copying graded homework.
- Working together on a take-home test or homework when specifically prohibited by the professor.
- Looking at another student's paper during an exam.
- Logging in using another student's i-clicker
- Looking at your notes when prohibited.

- Taking an exam out of the classroom (either in person or by using electronic means) when prohibited.
- Giving your work to another person to be copied.
- Giving someone answers to exam questions during the exam.
- After taking an exam, informing a person of questions that appeared on the exam.
- Giving or selling a term paper or class work to another student.
- Copying homework answers from a textbook and handing them in for a grade.
- Quoting text or other works on an exam, term paper or homework without citing the original source.
- Handing in a paper purchased from a term paper service or from the Internet.
- Handing in another person's paper as your own.
- Taking a paper from an organization's files and handing it in as your own.
- Passing information from an earlier class to a later class.
- Having someone take your test for you.
- Changing a graded paper and requesting that the paper be regraded.
- Transferring a computer file from one person's account to another.

Plagiarism can take several forms. The most obvious form of plagiarism is the purchase of prepared papers from commercial term paper companies and the submission of such papers as one's own work.

A second obvious form of plagiarism is a word-for-word copying of someone else's work, in whole or in part, without appropriate acknowledgment, whether that work be a magazine article, a portion of a book, a newspaper piece, another student's paper, or any other composition not your own. Any such verbatim use of another's work must be acknowledged by (1) appropriate indentation or enclosing all such copied portions in quotation marks, and by (2) giving the original source in a footnote or in the *Literature Cited* section of the paper. As a general rule, you should make very little use of directly quoted matter in your research paper. If you do not know how to cite references properly, ask your instructor for guidance.

Every student will be held responsible for reading and understanding the following statement.

To submit to your instructor a paper or comparable assignment that is not truly the product of your own mind and skill is to commit plagiarism. To put it bluntly, plagiarism is the act of stealing the ideas and/or expression of another person and misrepresenting them as your own. It is a form of cheating and a kind of scholastic dishonesty, which can incur severe penalties. It is important, therefore, that you understand what constitutes plagiarism, so that you will not unwittingly jeopardize your college career.

### **Copyright and Fair Use Laws:**

The University requires all members of the University community to familiarize themselves with, and to follow copyright and fair use requirements. **YOU ARE INDIVIDUALLY AND SOLELY RESPONSIBLE FOR VIOLATIONS OF COPYRIGHT AND FAIR USE LAWS. THE UNIVERSITY WILL NEITHER PROTECT NOR DEFEND YOU NOR ASSUME ANY RESPONSIBILITY FOR EMPLOYEE OR STUDENT VIOLATIONS OF FAIR USE LAWS.**

Violations of copyright laws could subject you to federal and state civil penalties and criminal liability, as well as to disciplinary action under University policies. To familiarize yourself with copyright and fair use policies, the University encourages you to visit its copyright website at <http://www.unlv.edu/committees/copyright> .

### **Sexual Harassment:**

It is the policy of UNLV to maintain the university community as a place of work and study for staff, faculty, and students free of sexual harassment and all forms of sexual intimidation and exploitation. The determination of what constitutes sexual harassment will vary with the particular circumstances, but it may be described generally as repeated and unwanted sexual behavior, such as physical contact and verbal comments or suggestions that adversely affect the working or learning environment. Anyone who is subjected to offensive sexual behavior is encouraged to pursue the matter through the Office of Diversity Initiatives (Tel. 895-3891). Contacts are confidential.

### **Dangerous Weapons:**

Dangerous weapons are not permitted on campus without the express written approval of the Director of the Office of Public Safety. This policy applies to all persons on the UNLV campus, except law enforcement officers in pursuit of their duties. Facsimile weapons are also banned.

## BIOL 304x COURSE CONTENT AND MEETING TIMES

Meeting Date		Class and Topic	Text Readings Chapter; Pages
Tues	Jan 16	SYLLABUS/CLASS INTRO	
Thurs	Jan 18	1.1: DNA STRUCTURE	1; 1-22
Tues	Jan 23	1.2: THE CONCEPT OF THE GENE	2-3; 23-53
Thurs	Jan 25	1.3: GENOME ORGANIZATION I	4-5; 54-80
Tues	Jan 30	1.4: GENOME ORGANIZATION II	5-6; 81-112
Thurs	Feb 01	1.5: mRNA STRUCTURE FUNCTION	7; 113-133
Tues	Feb 06	1.6: OVERVIEW OF PROTEIN SYNTHESIS	8; 134-161
Thurs	Feb 08	2.1: THE GENETIC CODE AND PROTEIN LOCALIZATION	9-10; 162-193
Tues	Feb 13	<b>EXAM I (covers 1.1 through 1.6)</b>	---
Thurs	Feb 15	2.2: TRANSCRIPTION	11; 194-221
Tues	Feb 20	2.3: BACTERIAL OPERONS	12; 222-242
Thurs	Feb 22	2.4: REGULATORY RNA/PHAGE STRATEGIES	13-14; 243-279
Tues	Feb 27	2.5: REPLICON STRUCTURES	15-16; 280-302
Thurs	Mar 01	2.6: CELL CYCLE/DNA REPLICATION	17-18; 303-333
Tues	Mar 06	<b>EXAM II (covers 2.1 through 2.6)</b>	---
Thurs	Mar 08	3.1: RECOMBINATION: HOMOLOGOUS and SITE SPECIFIC; IMMUNE GENE REARRANGEMENTS	19;334-355 23;409-428
Tues	Mar 13	<b>SPRING BREAK ---NO CLASS</b>	---
Thurs	Mar 15	<b>SPRING BREAK ---NO CLASS</b>	---
Tues	Mar 20	3.2: DNA REPAIR	20; 356-371
Thurs	Mar 22	3.3: TRANSPOSABLE ELEMENTS	21; 372-391
Tues	Mar 27	3.4: RETROVIRUSES AND RETROPOSONS	22; 392-408
Thurs	Mar 29	3.5: PROMOTERS AND ENHANCERS	24; 429-448
Tues	Apr 03	3.6: REGULATING EUKARYOTIC TRANSCRIPTION	25; 449-467
Thurs	Apr 05	3.7: RNA SPLICING AND PROCESSING	26; 468-489
Tues	Apr 10	<b>EXAM III (covers 3.1 through 3.7)</b>	---
Thurs	Apr 12	4.1: CATALYTIC RNA	27; 490-506
Tues	Apr 17	4.2: CHROMOSOMES	28; 507-525
Thurs	Apr 19	4.3: NUCLEOSOMES	29; 526-549
Tues	Apr 24	4.4: CHROMATIN STRUCTURE	30; 550-564
Thurs	Apr 26	4.5: EPIGENETIC EFFECTS	31; 565-580
Tues	May 01	4.6: GENETIC ENGINEERING	32; 581-594
Thurs	May 03	4.7: MOLECULAR GENETICS OF CANCER	HANDOUT
<b>Thurs</b>	<b>May 10</b>	<b>FINAL EXAM, (covers 4.1 through 4.7 + comprehensive material), 8:00-10:00 AM TBE A107 (NOTE CHANGE IN TIME)</b>	