BIOL 3024 - GENERAL GENETICS - FALL 2005

Instructors: Ron Van Den Bussche, Department of Zoology, 411 LSW; x49679; ravdb@okstate.edu
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Assistant: Deanna Martinez, Department of Zoology, 422 LSW; deanna.martinez@okstate.edu
Office Hours: T, Th 10:30 – 11:30 am; W 1:00 – 2:00 pm or by appointment.

Lectures: MTWTHF 9:30-10:20, AGH 108. Includes optional review and problem sessions

Textbook: Concepts of Genetics, 7th Edition, by Klug and Cummings. Prentice Hall. 2003.
Optional Supplement to textbook: Student Handbook by Harry Nickla. Prentice Hall 2003.

WebPage: www.okstate.edu/artsci/zoology/ravdb/3024.htm This web page will be modified throughout the semester

Calendar: A tentative schedule is shown below. Lecture topics may vary slightly but exams will be given on the dates listed. Lectures are presented by Van Den Bussche (V) or Meinke (M).

Month	Date	Day	V/M	Chapter	General Topic of Lecture
Aug	22	M	V/M	1	Introduction,
	23	T	V	2	Mitosis & Meiosis
	24	W	V	3	Basic Mendelian Genetics
	25	Th	V	3	Basic Mendelian Genetics
	26	**F**	**V**	**-**	**OPTIONAL REVIEW**
Aug	29	M	V	4	Alleles, Gene Interactions
	30	T	V	4	Sex Linkage & Sex Influenced Inheritance
	31	W	V	4	Gene Interactions
Sept	**1**	**Th**	**V**	**-**	**PROBLEM SESSIONS 1 & 2**
	2	**F**	**V**	**-**	**Exam I**
Sept	**5**	**M**	**V**	**-**	**University Holiday – No Class**
	6	T	V	6	Linkage, Chromosome Mapping
	7	W	V	6	Linkage, Chromosome Mapping
	8	Th	V	6	Linkage, Chromosome Mapping
	9	**F**	**V**	**-**	**OPTIONAL REVIEW**
Sept	12	M	V	6	Linkage, Chromosome Mapping
	13	T	V	6	Linkage, Chromosome Mapping
	14	W	V	6	Linkage, Chromosome Mapping
	15	Th	V	6	Advanced Transmission Genetics
	16	**F**	**V**	-	**PROBLEM SESSION #3**
Sept	**19**	**M**	**V**	**-**	**EXAM II**
	20	T	V	7	Sex Determination
	21	W	V	7	Dosage Compensation
	22	Th	V	8	Aneuploidy, Polyploidy, Deletions, Duplications
	23	F	V	8	Inversions & Translocations
Sept	26	M	V	25	Population Genetics
	27	T	V	25	Population Genetics
	28	W	V	27	Conservation Genetics
	29	Th	V	27	Conservation Genetics
	30	F	V	27	Conservation Genetics
Oct	**3**	**M**	**V**	**-**	**PROBLEM SESSION #4 & 5**
	4	**T**	**V**	**-**	**EXAM III**
	5	W	M	9	Chemical Nature of Genetic Material
	6	Th	M	9	Chemical Nature of Genetic Material
	7	F	M	9	Structure & Analysis of Nucleic Acids
Oct	10	M	M	9	Structure & Analysis of Nucleic Acids
	11	T	M	10	DNA Replication
	12	W	M	10	DNA Replication

	13	Th	M	11	DNA Organization in Chromosomes
	14	**F**	**M**	11	DNA Organization in Chromosomes
Oct	**17**	**M**	**M**	**-**	**FALL BREAK**
	18	**T**	**M**	**-**	**FALL BREAK**
	19	**W**	**M**	**-**	**PROBLEM SESSION #6**
	20	**Th**	**M**	**-**	**EXAM IV**
	21	F	M	12	Transcription: RNA Synthesis
Oct	24	M	M	12	Transcription: RNA Synthesis
	25	T	M	12	Overview of Genetic Code
	26	W	M	12	Overview of Genetic Code
	27	Th	M	13	Translation
	28	F	M	**-**	**Optional Review**
	31	M	M	13	Genes & Proteins
Nov	1	T	M	13	Genes & Proteins
	2	W	M	**-**	Mutations & Mutant Alleles
	3	**Th**	**M**	**-**	**PROBLEM SESSION # 7**
	4	**F**	**M**	**-**	**EXAM V**
Nov	7	M	M	16	Bacterial Genetics
	8	T	M	16	Bacterial Genetics
	9	W	M	16	Bacterial Genetics
	10	Th	M	16	Phage Genetics
	11	**F**	**M**	**-**	**REVIEW -- OPTIONAL**
Nov	14	M	M	17	Phage Genetics
	15	T	M	17	Gene Regulation in Prokaryotes
	16	W	M	17	Gene Regulation in Prokaryotes
	17	Th	M	17	Gene Regulation in Prokaryotes
	18	F	M	17	Gene Regulation in Prokaryotes
Nov	**21**	**M**	**M**	**-**	**PROBLEM SESSION # 8 & 9**
	22	**T**	**M**	**-**	**EXAM VI**
	23	**W**	**M**	**-**	**Optional Review**
	24	**Th**	**-**	**-**	**THANKSGIVING BREAK**
	25	**F**	**-**	**-**	**THANKSGIVING BREAK**
Nov	28	M	M	18	DNA Cloning and Manipulation
	29	T	M	18	DNA Cloning and Manipulation
	30	W	M	18	DNA Cloning and Manipulation
Dec	1	TH	M	18	DNA Cloning and Manipulation
	2	F	M	19	DNA Cloning and Manipulation
Dec	**5**	**M**	**M**	**-**	**PROBLEM SESSION #10**
	6	T	V	-	Applications & Ethics of Genetic Technology
	7	W	V	-	Applications & Ethics of Genetic Technology
	8	Th	V	-	Applications & Ethics of Genetic Technology
	9	F	V	-	Applications & Ethics of Genetic Technology
Dec	**14**	**W**	**V/M**	**-**	**COMPREHENSIVE FINAL 8:00 – 9:50 A.M.**

IMPORTANT DATES:

Monday, August 29 – Last day to drop a course with no grade and no fees
Friday, September 2 – Last day to add a course (restrictive – requires instructors signature)
Friday, November 11 – Last day to drop a course (Grade of "W")
Friday, December 2 – Last day to withdraw from ALL courses with "W" or "F"

BIOL 3024 - GENERAL GENETICS - COURSE INFORMATION

INTRODUCTION:

The purpose of this course is to introduce biological science majors to the principles of classical and molecular genetics. Topics of discussion include: the molecular structure and function of the genetic material, the nature of gene interactions, methods of linkage assignment and gene mapping, variation in chromosome number and structure, RNA and protein synthesis, the nature of mutations, the regulation of gene expression, the manipulation of recombinant DNA molecules, and the genetics of populations.

Genetics is one of the most fascinating but demanding disciplines in modern biology. Over the past 50 years, we have learned much about how information stored within a gene is used to control a wide range of cell functions. In order to understand and appreciate these remarkable advances and their impact on human societies, students must be prepared to dedicate considerable time and effort to mastering the basic principles, underlying logic, and detailed terminology of modern genetics. Students willing to make this investment of time and effort will have the opportunity to gain a unique perspective on the molecular basis of life.

OVERVIEW OF COURSE:

This class has traditionally been taught by two professors, one from Botany and the other from Zoology. Your instructors are Dr. Ronald Van Den Bussche (Zoology) and Dr. David Meinke (Botany). Dr. Van Den Bussche is a conservation geneticist/molecular systematist with research interests in mammalian evolution and wildlife biology. Dr. Meinke is a molecular geneticist and works on developmental genetics of *Arabidopsis*. Grading is based on six hourly exams (100 points each), assigned homework problems (100 points), and a comprehensive final exam (150 points). Exams will definitely be given on the dates shown on the attached schedule. The final exam percentage can replace the lowest score on the six hourly exams. The final exam score may therefore be counted twice. A curve may be used to adjust grades slightly at the end of the semester.

BASIC EXPECTATIONS:

Students are expected to attend class regularly, read assigned chapters in the text book, review lecture notes well in advance of scheduled examinations, turn in homework problems on time, ask questions when they do not understand the material, and be enthusiastic about learning the basic principles of genetics.

EXAMS:

All exams will consist of a mixture of short answers, short essays, and problem solving questions. Make-up tests will not be given. Students with an excused absence from an exam can replace that score with the score on their final exam. Extra credit questions may be included on some exams.

GRADING POLICY:

The total number of points earned by each student will be calculated at the end of the semester. The maximal number of points will be 850 (600: hourly exams; 150 final exam: 100 homework). A percent score of 90 - 100 = A, 80 - 89 = B, 70 - 79 = C, 60 - 69 = D, and below 60 = F. Scores may be curved up slightly at the end of the semester (i.e., 89% may turn out to be an A) but never will they be curved down (i.e., 90% will always be an A). *If attendance and enthusiasm remain high throughout the semester, we may drop the C/D boundary down to 65% to encourage more students to remain in the class and graduate with a final grade of C rather than be forced to repeat the class after receiving a D.* Each professor will utilize a system of partial credit for answers to exam questions that attempts to be fair to all students in the class. Answers must be accurate, complete, and clearly stated in order to receive full credit.

HOMEWORK PROBLEMS:

Each professor will hand out selected problems at different times throughout the semester. Answers to these problems must be turned in by the deadline. Late papers will not be given credit. Students can work together to solve these problems, but the answers must be written by each individual. Each answer will typically be worth 1 point. The cumulative score on homework problems cannot be replaced by the score on the final exam.

PROBLEM/REVIEW SESSIONS:

The optional sessions are designed to assist students with problems and questions. The format will be informal and run by the teaching assistant. New lecture material will not be presented. Assigned problems will be solved in class after they have been turned in for grading. Some sessions will include a review of topics for the next exam. Please come prepared to ask questions and remember that these optional sessions have been added to the schedule to provide assistance, not simply to increase the number of lecture periods.

GENERAL POLICY:

This is an upper division course for biological science majors. Students are expected to attend class regularly except in case of illness or family crisis. The University policy and deadlines for dropping this class are summarized on the attached schedule. Academic dishonesty of any type will not be tolerated. Students suspected of cheating on exams may receive either a "0" for that exam (and not be given the option to replace that score with the final exam), or in the most blatant cases, be given an "F" for the course. Students who repeatedly glance at their neighbor's exam in class will first be warned with a note and then given a "0" for the exam if the pattern continues. Please remember that your neighbor is an unreliable source of information during examinations.

DIFFICULTIES:

The professors of this course really do want you to master the fundamentals of genetics. Please find the courage to ask questions when you do not understand the material. But also remember that the best way to succeed in this class is to keep up with the lecture notes, reading, and homework problems.

Genetics is a beautifully logical discipline of science. Your challenge this semester is to understand and appreciate the logic. Our job as professors is to be your guide on this journey. Good Luck!

AUTOBIOGRAPHIES:

One thing that often happens in large universities is that instruction tends to become depersonalized. With relatively large classes, professors find it difficult to know each of their students personally, and students have little appreciation for what their professors do outside of class. In an attempt to minimize this problem, we have included some autobiographical materials on the following page to tell you a little about ourselves, our educational history, personal interests, and research expertise. In return, we ask that you fill in the information requested on the last pare and write a brief autobiography telling us about your background, interests, goals, and aspirations.

AUTOBIOGRAPHICAL INFORMATION

Ronald A. Van Den Bussche:

I was born in 1958 in Chicago, Illinois and am the second oldest of six children. After graduating from high school in 1977, I attended Northern Illinois University for two years after which I transferred to Eastern Kentucky University. I received a B.S. degree in Wildlife Management in 1982. I then enrolled in graduate school at Memphis State University (now the University of Memphis), where my Masters thesis was concerned with the internal parasites of coyotes. While at Memphis State University, I met another Masters student, Meredith Hamilton, whom I would marry 8 years later.

After completing our M.S. degrees, Meredith and I enrolled in the Ph.D. program at Texas Tech University. My primary interests were in mammalian molecular systematics whereas Meredith focused on mammalian chromosomal evolution. After completing our Ph.D. degrees I accepted a post-doc position at the University of Idaho and Meredith accepted a post-doc position at Los Alamos National Laboratory to work on the human genome project. After the first year in Idaho, Meredith and I married in Lubbock, Texas and Meredith accepted a post-doc position at the University of Idaho. After three years, Meredith and I moved back to Lubbock, Texas where I became a Research Associate and Meredith first worked as an administrator for a Howard Hughes grant to the Biology Department and then as a Research Associate.

We moved to Stillwater in August 1995 after I accepted a position in the Department of Zoology where I am currently a Professor. My research interests include Molecular Systematics, Phylogeography, and Conservation Genetics. Due to my research interests, I have been fortunate enough to be able to conduct fieldwork throughout North America, Puerto Rico, Mexico, Honduras, Peru, Argentina, Ukraine, and Russia. Additionally, due to my research on bats, I have been fortunate to attend the International Bat Meetings in Poland during 2004, spent three weeks in Warsaw, Poland during January 2005 on a Fulbright Fellowship isolating DNA from fossil bats, and this August, I will be attending the European Bat Meetings in Galway, Ireland. If you would like to learn more about my research program, you can look at my web page at www.okstate.edu/artsci/zoology/ravdb

My interests outside of science include training and competing with my golden retrievers GMHR RockErin's Private Dancer MH("Tina"), and DFR RockErin's Bodacious Cowgirl ("Boadie") in field trial, field tests, and bird hunting. Meredith also has a golden retriever named Skeeter, and an Irish Setter named Gypsy In addition to our dogs, Meredith and I have 6 cats, a cockatiel, and chickens.

David Meinke

I was born in 1952 in Ann Arbor, Michigan, where my father was a professor in the Department of Chemistry at the University of Michigan. I left Ann Arbor at the end of elementary school and moved to Bethesda, Maryland, a suburb of Washington, D.C. Much of my spare time in high school was spent pursuing my interests in music. I became a serious clarinet player and spent two memorable summers at the National Music Camp in Interlochen, Michigan.

I received my undergraduate education from the College of Wooster, a liberal arts school in Ohio with a strong tradition in music and natural sciences. I decided to major in chemistry and graduated in spring of 1974. Along the way I met a geology major named Deborah, and we were married in the fall of 1973. Together we moved to Connecticut in 1974 to pursue our graduate careers at Yale University. I settled in the laboratory of Ian Sussex, a plant developmental biologist. Deborah worked with Keith Thomson, an evolutionary biologist. We both received our Ph.D. degrees from Yale in 1979, and then moved to Washington University in St. Louis, where I worked for three years as a postdoctoral researcher in plant molecular biology.

I moved to Stillwater in 1982 after accepting a faculty position at Oklahoma State University. I am currently a Regents Professor in the Department of Botany. During the 1998-99 academic year, I served as a Program Director for Plant Genome Research at the National Science Foundation in Arlington, VA. I have traveled extensively to present talks at scientific meetings throughout Europe and Asia. Deborah worked for a number of years as an instructor and academic advisor for the College of Arts and Sciences. Last year she completed a career change and received a Masters of Divinity from Phillips Theological Seminary in Tulsa. She is currently the pastor of a small Presbyterian church in Grove, OK, located on Grand Lake in northeastern Oklahoma. Together we attempt to educate people outside the university on the relationship between science and religion, particularly with respect to evolution and stem cell research. We have two grown children. Laura is a senior at Macalester College in St. Paul, MN. Scott is a sophomore at American University in Washington, D.C. Neither of them decided to major in biology. Laura is pursuing a degree in geography and Scott has expressed an interest in art history.

The purpose of my research program is to identify large numbers of genes with essential functions during plant embryo development. Many years ago I chose to work with a simple plant in the mustard family known as *Arabidopsis*. My approach was to isolate embryo-defective mutants, characterize the abnormal pattern of seed development in these mutants, and use this information to learn more about the genetic control of embryogenesis. Over the past 15 years, *Arabidopsis* has become the model system of choice for research in plant biology, particularly after publication of the complete genome sequence in December, 2000. More than 10,000 scientists worldwide are now using *Arabidopsis* in their research efforts. Thus I currently find myself in the middle of a large and exciting multinational effort to isolate and characterize every gene from this model plant. If you would like to assist in this effort, I am always looking for talented new students who are genuinely interested in basic research in a laboratory environment. To learn more about *Arabidopsis*, please check out the international database at www.arabidopsis.org. My research web page (www.SeedGenes.org) presents additional details on my current research program.

STUDENT INFORMATION -- BIOL 3024 – FALL 2005

Name:_____ Age:_____

Hometown and State:_____

Classification (Senior, etc.):_____

College Major:_____

Career Goal:_____

Previous College Biology Courses:

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Why are you taking this course?

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Are you currently working in a research laboratory on campus? If so, which one and on what topic?

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On the back of this page, please write a brief autobiography that includes a description of your background, interests, and aspirations.