BIOLOGY 3030
Molecular Genetics
SPRING 2015

INSTRUCTOR: David W Jones, Assistant Professor
Office: Science Building 102
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Office Hours: 0900-0950 MTWR or by appointment

Lecture: MTWR 0900-1050/ SCI 109

Course Description:
Genetic systems are the defining hallmark of life on earth. The processing and transmission of genetic information guide life from the seemingly mundane tasks of the cell to the behavior of organisms to the intricacies of evolution. This course will investigate the fundamental machinations of the genetic material in detail. In addition, this course will include in-depth discussions of our ability to engineer these systems *in vitro* from a technical perspective, as well as, the ethical consequences of our actions.

Biology 3030 is intended for science majors and is a core requirement for the baccalaureate degree in biology offered by the Department of Biology at Dixie State University. The material presented is an attempt to represent the basics of our current understanding of molecular genetic mechanisms. Because of the complex nature of genetic systems and the highly technical research required for the science, this course will be advanced sand intellectually rigorous. This course qualifies as 'upper division' and it is my intention that the class work will extend beyond normal instructor/student transaction. Your participation during the class will be necessary to ensure your personal comprehension and success of the class as a whole.

Course Objectives:
- To know and appreciate DNA's principle position in all biological systems.
- To know and understand the structure and function of the gene.
- To know the primary mechanisms of regulating gene expression.
- To recognize the technologies of genetic analyses.
- To understand the mechanisms of transmission genetics at the individual and population levels.

Biology Program Goals and Student Learning Outcomes:

As a Core Requirement of the Bachelor's of Science (B.S.) in Biology, BIOL 3030 is intended to reinforce basic concepts of the biological sciences by meeting the following Program Goals:

- **Goal 1: Demonstrate breadth of discipline-specific knowledge**
  - **Outcome 1: Students will describe and explain fundamental topics in five principal perspectives of biology:**
    1. **The chemical and molecular machinations operating within all biological processes**
    2. **The centrality of genetic systems' governance of life's actions from the cellular to the phyletic**

3. The coordinated regulation of integrated cellular systems and their effect on the physiological functioning of organisms

4. The dynamic interaction of living systems with each other and their environments

5. The transforming role of evolution in changing life forms and how evolution explains both the unity and diversity of life

- Goal 2: Demonstrate the capacity to think independently and critically
  - Outcome 2: Students will employ scientific methods to acquire, analyze and apply knowledge of biological phenomena.
  - Outcome 3: Students will evaluate scientific ideas and information while maintaining receptivity to potential alternative predications.

- **Goal 3: Effectively convey scientific literacy through various mediums of communication**
  - **Outcome 4: Reading Comprehension: Students will analyze and critique scientific literature: identifying hypotheses, critiquing methods, interpreting data and results, and articulating the context of discussions.**
  - **Outcome 5: Written Communication: Students will produce well-written reports and/or research papers covering topics in biology. These papers will be presented in the accepted formats of scientific research articles.**
  - Outcome 6: Oral Presentation: Students will publicly present scientific information covering specific topics in the biological sciences. Presentations will adequately communicate data and information in a clear and logical format.

    1. explain and apply major concepts of a view of life, the cell, and the genetic basis of life,
    2. demonstrate knowledge of the process of science including asking testable questions, using inductive and deductive reasoning in forming hypotheses and in making reliable predictions,
    3. explain the objective of science and research including distinguishing among the natural sciences, liberal arts (humanities and fine arts), social and behavioral sciences and pseudo-science,
    4. compute ratios, proportions, percentages, decimals, fractions, frequencies and elementary probabilities.

Student Learning Outcomes will be assessed at the course-level through a series of Take-home examinations comprised of large essay questions and/or small written reports.

Answers are awarded points based on 1) factuality of content and 2) evidence of comprehension (i.e. integrating presented material with concepts/ideas from other sources).

Successfully answering questions indicate that students were capable of retrieving and comprehending scientific literature.

Grading Policy/Evaluation:

MIDTERM I	150
MIDTERM II	150
MIDTERM III	150
FINAL EXAM	150
TOTAL	600

540 – 600	A- - A	(>93%)
480 – 539	B- - B+	
420 – 479	C- - C+	
360 – 419	D- - D+	
<359	F	

Prerequisites:
BIOL 1610 and BIOL 1620

Course Text:
There will be **NO** required text for this BIOL 3030 section.

However, the instructor strongly recommends that you acquire a relatively current 'molecular biology' textbook. These can be found online as electronic or paper editions.

In addition, other recommended readings that may/may not be directly applicable too this course but provide important intellectual exercises as you become mature students of biology include –

The River out of Eden	Richard Dawkins
The Selfish Gene	Richard Dawkins
The Agile Gene	Matt Ridley
Coming to Life	Chritiane Nusslein-Volhard
Evolution in Four Dimensions	Eva Joblonka and Marion Lamb
What is Life?	Addy Pross

Any and all other material will be provided by the instructor.

Attendance:
Daily attendance records will not be taken but your performance in this course (as in all course) is directly proportional to your level of attendance. In addition, your participation in class discussions will be considered when calculating your final grades. This is not intended as a negative sanction for a poor attitude but to encourage you to become an engaged and active participant in your own education. The educational process is enriched by the addition of pertinent questions and spontaneous comments.

Cell phones:
Academics are fundamentally an exercise in dialogue and discourse. Constantly communicating with others outside of the discussion dilutes your ability to participate and suggests a lack of 1) intellectual focus and 2) basic manners. It is today's most ubiquitous display of 'bad home raising'.

Requirements:

1. Students are expected to abide by the rules and regulations outlined in the Student Handbook.
2. Any additional information will be announced by your instructor. Your instructor retains the right to change policy at any time for any reason he deems valid.

Academic Misconduct:
Academic honesty is expected and required in all classes. All incidents of academic misconduct will result in a grade of ZERO and the Chair of the Department will be notified so that University policy will be enforced which may result in expulsion.

From DSU *Policies and Procedures Manual Section 3-34*

3-34 ACADEMIC DISCIPLINE
34.1 Cheating: Academic dishonesty in any form will not be tolerated at Dixie State University, including but not limited to **plagiarism on written assignments, submitting other person's work as one's own, and cheating on exams or quizzes** (*emphasis added)***.** Teachers at Dixie State College may discipline students proven guilty of academic dishonesty by:
34.1.1 Giving a failing grade on the specific assignment where dishonesty occurred,
34.1.2 Failing the student in the entire course,
34.1.3 Immediately dismissing and removing the student from the course, and/or
34.1.4 Referring the student to Student Affairs, a committee which may reprimand, place on probation, suspend, and/or expel the student

Dmail: You are required to frequently check your Dmail account. Important class and university information will be sent to your Dmail account, including DSU bills, financial aid/scholarship notices, notices of canceled classes, reminders of important dates and events, and other information critical to your success in this class and at DSU. If you don't know your how to access your Dmail account, go to **Error! Hyperlink reference not valid.** and select "Dmail" from the left column. To locate your Dmail username and password, go to www.dixie.edu and click on "Login to student services" in the upper right-hand corner. You will be held responsible for information sent to your Dmail account, so please check it often.

University approved absences: Dixie State University Policy explains in detail what needs to happen if you anticipate being absent from class because of a university-sponsored activity (athletic events, club activities, field trips for other classes, etc). Please read this information

and follow the instructions carefully! The policy can be found at: http://www.dixie.edu/humanres/policy/sec5/523.html

Disability Accommodations: If you suspect or are aware that you have a disability that may affect your success in this course, you are strongly encouraged to contact the Disability Resource Center (DRC) located in the northeast corner of the North Plaza building. The disability will be evaluated and eligible students will receive assistance in obtaining reasonable accommodations. Phone: (435) 652-7516.

Classroom expectations: It is the responsibility of an instructor to manage the classroom environment to ensure a good learning climate for all students. This means that you must refrain from actions such as physical violence, verbal abuse, or harassment; intoxication or illegal drug use; use of profanity; disrespecting others when expressing their own viewpoints; talking while the instructor or another student is talking; and constant questions or interruptions that interfere with classroom presentation. An instructor may ask you to stop the inappropriate behavior, meet with you after class to discuss the problem, or involve the Dean of Students, the department chair, or campus police if necessary. Students can be removed temporarily or permanently from a course for disrupting the learning environment.

Academic integrity: In order to ensure that the highest standards of academic conduct are promoted and supported at the University, students must adhere to generally accepted standards of academic honesty, including but not limited to, refraining from cheating, plagiarizing, falsification, misrepresentation, and/or inappropriately colluding or collaborating. The University shall consistently hold students accountable for instances of academic dishonesty and apply appropriate consequences. For more information, see the Student Academic Misconduct section of DSU policy at http://dixie.edu/humanres/policy/sec5/533.html#appeals

Campus resources: Several campus resources are available to help you succeed. Check out the links for each one to get more information.

> If you need help understanding the content of your courses, go to the **Tutoring Cente**r located on the 4th floor of the Holland Centennial Commons in Room 431. You can visit them online at http://www.dixie.edu/tutoring/
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> If you need help writing papers, essays, etc go to the **Writing Center** on the fourth floor of the Holland Centennial Commons in room 421. You can also visit them online at http://dixiewritingcenter.com/
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> If you need to use a **computer** to do schoolwork on campus, go to the Smith Computer Center or the Holland Centennial Commons on the second, mezzanine, or third floors.
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> If you are assigned to take a test in the **Testing Center**, go to the North Plaza. You can get information on their website at http://www.dixie.edu/testing/
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> The **Library** has all kinds of information and resources. Visit the Dixie State University Library on the 2nd, and 3rd floors of the Holland Centennial Commons, or go to the library website at http://library.dixie.edu/

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Tentative **Schedule of Topics**

Topic

I. Genomic Architecture

Introduction
DNA as (a) Genetic Material

Genomic Characteristics and Content

II. Faithful Replication (of an ever-changing genome)

DNA Replication

MIDTERM I

DNA Repair
Genomic Dynamism

III. The Gene Structure and Function
The Gene as Transcriptional Unit

The RNA World

Protein Synthesis – *A* Genetic Code

MIDTERM II

IV. The Regulation of Differential Gene Expression

The Paradigm of Gene Expression

Prokaryotic Gene Expression

Eukaryotic Gene Expression

MIDTERM III

FINAL EXAM **FRIDAY, MAY 1 (0930-1130)**

2015 Spring Semester

Jan 12	Classwork Starts
Jan 15	Last Day for Waitlist
Jan 16	Last Day to Add Without Signature
Jan 19	Martin Luther King Jr. Day
Jan 22	Drop/Audit Fee Begins ($10 per class)
Jan 22	Residency Application Deadline
Jan 27	$50 Late Registration/Payment Fee
Feb 2	Spring 2015 Associate's degree Graduation Application Deadline
Feb 2	Pell Grant Census
Feb 2	Last Day for Refund
Feb 2	Last Day to drop without receiving a "W" grade
Feb 4	Courses dropped for non-payment
Feb 6	Last Day to Add/Audit
Feb 16	President's Day
Mar 2	Summer 2015 Bachelor's degree Graduation Application Deadline
Mar 2	Mid-Term Grades Due
Mar 6	Last Day to Drop Individual Class
Mar 9-13	Spring Break
Mar 23	Fall Class schedule available online
Mar 23	Summer Registration open to Seniors (90+ credits)
Mar 24	Summer Registration open to Juniors (60+ credits)
Mar 25	Summer Registration open to Sophomores (30+ credits)
Mar 26	Summer Registration open to all students
Apr 1	Fall 2015 Bachelor's degree Graduation Application Deadline
Apr 10	Last Day for Complete Withdrawal
Apr 13	Fall Registration open to Seniors (90+ credits)
Apr 14	Fall Registration open to Juniors (60+ credits)
Apr 15	Fall Registration open to Sophomores (30+ credits)
Apr 16	Fall Registration open to all students
Apr 29	Classwork Ends
Apr 30	Reading Day
May 1	Final Exams
May 1	Associate's degree Graduation Deadline - Summer 2015
May 4-7	Final Exams
May 8	Commencement