Course Number                   Course Title                  Credits           Clock Hours Per Week
PCB 3063                   Principles of Genetics              4                  3 Lecture
                                                                       3 Laboratory

Department: Biology       Prerequisites: BSC1010 & BSC1011

Required Textbook:         iGenetics (A Mendelian Approach); 1st edition by Russell

Faculty Name:             Dr. Michael Anthony Thornton

thornthor@yahoo.com

Term and Year: Spring 2010

Office Location:         Jones Hall 208

Campus Telephone: 561-8093

Office Hours: (Others by Appt.)
Monday                      1:40-3:40pm
Tuesday                     1:40-3:40pm
Wednesday                   1:40-3:40pm
Thursday                     1-3 pm

Course Description

The purpose of this course is to give a basic understanding of the multifaceted science of Genetics. The course examines the history of the concept of a gene from Aristotle’s ‘pangenesis’ through Mendel’s and Sutton’s theorems on the particulate and chromosomal nature of inheritance respectively. We examine the molecular structure of genes and the processes governing their transmission of hereditary characteristics. The course also examines the effects that human genetic variations/mutations and diseases have on the lives of individuals and populations.

Conceptual Framework

The Conceptual Framework in the Professional Education Unit (PEU) at Florida A&M University is an integrated approach to providing educational experiences that result in exemplary professional educators. The Framework is comprised of six themes with the mission of developing high quality classroom teachers, administrators and support personnel. The term “exemplary” refers to the kind of graduates the PEU strives to produce. The figure below provides a diagram of the Exemplary Professional Conceptual Framework:

F=Florida Educator Accomplished Practices Standards (FEAPS)
I=Interstate New Teacher Assessment and Support Consortium Standards (INTASC)
(K)=Knowledge       (S)=Skill       (D)=Disposition

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TECHNOLOGY

• CF 2
  • Through this focal area, the FAMU professional education candidate will:

| CF:  | 2.1 (S) | Use of available technology and software to support student learning. | F: 4,12 | I: 6 |
| CF:  | 2.3 (K) | Know fundamental concepts in technology. | F: 12 | I: 1,6 |
| CF:  | 2.4 (K) | Understand fundamental concepts in technology. | F: 2,12 | I: 6 |
| CF:  | 2.5 (S) | Use fundamental concepts in technology. | F: 12 | I: 6 |
| CF:  | 2.6 (S,D) | Facilitate access to technology for students. | F: 12 | I: 6 |
| CF:  | 2.7 (S) | Facilitate the use of technology by students. | F: 4,12 | I: 6 |

CRITICAL THINKING

• CF 4
  • Through this focal area, the FAMU professional education candidate will:

| CF:  | 4.1 (K) | Understand a variety of instructional/professional strategies to encourage student development of critical thinking and performance. | F: 4,7 | I: 4 |
| CF:  | 4.2 (S) | Use a variety of instructional/professional strategies to encourage students’ development of critical thinking and performance. | F: 2,7 | I: 4 |
| CF:  | 4.3 (D) | Value critical thinking and self-directed learning as habits of mind. | F: 4 | I: 1,4 |
| CF:  | 4.4 (K) | Acquire performance assessment techniques and strategies that measure higher order thinking skills of student. | F: 1,4 | I: 1,8 |
| CF:  | 4.5 (S) | Demonstrate the use of higher order thinking skills. | F: 8 | I: 4 |

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respectively. We examine the molecular structure of genes and the processes governing their transmission of hereditary characteristics. The course also examines the effects that human genetic variations/mutations and diseases have on the lives of individuals and populations.

**Overall Goals of the Course**

The goals of this course are:

1. To provide a basic understanding of the general principles surrounding the inheritance of traits and to demonstrate how genetic variations are manifested and inherited. Additionally to stress that variations may have profound effects on the genotypic composition of populations affecting their evolution.
2. To provide each student with specific expertise in the areas of classical inheritance patterns, probability laws, gene linkage, mutations, cytogenetics, gene structure and regulation and biochemical and molecular genetics.
3. To expose students to the emerging field of recombinant DNA technology, showing the applicability of such new technologies toward conducting classical genetic studies.

The backdrop which scaffolds the training principles of our professional education program at Florida A&M University is one which is inter-thematic. Specifically, six themes:

1. Multiculturalism, (2) Educational Technology, (3) Values, (4) Problem Solving, (5) Professionalism and (6) Urban and Rural Education are included.

These six themes are all centered at achieving one primary goal; the production of an “Exemplary Professional”. Educational training for each of the six themes is accomplished through multiple interdisciplinary activities including; General Studies, Specialty Studies, Research, Field experiences, Professional Studies, Practitioner exercises such as teaching assistantships and Student personnel services.

Those students who have the professional objective of being science teachers such as biology teachers are required to experience a broad science curriculum which at Florida A&M University includes a mandatory exposure to the science of Genetics. In terms of the six themes of the ’Professional Education Unit Conceptual Framework’, the Genetics course would be considered under the classification of “Specialty studies”. The laboratory portion of the course, includes an independent research study, so the course would also be considered a "Faculty Development (Research) course. These activities would directly support the themes of Professionalism and Problem solving.

**Specific Objectives**

The pre-service and in-service teachers will be able to:

- Extend their training on describing patterns of structure and function in living things. Particularly as it relates to DNA structure and its function as an information molecule.

Sunshine State Standards [SSS]; Strand F; The processes of life;
NCATE Biology Competencies and skills; 5.1-5.4, 5.7, and 5.13
- Understand the process and importance of genetic diversity. (SC.F.2.4)

[SSS]; Strand F; The processes of life
NCATE Biology Competencies and skills: 10.1, 10.2, 10.5, and 10.6

- Understand the competitive, interdependent, cyclic nature of living things in the environment.

[SSS] Strand G; How Living Things Interact with Their Environment- Standards 1 and 2
NCATE Biology Competencies and skills; 9.5, 10.1,10.2,10.5,10.6, 10.7 and 10.8 which detail, the great diversity and interdependence of living things as well as how genetic variation of offspring contributes to population control in an environment and which also details how natural selection ensures that those who are best adapted to their surroundings survive to reproduce.

- Use the scientific processes and habits of mind to solve problems.

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SECTION II. Course Related Standards and Competencies

The state of Florida has mandated by state statute or rule that each Teacher education program for initial certification include seven training components, each with its own set of standards and/or competencies. Highlighted below are a select list of four of the seven mandatory program components of which the PCB 3063 Principles of Genetics Course meets certain specified standards towards achieving those mandated competencies. The specific standards met in the Genetics Lectures and Laboratories are listed as a subdivision of each of the four program components.

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Behavioral objectives</th>
<th>INTASC Standards</th>
<th>FEAPs</th>
<th>FTCE SAE</th>
<th>PEU Conceptual Framework</th>
</tr>
</thead>
<tbody>
<tr>
<td>DNA Forensic Lab Project 1</td>
<td>Learn DNA structure and its function as an information molecule.</td>
<td>I: 4, 6, 8</td>
<td>FEAPs: 4.1:4b, 4c, 4g, 4j, 8.1:8b, 8c, 8f, 12.1:12b, 12c, 12j, 12k, 12l</td>
<td>FTCE: 1.1, 1.2, 1.3, 1.5 – 1.15, 2.1, 2.4, 3.13, 3.14, 4.2, 4.4, 4.5, 5.1 – 5.13, 6.1, 6.2, 10.1, 10.2, 10.5 – 10.10, 10.12</td>
<td>CF: 2.1.2.3.2.4, 2.5, 2.6, 2.7.4.1, 4.2, 4.3, 4.4.4.5</td>
</tr>
<tr>
<td>Neospora – Ordered Tetrad Analysis Lab Project 2</td>
<td>Understand the process and importance of genetic diversity</td>
<td>I: 4, 6, 8</td>
<td>FEAPs: 4.1:4b, 4c, 4g, 4j, 8.1:8b, 8c, 8f, 12.1:12b, 12c, 12j, 12k, 12l</td>
<td>FTCE: 1.1, 1.2, 1.3, 1.5 – 1.15, 2.1, 2.4, 3.13, 3.14, 4.2, 4.4, 4.5, 5.1 – 5.13, 6.1, 6.2, 10.1, 10.2, 10.5 – 10.10, 10.12</td>
<td>CF: 2.1.2.3.2.4, 2.5, 2.6, 2.7.4.1, 4.2, 4.3, 4.4.4.5</td>
</tr>
<tr>
<td>Drosophila Population Genetics Lab Project 3</td>
<td>Learn about the processes of life (e.g., competition for space/mates and reproduction)</td>
<td>I: 4, 6, 8</td>
<td>FEAPs: 4.1:4b, 4c, 4g, 4j, 8.1:8b, 8c, 8f, 12.1:12b, 12c, 12j, 12k, 12l</td>
<td>FTCE: 1.1, 1.2, 1.3, 1.5 – 1.15, 2.1, 2.4, 3.13, 3.14, 4.2, 4.4, 4.5, 5.1 – 5.13, 6.1, 6.2, 10.1, 10.2, 10.5 – 10.10, 10.12</td>
<td>CF: 2.1.2.3.2.4, 2.5, 2.6, 2.7.4.1, 4.2, 4.3, 4.4.4.5</td>
</tr>
</tbody>
</table>

National and State Standards Addressed in the Course

Interstate New Teacher Assessment and Support Consortium (INTASC) Standards

Standard 1: Subject Matter:
The teacher understands the central concepts, tools of inquiry, and structures of the discipline(s) he or she teaches and can create learning experiences that make these aspects of subject matter meaningful for students.

Standard 4: Instructional Strategies
The teacher understands and uses a variety of instructional strategies to encourage students’ development of critical thinking, problem solving, and performance skills.

Standard 6: Communication
The teacher uses knowledge of effective verbal, nonverbal, and media communication techniques to foster active inquiry, collaboration, and supportive interaction in the classroom. Standard .

Standard 8: Assessment
The teacher understands and uses formal and informal assessment strategies to evaluate and ensure the continuous intellectual, social and physical development of the learner.

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Florida Educator Accomplished Practices (FEAPs)

1. CRITICAL THINKING

4.1 The preprofessional teacher is acquiring performance assessment techniques and strategies that measure higher order thinking skills in students and is building a repertoire of realistic projects and problem-solving activities designed to assist all students in demonstrating their ability to think creatively.

4.PRE.b Identifies strategies, materials, and technologies that she/he will use to expand students’ thinking abilities.
4.PRE.c Has strategies for utilizing discussions, group interactions, and writing to encourage student problem solving.
4.PRE.g Demonstrates and models the use of higher-order thinking abilities.
4.PRE.j Uses technology and other appropriate tools in the learning environment.

8. KNOWLEDGE OF SUBJECT MATTER

8.1 The preprofessional teacher has a basic understanding of the subject field and is beginning to understand that the subject is linked to other disciplines and can be applied to real-world integrated settings. The teacher’s repertoire of teaching skills includes a variety of means to assist student acquisition of new knowledge and skills using that knowledge.

8.PRE.b Increases subject matter knowledge in order to integrate the learning activities.
8.PRE.c Uses the materials and technologies of the subject field in developing learning activities for students.
8.PRE.f Develops short- and long-term personal and professional goals relating to knowledge of subject matter.

12. TECHNOLOGY

12.1 The preprofessional teacher uses technology as available at the school site and as appropriate to the learner. She/he provides students with opportunities to actively use technology and facilitates access to the use of electronic resources. The teacher also uses technology to manage, evaluate, and improve instruction.

12.PRE.b Uses technology tools on a personal basis.
12.PRE.c Demonstrates awareness of and models acceptable use policies and copyright issues.
12.PRE.i Selects and utilizes educational software tools for instructional purposes based upon reviews and recommendations of other professionals.
12.PRE.j Uses digital information obtained through intranets and/or the Internet (e.g., e-mail and research).
12.PRE.k Uses technology to collaborate with others.
12.PRE.l Develops professional goals relating to technology integration.

Florida Teacher Certification Examination (FTCE) Subject Area Examination (SAE) Competencies and Skills

1 Knowledge of the investigative processes of science
1.1 Identify components, proper use, and care of light microscopes.
1.2 Distinguish between the types of microscopy (e.g., scanning electron microscopy, transmission electron microscopy, phase contrast) and their applications.
1.3 Identify proper techniques for common laboratory procedures (e.g., dissecting; reserving, staining, and mounting microscope specimens; gel electrophoresis).
1.4 Select appropriate uses of common laboratory procedures (e.g., polymerase chain reaction, chromatography, spectrophotometry, centrifugation, gel electrophoresis).
1.6 Calculate measurements in the appropriate metric units.
1.7 Differentiate between assumptions, inferences, observations, hypotheses, conclusions, theories, and laws.
1.8 Interpret empirical data (e.g., charts, graphs, tables, diagrams).
1.9 Differentiate the characteristics and methodologies of scientific and nonscientific knowledge.
1.10 Identify relationships between the variables and possible outcomes of a specific experiment.
1.11 Relate the validity and reliability of scientific knowledge to reproducibility, statistical significance, technological limitations, bias, and types of error.
1.12 Identify the development of biological theories and knowledge through important historical events, creative endeavors of diverse individuals, and experimental evidence.

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1.13 Differentiate between qualitative and quantitative data in experimental, observational, and modeling methods of research.
1.14 Determine the elements of a well-designed and controlled experiment.
1.15 Identify evidence of the dynamic nature of science in the face of new scientific information.

2 Knowledge of the interaction of science, technology, and society, including ethical, legal, and social issues
2.1 Analyze the ethical, legal, economic, and social implications of current scientific research and practices (e.g., reproductive and life-sustaining technologies, genetic basis for behavior, population growth and control, government and business influences on biotechnology, cloning, genomics, genetic engineering).
2.4 Identify pertinent legislation and national guidelines (e.g., National Association of Biology Teachers, International Society of Environmental Forensics, Occupational Safety and Health Administration chemical safety guidelines, material safety data sheets) regarding laboratory safety, hazardous materials, experimentation, and the use and handling of organisms in the classroom.

3 Knowledge of the chemical process of living things
3.13 Identify the effect of environmental factors on the biochemistry of living things (e.g., ultraviolet light effects on melanin and vitamin D production).
3.14 Identify the roles of ATP and ADP in cellular processes

4 Knowledge of the interaction of cell structure and function
4.2 Distinguish between the major structural characteristics of prokaryotic and eukaryotic cells.
4.4 Differentiate the events of each phase of the cell cycle (e.g., G1, S, G2, M) and the regulatory mechanisms of the cycle.
4.5 Compare the mechanisms and results of nuclear division (i.e., karyokinesis) and cell division (i.e., cytokinesis) in plant and animal cells.

5 Knowledge of genetic principles, processes, and applications
5.1 Evaluate the relationships between structure and function in nucleic acids.
5.2 Sequence the principal events of DNA replication.
5.3 Sequence the principal events of protein synthesis.
5.4 Distinguish between the functions of DNA and RNA.
5.5 Distinguish between the regulatory systems for prokaryotic and eukaryotic protein synthesis.
5.6 Identify proper techniques for recombinant DNA technology (e.g., Southern blotting, creation of transgenic organisms, gene splicing, mitochondrial DNA isolation).
5.7 Evaluate possible effects of environmental and genetic influences (e.g., viruses, oncogenes, carcinogenic agents, mutagenic agents, epigenetic factors) on gene structure and expression.
5.8 Analyze the processes and products of meiosis in plants, animals, and fungi.
5.9 Identify Mendelian laws of inheritance, their relationship to chromosomes, and related terminology.
5.10 Analyze applications of probability and statistical analysis (e.g., chi-square, Punnett square) in genetics.
5.11 Analyze various patterns of inheritance (e.g., sex-linked, sex-influenced, sex-limited, incomplete dominance, codominance, autosomal linkage, multiple alleles, polygenic inheritance).
5.12 Identify the causes of genetic disorders (e.g., point mutation, nondisjunction, aneuploidy, translocation, deletion, insertion, inversion, duplication).
5.13 Identify the effect of a mutation in a DNA sequence on the products of protein synthesis.

6 Knowledge of the structural and functional diversity of viruses and prokaryotic organisms
6.1 Distinguish the structure and function of viruses and prokaryotic organisms.
6.2 Identify the effects of viruses (e.g., AIDS, influenza, measles, feline leukemia, some human cancers) and prokaryotes (e.g., tuberculosis, bubonic plague, cholera) on organisms.

10 Knowledge of evolutionary mechanisms
10.1 Compare the current theory of evolution by natural selection with previous scientific theories of evolution (e.g., Lamarck, Darwin).
10.2 Analyze exceptions to and limitations of the biological species concept.
10.3 Analyze variation within a species along an environmental cline.
10.6 Identify factors affecting speciation (e.g., mutation, recombination, types of isolation, sexual reproduction and selection, genetic drift, plate tectonics, geographic distribution).
10.7 Evaluate the roles of mutation, recombination, isolation, sexual reproduction and selection, genetic drift, plate tectonics, and geographic distribution in evolution.
10.8 Compare the concepts of punctuated equilibrium and gradualism.
10.9 Interpret examples of evidence for evolutionary theory (e.g., molecular, morphological, embryological, paleontological).

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10.10 Analyze aspects of modern scientific theories (e.g., primitive precell, endosymbiotic) on the origin and early evolution of life on Earth.

10.12 Apply the Hardy-Weinberg equilibrium, using the formula and assumptions, to predict changes in genotypic frequencies in a population.

**National Science Teachers Association Standards**

**C.2.a. Core Competencies.** All teachers of biology should be prepared to lead students to understand the unifying concepts required of all teachers of science, and should in addition be prepared to lead students to understand:

1. Life processes in living systems including organization of matter and energy.
2. Scientific theory and principles of biological evolution.
3. General concepts of genetics and heredity.
4. Fundamental processes of modeling and investigating in the biological sciences.

**C.2.b. Advanced Competencies.** In addition to these core competencies, teachers of biology as a primary field should be prepared to effectively lead students to understand:

15. Molecular genetics and heredity and mechanisms of genetic modification.
18. Issues related to living systems such as genetic modification, uses of biotechnology, cloning, and pollution from farming.
19. Historical development and perspectives in biology including contributions of significant figures and underrepresented groups, and the evolution of theories in biology.
20. How to design, conduct, and report research in biology.

**C.2.c. Supporting Competencies.** All teachers of biology should also be prepared to effectively apply concepts from other sciences and mathematics to the teaching of biology including basic concepts of:

25. Mathematics, including probability and statistics.

**Topical Outline**

1. What is a ‘gene’? *(NCATE 5.1, 5.2 and 6.1; SSS; Strand F-2)*

2. Chromosome Structure, DNA & RNA: structure & synthesis, Replication: *(NCATE 1.5, 1.14, 5.1, 5.2, 6.1, and 6.2; SSS; Strand F-1 and F-2)*

3. The Genetic Code; Transcription/Translation, Mutation; *(NCATE 1.14, 2.2, 3.3, 3.13, 5.3, 5.4, 5.5, 5.6, 5.12 and 5.13; SSS; Strand F-1 and F-2)*

4. Mitosis: Meiosis, Inheritance of Genetic Material: *(NCATE 1.1, 1.2, 4.2, 4.4, 4.5, 5.8, 5.9, 7.1 and 7.10; SSS; Strand F-2)*

5. Mendelian Genetics- *(NCATE 5.8, 5.9, 5.10; SSS; Strand F-2)*
   - Monohybrid
   - Polyhybrid Crosses, Dominance
   - Lack of Dominance.

6. Basic Probability; Pedigrees (“Family Trees”) and the Probability of Inheriting a Phenotype or Genotype *(NCATE 5.9, 5.10; SSS; Strand F-2)*
   - Some human genetic diseases. *(NCATE 5.7, 5.12, 5.1; SSS; Strand F-1 and F-2)*

7. Quantitative Inheritance *(NCATE 1.15, 1.9, 5.11; SSS; Strand F-2)*

8. Gene Interactions (Epistasis, Collaboration) *(NCATE 5.11; SSS; Strand F-2)*
   - Complementation: intragenic and intergenic (Bacterial, Yeast Mutations) *(NCATE5. 5.9, 5.11, 5.12, 5.13, 7.1; SSS; Strand F-1 and F-2)*

9. Sex Determination, Sex Chromosomes & Chromatin *(NCATE 5.11; SSS; Strand F-2)*

10. Sex Limited and Influenced Traits; Sex Chromosome Abnormalities *(NCATE 5.11, 5.12; SSS; Strand F-2)*

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11. **Eukaryotic Linkage**, Crossing over and Gene Mapping; new techniques for locating & mapping genes. *(NCATE 5.9, 5.11; SSS; Strand F-1 and F-2)*

12. **Reverse Genetics** - Finding diseased genes *(NCATE 5.9, 5.11, 5.12, 5.13; SSS; Strand F-1 and F-2)*

13. **Genetic Counseling**: Uses and Limitations *(NCATE 2.1, 2.2, SSS; Strand H-3)*
   - Genetic Imprinting *(NCATE 5.5; SSS Strand F-2)*
   - Imprinting and gene insulation (Molecular Genetics Topic) Handout *(NCATE 5.5; SSS; Strand F-2)*

14. **Genetics of Behavior & Intelligence**, Heritability, Twin Studies *(NCATE 5.12; SSS; Strand F-1 and F-2)*

15. **Mutation** (general): Point Mutations; Mutagens. *(NCATE 3.13, 5.12, 5.13; SSS Strands F-1; F-2; G-1 and G-2)*
   - Ames Test, Mutations and Disease: Sickle Cell Disease. *(NCATE 3.13, 5.7, 5.12, 5.13; SSS; Strands F-1; F-2)*
   - Glanzmann's Thrombasthenia *(NCATE 5.12, 5.13; SSS; Strand F-1 and F-2)*
   - Modes of Action; Detection & Repair of Mutations *(NCATE 3.13, 5.7, 5.12, 5.13; SSS; Strands F-1 and F-2)*

16. **DNA Damage** *(NCATE 2.2, 5.6, 5.7; SSS Strands F-1 and F-2)*
   - Mutation at the Chromosomal Level (Inversions) Translocations, etc.) *(NCATE 5.9, 5.12; SSS Strand F-2)*
   - Mutation at the Genome Level (Ploidy Changes) Non-Disjunction. *(NCATE 5.12; SSS Strands F-2, G-1, H-3)*

17. **Genetics of Cancer**: Knudson two hit; Retinoblastoma. *(NCATE 5.7, 5.12, 5.13, 6.1 and 6.2; SSS; Strand F-2)*

18. **Human Genome Project** *(NCATE 2.1, 2.2, 5.6; SSS; Strands F-2, H-3)*
   - Recombinant DNA Technology: Restriction enzymes; DNA Cloning, Genomic libraries, cDNA libraries, PCR, Southern Blots; Restriction Fragment Length Polymorphisms (RFLP’s) Cystic Fibrosis. *(NCATE 1.5, 2.1, 2.2, 5.6; SSS; Strand H-3)*
   - Genetics and Biotechnology. *(NCATE 2.1, 2.2, 5.6; SSS; Strand H-3)*
   - Microarrays- *(NCATE 5.6; SSS Strand H-3)*

19. **Genomics** and Databases - Computer Lab/Library *(NCATE 2.2; SSS Strand H-3)*

20. **Proteomics**: Database analyses - Computer Lab/Library. *(NCATE 2.2; SSS Strand H-3)*
   - Visual Tools for Alignment VISTA Phylogenetic footprinting *(NCATE 2.2; SSS Strand H-3)*

21. **Population Genetics I** *(NCATE 5.9, 10.1-10.8, 10.12 SSS; Strand G-1,G-2)*

22. **Population Genetics I** *(NCATE 5.9, 10.1-10.8, 10.12; SSS; Strand G-1,G-2)*

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**Teaching Methods/Performance-Based Tasks**

Lectures, class discussions, brainstorming sessions, problem centered hands-on investigations, research and technologies such as internet, CD-ROM, “Blackboard” and computer animations.

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**Methods of Evaluation/Performance-based Assessment**

- Class Participation in class activities and hands on activities
- Laboratory Projects and Assignments
- Quizzes
- Exams/Final Exams

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**Course Policies**

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Policy Statement on Non-Discrimination It is the policy of Florida Agricultural and Mechanical University to assure that each member of the University community be permitted to work or attend classes in an environment free from any form of discrimination including race, religion, color, age, disability, sex, marital status, national origin, veteran status and sexual harassment as prohibited by state and federal statutes. This shall include applicants for admission to the University and employment.

Academic Honor Policy The University’s Academic Honor Policy is located in the FANG Student Handbook, under the Student Code of Conduct-Regulation 2.012 section, beginning on page 55-56.

ADA Compliance To comply with the provisions of the Americans with Disabilities Act (ADA), please advise instructor of accommodations required to insure participation in this course. Documentation of disability is required and should be submitted to the Learning Development and Evaluation Center (LDEC). For additional information please contact the LDEC at (850) 599-3180.

References

3. DNA Interactive: [http://www.dnai.org](http://www.dnai.org)
4. NOVA:Cracking the Code of Life: [http://www.pbs.org/wgbh/nova/genome/program.html](http://www.pbs.org/wgbh/nova/genome/program.html)

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