

Division of Earth, Life & Natural Sciences

Biology Department

<https://www.hccs.edu/programs/areas-of-study/science-technology-engineering--math/biology/>

# BIOL 2416: Genetics | Lecture | #13369

Fall 2019 | 16 Weeks (8.26.2019-12.15.2019)

In-Person | WHI /316 | M/W 8 a.m.-11:50 a.m.

4 Credit Hours | 48 hours per semester

## Instructor Contact Information

Instructor: Brian C. Mahon, Ph.D. Office Phone: 713-718-6423

Office: Central, LHSB Room 313 Office Hours: T/R 10-11a.m.@Central / WHI TBA

HCC Email: brian.mahon@hccs.edu Office Location: Central, LHSB Room 313

Please feel free to contact me concerning any problems that you are experiencing in this course. Your performance in my class is very important to me. I am available to hear the concerns and just to discuss course topics.

### Instructor’s Preferred Method of Contact

**HCC Email or Canvas messages are preferred.** I will respond to emails within 24-48 hours Monday through Friday; I will reply to weekend messages during the following week.

## What’s Exciting About This Course

You will learn how your genetics and interactions with the environment controls so much about your life and the living things around you. This course has a high degree of Active Learning and Team-based content and requires participation in both Classroom and Laboratory activities.

In addition to lecture topics in transmission and molecular genetics as well as population and medical genetics, we will develop our math and statistical skills for analyizing genetic data. We will be conducting laboratory experiments with fruit flies, extracting DNA from organisms, using microscopes to view chromosomes and other lab techniques. We will utilize the Polymerase Chain Reaction technique to either detect Genetic Modifications in food products (GMO) or for Forensic Crime Scene analysis, we will also genetically modify bacteria and other fascinating activities in the Lab. The information in this course will enable you to better understand people in your life as well as develop a better understanding the role heredity has in all living thing’s lives.

## My Personal Welcome

Welcome to Genetics—I’m delighted that you have chosen this course! One of my passions is to know as much as I can about heredity and how our genetic material is passed on and shapes all living things in concert with the environment. I can hardly wait to pass on what I have learned. I will present the information in the most exciting way I know, so that you can grasp the concepts and apply them now and hopefully throughout your life.

As you read and wrestle with new ideas and facts that may challenge you, I am available to support you. The fastest way to reach me is by my HCC email or Canvas Messages. The best way to really discuss issues is in person and I’m available during posted office hours to tackle the questions. My goal is for you to walk out of the course with a better understanding of yourself and of all life on earth. So please visit me or contact me by email/message whenever you have a question.

## Prerequisites and/or Co-Requisites

**BIOL 2416** requires college-level reading and writing skills. Research indicates that you are most likely to succeed if you have already taken and passed ENGL 1301. Students must have completed one of the following with a grade of C or higher: BIOL 1306 (or 1406), 1311 (or 1411), 1313 (or 1413), 2301 (or 2401), 2302 (or 2402), 2320 (or 2420), or 2321 (or 2421). If you have enrolled in this course having satisfied these prerequisites, you have a higher chance of success than students who have not done so.

## Canvas Learning Management System

All Biology sections utilize [Canvas](file:///C%3A%5CUsers%5CMatt%20Webster%5CAppData%5CLocal%5CTemp%5CCanvas) (<https://eagleonline.hccs.edu>) to supplement in-class assignments, exams, and activities.

## Open Lab Locations

[HCCS Open Computer Lab locations](https://www.hccs.edu/departments/division-of-instructional-services/institute-for-instructional-engagement--development/open-lab-schedule/) may be used to access the Internet and Canvas. **USE** [**FIREFOX**](https://www.mozilla.org/en-US/firefox/new/) **OR** [**CHROME**](https://www.google.com/chrome/browser/desktop/index.html) **AS THE INTERNET BROWSER**.

## HCC Online Information and Policies (Not Applicable)

For online/hybrid students. As an online /hybrid student, you are responsible for all information/requirements provided by the online college. Here is the link to information about HCC Online classes <http://www.hccs.edu/online/>. This includes the mandatory online course prior to start of class.

## Scoring Rubrics, Sample Assignments, etc.

When applicable, look in Canvas for the scoring rubrics for assignments, samples of class assignments, and other information to assist you in the course.

<https://eagleonline.hccs.edu/login/ldap>

# Instructional Materials

## Required Resources

The textbook listed below is ***required*** for this course.

***Genetics: A Conceptual Approach, 6th ed.*** LL + Sapling Plusby Pierce (W.H. Freeman) ISBN: 9781319125950

The book is included in a package that contains the text as well as an access code and are found at the [HCC Bookstore](https://hccs.bncollege.com/webapp/wcs/stores/servlet/BNCBHomePage?storeId=19561&catalogId=10001&langId=-1). You may either use a hard copy of the book, or rent the e-book from Macmillan or another source. Order your book here: [HCC Bookstore](https://hccs.bncollege.com/webapp/wcs/stores/servlet/BNCBHomePage?storeId=19561&catalogId=10001&langId=-1). 5th edition is also acceptable if you can find one. A couple of copies can be used for 2 hours in the library as well.



## Suggested Resources



### HCCS Biology Lab Study Pages

[Click here to access Biology lab study pages online.](https://iied21.hccs.edu/JyotiW/BiologyLabs/index.html)

## Other Instructional Resources

### Tutoring

HCC provides free, confidential, and convenient academic support, including writing critiques, to HCC students in an online environment and on campus. Tutoring is provided by HCC personnel in order to ensure that it is contextual and appropriate. Visit the [HCC Tutoring Services](http://www.hccs.edu/resources-for/current-students/tutoring/) website for services provided.

### Libraries

The HCC Library System consists of 9 libraries and 6 Electronic Resource Centers (ERCs) that are inviting places to study and collaborate on projects. Librarians are available both at the libraries and online to show you how to locate and use the resources you need. The libraries maintain a large selection of electronic resources as well as collections of books, magazines, newspapers, and audiovisual materials. The portal to all libraries’ resources and services is the HCCS library web page at [http://library.hccs.edu](http://library.hccs.edu/).

### Supplementary Instruction

Supplemental Instruction is an academic enrichment and support program that uses peer-assisted study sessions to improve student retention and success in historically difficult courses. Peer Support is provided by students who have already succeeded in completion of the specified course, and who earned a grade of A or B. Find details at <http://www.hccs.edu/resources-for/current-students/supplemental-instruction/>.

# Course Overview

BIOL 2416 Study of the principles of molecular and classical genetics and the function and transmission of hereditary material. May include population genetics and genetic engineering. Core curriculum course.

## [Core Curriculum Objectives (CCOs)](https://www.hccs.edu/programs/catalog/academic-information/)

BIOL 2416 satisfies the Life and Physical Sciences requirement in the HCCS core curriculum. The HCCS Biology Discipline Committee has specified that the course address the following core objectives:

* ***Critical Thinking***: Students will demonstrate the ability to engage in inquiry and analysis, evaluation and synthesis of information, and creative thinking by completing a written assignment such as a book report, research paper, or essay.
* ***Communication Skills***: Students will demonstrate effective development, interpretation and expression of ideas through written, oral, and visual communication by completing a written assignment such as a book report, research paper, or essay.
* ***Empirical and Quantitative Skills***: Students will demonstrate manipulation and analysis of numerical data or observable facts resulting in informed conclusions by completing textbook reading assignments, completing assignments, and answering questions on quizzes and exams.
* ***Teamwork***: Students will demonstrate the ability to consider different points of view and to work effectively with others to support a shared purpose or goal by completing textbook reading assignments, completing assignments, and answering questions on quizzes and exams.

## Program Student Learning Outcomes (PSLOs)

Can be found at:

<https://www.hccs.edu/programs/areas-of-study/science-technology-engineering--math/biology/>

## Course Student Learning Outcomes (CSLOs)

Upon completion of BIOL 2416, the student will be able to:

1. Deduce information about genes, alleles, and gene functions from analysis of genetic crosses and patterns of inheritance.
2. Describe the molecular anatomy of genes and genomes.
3. Describe the mechanisms by which an organism’s genome is passed on to the next generation.
4. Describe the phenomenon of linkage and how it affects assortment of alleles during meiosis.
5. Describe the processes that can affect the frequency of phenotypes in a population over time.
6. Compare different types of mutations and describe how each can affect genes and the corresponding mRNAs and proteins.
7. Apply the results of molecular genetic studies in model organisms to understanding aspects of human genetics and genetic diseases.
8. Interpret results from molecular analyses to determine the inheritance patterns and identities of human genes that can mutate to cause disease.
9. Describe the molecular basis of replication, transcription and translation in Eukaryotes and Prokaryotes.

## Learning Objectives

Learning Objectives for each CSLO can be found at [Learning Objectives for BIOL 2416](http://learning.hccs.edu/programs/biology)

# Student Success

Academic standards require a minimum of 3 study hours for every contact hour; meaning for a class that meets 3 hours per week, you need to budget and set aside a minimum of 9 hours each week to study and prep for your course success. Expect to spend at least twice as many hours per week outside of class as you do in class studying the course content. Additional time will be required for written assignments. The assignments provided will help you use your study hours wisely. Successful completion of this course requires a combination of the following:

* Reading the textbook
* Attending class in person and/or online
* Timely completion of assignments
* Participating in class activities
* Successful exam performance, including the mandatory final

There is no short cut for success in this course; it requires reading and studying the material using the course objectives as a guide.

## Instructor and Student Responsibilities

As your Instructor, it is my responsibility to**:**

* Provide the grading scale and detailed grading formula explaining how student grades are to be derived
* Facilitate an effective learning environment through learner-centered instructional techniques
* Provide a description of any special projects or assignments
* Inform students of policies such as attendance, withdrawal, tardiness, and making up assignments
* Provide the course outline and class calendar that will include a description of any special projects or assignments
* Arrange to meet with individual students before and after class as required

As a student, it is your responsibility to**:**

* Attend class in person and/or online
* Participate actively by reviewing course material, interacting with classmates, and responding promptly in your communication with me
* Read and comprehend the textbook
* Complete the required assignments and exams
* Ask for help when there is a question or problem
* Keep copies of all paperwork, including this syllabus, handouts, and all assignments
* Attain a raw score of at least 50% on the departmental final exam
* Be aware of and comply with academic honesty policies in the [HCCS Student Handbook](http://www.hccs.edu/resources-for/current-students/student-handbook/)

# Assignments, Exams, and Activities

## Exams

There will be 4 Unit Exams which will last for two hours consisting of 50-70 multiple-choice questions worth 80% of the Exam and a number of free-response, calculation, essay type of problems worth 20% of the Exam. HCC does not provide students with Scantron forms. They are sold in campus bookstores.

## In-Class Activities

Student should expect in addition to lectures an number of other activities, such as quizzes, participation in activities during class, workshops, homework, etc. These will occur often so attendance is important.

**Group Learning Assignment**

Students will Design, Create, and Utilize aGroup Learning Tool during the semester.

This project is a major component of the course involving a selected topic from the course and designing a teaching tool and activity that will allow other students to better understand the process or concept being illustrated. More details will be given shortly on the project and the IdeaStudio use. Project is worth up to 200 points.

## Final Exam

All students will be required to take a comprehensive departmental final exam consisting of 50 multiple- choice questions. Students must provide their own Scantron forms. The final counts 10% of the Final Grade.

## Grading Formula

Grades are calculated using the breakdown scale below with 1,000 total points possible.

Group Learning Assignment 200 points

3 of 4 Unit Exams 500 points

Class Activities/Workshops 100 points

Lab Reports/1 Formal Report 100 points (75/25)

Departmental Final Exam 100 points

Total points 1000

| **Grade** | **Total Points** |
| --- | --- |
| A | 900+ |
| B | 800-899 |
| C | 700-799 |
| D | 600-699 |
| F | <600 |

### Incomplete Policy:

In this course, the purposes of the “I” (incomplete) grade is for students who are caught up and passing at the student withdrawal deadline, and then have a medical or other problem that prevents them from completing the course. If you are not passing at the student withdrawal deadline, you should drop yourself from the course, or you will likely earn an “F.” An incomplete “I” grade will be given only if all of the following conditions are met:

* You have earned at least 85% of the available points by the date that the “I” grade is requested.
* You can provide documentation showing why you should earn an incomplete, such as a doctor's note, etc.
* You must be passing with a grade of “C” or better.
* You must request the incomplete in writing (email) **BEFORE** **Day of the Final**
* In all cases, the instructor reserves the right to decline a student’s request to receive a grade of Incomplete.

### HCC Grading Scale can be found on this site under Academic Information:

[**http://www.hccs.edu/resources-for/current-students/student-handbook/**](http://www.hccs.edu/resources-for/current-students/student-handbook/)

# Course Calendar

**Tentative Instructional Outline: \*Note: Subject to Change\***

**Lecture (topics by chapter/unit)**

(Unit 1) 8/26-9/30

1. Introduction to Genetics, 30 min

2. Chromosomes and Cellular Reproduction, 1.5 hr

3. Basic Principles of Heredity, 1.5 hr

4. Sex Determination and Sex-Linked Characteristics, 1 hr

5. Extensions and Modifications of Basic Principles, 1.5 hr

6. Pedigree Analysis, Human Applications, and Genetic Testing, 1 hr

**(Exam 1, 9/30)**

(Unit 2) 9/30 – 10/21

10. DNA: The Chemical Nature of the Gene, 1.5 hr

9. Bacterial and Viral Genetic Systems, 1 hr

11. Chromosome Structure and Organelle DNA, 30 min

8. Chromosome Variation, 30 min

12. DNA Replication and Recombination, 1.5 hr

7. Linkage, Recombination, and Eukaryotic Gene Mapping, 1 hr

**(Exam 2, 10/21)**

(Unit 3) 10/21– 11/18

13. Transcription, 1.5 hr

14. RNA Molecules and RNA Processing, 45 min

15. The Genetic Code and Translation, 1.5 hr

16. Control of Gene Expression in Prokaryotes, 1 hr

17. Control of Gene Expression in Eukaryotes, 45 min

18. Gene Mutations and DNA Repair, 1 hr

**(Exam 3, 11/18)**

(Unit 4) 11/18 – 12/4

20. Genomics and Proteomics, 1 hr

21. Epigenetics, 30 min

22. Developmental Genetics and Immunogenetics, 1 hr (+ HHMI lecture on Developmental Genetics)

23. Cancer Genetics, 1 hr (+ HHMI lecture on Cancer)

25. Population Genetics, 1 hr

26. Evolutionary Genetics, 1 hr min

**(Exam 4, 12/4)**

**Wednesday, 11 Dec, 8 am - Cumulative Final Exam, 2hrs**

**Wednesday Laboratory Schedule Please note Lab meets for about 3 hours each week. Extra time will be used for other activities/workshops/lecture.**

(Unit 1)

Aug 28 Microscopy, Cells (1-2 hrs)

Sep 4 Mitosis with onion root tips (2-3 hrs)

Sep 11 Karyotyping (2 hrs) & ABO blood typing (1 hr)

(Unit 2)

TBA Week 1 flies: Observing and Sexing Flies; Setting Up the Parental Cross (3 hrs)

 Week 2 flies: Clearing the F1 Vials (1 hr) & DNA Extraction (1 hr)

 Week 3 flies: Scoring the F1 Flies and Setting Up the F1 Cross (3 hrs)

 Week 4 flies: Clearing the F2 Vials (1 hr) & Pipetting workshop (2 hrs)

 Week 5 flies: Scoring the F2 Flies & Fly simulation (3 hrs)

(Unit 3)

TBA Pipetting and Centrifuge

Part 1 of Transformation of Green fluorescence in E. coli (3 hrs)

 Part 1 of PCR based Lab: Crime Scene Analysis (2 hrs) & Part 2 Transformations (1 hr)

 Part 2 of PCR make and run gels (2 hrs)

(Unit 4)

TBA Computer based Bioinformatics activity (3 hrs)

 Population & Evolutionary Genetics simulation (2 hrs)

**Workshops/Problem solving (in lab and/or between lectures w/ take home follow ups)**

(Unit 1)

3-6. Mendelian Genetics, Pedigree Problems, 1.5 hrs

(Unit 2)

24. Quantitative Genetics /Statistics Problems, 1.5 hrs

DNA structure workshop, 1.5 hrs

19. Biotechnology, Genetic Engineering 1.5 hrs

(Unit 3)

Exploring Genome Databases - database project, 2 hrs

3-D Protein Structure, Amino Acids & Biochemistry, 2 hrs

(Unit 4)

25&26. Population & Evolutionary Genetics lab simulations & Problems workshop, 2-3hrs

## Syllabus Modifications

The instructor reserves the right to modify the syllabus at any time during the semester and will promptly notify students in writing, typically by e-mail, of any such changes.

# Instructor’s Practices and Procedures

## Missed Assignments

Exam will be given with two hours to complete the Exam. Late arrival will result in less time to complete the Exam and you may not take the Exam if anyone has already finished the Exam and departed. Three out of four Exams will count to your score, lowest or one missed Exam will be dropped. Lab reports are due the next week except for the formal lab report which will be due as assigned later in the semester. Missed assignments may not be possible to make up.Labs can not be made up due to their nature.

## Academic Integrity

students are responsible for academic honesty and independent effort. Failure to uphold these standards includes, but is not limited to, the following: plagiarizing written work or projects, cheating on exams or assignments, collusion on an exam or project. Cheating includes merely looking at or copying from another student's exam, orally communicating or receiving answers during an exam, having another person complete a project or assignment, using unauthorized notes, texts, smart watches, or other materials for an exam, and obtaining or distributing an unauthorized copy of an exam or any part of an exam. Plagiarism means passing off as his/her own the ideas or writings of another (that is, without giving proper credit by documenting sources). Plagiarism includes submitting a paper, report, or project that someone else has prepared, in whole or in part. Collusion is inappropriately collaborating on assignments designed to be completed independently. These definitions are not exhaustive. When there is clear evidence of cheating, plagiarism, collusion, or misrepresentation, disciplinary action may include but is not limited to requiring you to retake or resubmit an exam or assignment, assigning a grade of zero or "F" for an exam or assignment; or assigning a grade of "F" for the course. Beware cell phones and smart watches are NOT allowed on or near your person during

proctored exams, nor may you take a bathroom break during an exam. Please remember to

keep your eyes on your own test or on the ceiling. Scholastic Dishonesty will result in a referral to the Dean of Student Services. See the link below for details.

Here’s the link to the HCC information about academic integrity (Scholastic Dishonesty and Violation of Academic Scholastic Dishonesty and Grievance):

<http://www.hccs.edu/about-hcc/procedures/student-rights-policies--procedures/student-procedures/>

## Attendance Procedures

You MUST come to class and actively participate, or you will not do well. Roll will be taken

but attendance does not count towards your grade. Missed assignments may not be possible to make up.

## Student Conduct

All official HCC policies, student services and student responsibilities are clearly stated in the

HCC Student Handbook, including academic honesty, support, withdrawal, repeating courses,

grade of FX and international students, FERPA and privacy, the HCC grading scale, campus

carry and safety, transfer planning, complaints, student services, rights and responsibilities

etc.: <http://www.hccs.edu/resources-for/current-students/student-handbook/>

Those engaged in disruptive behavior will be warned. If the behavior persists, the student

will be asked to leave the class session and the incident will be reported in Maxient.

Recurring disruptive behavior will be referred to the Chair and/or Dean for disciplinary action.

## Instructor’s Course-Specific Information

Exam/Assignment Grades will be entered into the Canvas Gradebook. They will not be given by email or phone. Written portions of Exams will take a few days so you will see the Scantron portion first in a day or two after the Exam (80% of grade) and then the written portion in a few days.

## Electronic Devices

No electronic devices (smartphones, tables, computers, smartwatches etc.) are allowed in

use during class, unless requested by the instructor. If you wish to use an electronic device

during class, you may step outside to do so. All personal electronic devices must be turned

off and placed in closed bags for exams.

# [Biology Program Information](https://www.hccs.edu/programs/areas-of-study/science-technology-engineering--math/biology/)

The Biology area of study here at HCC covers the smallest and simplest organisms (microbiology) to the largest and most complex organisms (human anatomy and physiology, zoology, botany).

AWARD TYPES: Associate in Science

AREA OF STUDY: Science, Technology, Engineering & Math

Please visit link: <https://www.hccs.edu/programs/areas-of-study/science-technology-engineering--math/biology/>

# HCC Policies

Here’s the link to the HCC Student Handbook <http://www.hccs.edu/resources-for/current-students/student-handbook/> In it you will find information about the following:

* Academic Information
* Academic Support
* Attendance, Repeating Courses, and Withdrawal
* Career Planning and Job Search
* Childcare
* disAbility Support Services
* Electronic Devices
* Equal Educational Opportunity
* Financial Aid TV (FATV)
* General Student Complaints
* Grade of FX
* Incomplete Grades
* International Student Services
* Health Awareness
* Libraries/Bookstore
* Police Services & Campus Safety
* Student Life at HCC
* Student Rights and Responsibilities
* Student Services
* Testing
* Transfer Planning
* Veteran Services

## EGLS3

The EGLS3 ([Evaluation for Greater Learning Student Survey System](http://www.hccs.edu/resources-for/current-students/egls3-evaluate-your-professors/)) will be available for most courses near the end of the term until finals start. This brief survey will give invaluable information to your faculty about their teaching. Results are anonymous and will be available to faculty and division chairs after the end of the term. EGLS3 surveys are only available for the Fall and Spring semesters. EGLS3 surveys are not offered during the Summer semester due to logistical constraints.

<http://www.hccs.edu/resources-for/current-students/egls3-evaluate-your-professors/>

## Campus Carry Link

Here’s the link to the HCC information about Campus Carry: <http://www.hccs.edu/departments/police/campus-carry/>

## HCC Email Policy

When communicating via email, HCC requires students to communicate only through the HCC email system to protect your privacy. If you have not activated your HCC student email account, you can go [to HCC Eagle ID](http://www.hccs.edu/resources-for/current-students/student-e-maileagle-id/) and activate it now. You may also use Canvas Inbox to communicate.

## Housing and Food Assistance for Students

Any student who faces challenges securing their foods or housing and believes this may affect their performance in the course is urged to contact the Dean of Students at their college for support. Furthermore, please notify the professor if you are comfortable in doing so.

This will enable HCC to provide any resources that HCC may possess.

# Office of Institutional Equity

Use the link below to access the HCC Office of Institutional Equity, Inclusion, and Engagement (<http://www.hccs.edu/departments/institutional-equity/>)

## disAbility Services

HCC strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability (including long and short term conditions, mental health, chronic or temporary medical conditions), please meet with a campus Abilities Counselor as soon as possible in order to establish reasonable accommodations. Reasonable accommodations are established through an interactive process between you, your instructor(s) and Ability Services. It is the policy and practice of HCC to create inclusive and accessible learning environments consistent with federal and state law. For more information, please go to <http://www.hccs.edu/support-services/disability-services/>

## Title IX

Houston Community College is committed to cultivating an environment free from inappropriate conduct of a sexual or gender-based nature including sex discrimination, sexual assault, sexual harassment, and sexual violence. Sex discrimination includes all forms of sexual and gender-based misconduct and violates an individual’s fundamental rights and personal dignity. Title IX prohibits discrimination on the basis of sex-including pregnancy and parental status in educational programs and activities. If you require an accommodation due to pregnancy please contact an Abilities Services Counselor. The Director of EEO/Compliance is designated as the Title IX Coordinator and Section 504 Coordinator. All inquiries concerning HCC policies, compliance with applicable laws, statutes, and regulations (such as Title VI, Title IX, and Section 504), and complaints may be directed to:

David Cross
Director EEO/Compliance
Office of Institutional Equity & Diversity
3100 Main
(713) 718-8271
Houston, TX 77266-7517 or Institutional.Equity@hccs.edu

<http://www.hccs.edu/departments/institutional-equity/title-ix-know-your-rights/>

## Office of the Dean of Students

Contact the office of the Dean of Students to seek assistance in determining the correct complaint procedure to follow or to identify the appropriate academic dean or supervisor for informal resolution of complaints.

<https://www.hccs.edu/about-hcc/procedures/student-rights-policies--procedures/student-complaints/speak-with-the-dean-of-students/>

## Department Chair Contact Information

Dr. DaeJan Grigsby

Email: daejan.grigsby@hccs.edu

Phone: 713-718-7775