

# Cover Sheet: Request 14348

## PCB 4XXX Human Genomics

### Info

Process	Course New Ugrad/Pro
Status	Pending at PV - University Curriculum Committee (UCC)
Submitter	Jennifer Drew jdrew@ufl.edu
Created	10/16/2019 3:04:24 PM
Updated	9/11/2020 2:03:09 PM
Description of request	This request is for course approval for an undergraduate course entitled "Human Genomics" to be offered through the Microbiology and Cell Science department and 3 credits. This course is for life sciences majors. The course is taught at a 4000 level because it requires prerequisite knowledge of eukaryotic molecular biology and classical genetics. Its appropriate and valuable preparation for students considering medical, research, biotech, education, public health, communication, and social science fields of study and careers. The course will serve as an elective for the Microbiology and Cell Science major and includes a CURE component. We are in the era of precision medicine, which began with the sequencing of the human genome and is based on the personalized analysis of individual genomes. It is important for life science majors to understand the structure and function of the human genome and how that information is studied, interpreted and applied. Human genomics, and its advances, is a field that encompasses medicine, biomedical research, agriculture, environment, and increasingly, ethical/social/societal/legal issues.

### Actions

Step	Status	Group	User	Comment	Updated
Department	Approved	CALS - Microbiology and Cell Science 514910000	Eric Triplett		10/29/2019
summaryofdistinctions.docx					10/28/2019
Human Genomics Course letter_Chair_Oct29.pdf					10/29/2019
Anthro Consult 10_2019.pdf					10/29/2019
College	Approved	CALS - College of Agricultural and Life Sciences	Joel H Brendemuhl	Edits requested by CALS CC have been addressed.	5/20/2020
Human Genomics PCB4XXX_syllabus_051820.doc					5/18/2020
University Curriculum Committee	Commented	PV - University Curriculum Committee (UCC)	Lee Morrison	Added to the UCC September agenda.	9/11/2020
bio and anthro consult_HumGen.pdf					9/9/2020
Evie Cummings Letter of Support CALS Human Genomics.pdf					7/2/2020
University Curriculum Committee	Pending	PV - University Curriculum Committee (UCC)			9/11/2020
No document changes					
Statewide Course Numbering System					
No document changes					
Office of the Registrar					
No document changes					

Step	Status	Group	User	Comment	Updated
Student Academic Support System					
No document changes					
Catalog					
No document changes					
College Notified					
No document changes					

# Course|New for request 14348

## Info

**Request:** PCB 4XXX Human Genomics

**Description of request:** This request is for course approval for an undergraduate course entitled "Human Genomics" to be offered through the Microbiology and Cell Science department and 3 credits. This course is for life sciences majors. The course is taught at a 4000 level because it requires prerequisite knowledge of eukaryotic molecular biology and classical genetics. Its appropriate and valuable preparation for students considering medical, research, biotech, education, public health, communication, and social science fields of study and careers. The course will serve as an elective for the Microbiology and Cell Science major and includes a CURE component. We are in the era of precision medicine, which began with the sequencing of the human genome and is based on the personalized analysis of individual genomes. It is important for life science majors to understand the structure and function of the human genome and how that information is studied, interpreted and applied. Human genomics, and its advances, is a field that encompasses medicine, biomedical research, agriculture, environment, and increasingly, ethical/social/societal/legal issues.

**Submitter:** Jennifer Drew jdrew@ufl.edu

**Created:** 10/28/2019 4:35:21 PM

**Form version:** 2

## Responses

### Recommended Prefix

*Enter the three letter code indicating placement of course within the discipline (e.g., POS, ATR, ENC). Note that for new course proposals, the State Common Numbering System (SCNS) may assign a different prefix.*

Response:  
PCB

### Course Level

*Select the one digit code preceding the course number that indicates the course level at which the course is taught (e.g., 1=freshman, 2=sophomore, etc.).*

Response:  
4

### Course Number

*Enter the three digit code indicating the specific content of the course based on the SCNS taxonomy and course equivalency profiles. For new course requests, this may be XXX until SCNS assigns an appropriate number.*

Response:  
XXX

### Category of Instruction

*Indicate whether the course is introductory, intermediate or advanced. Introductory courses are those that require no prerequisites and are general in nature. Intermediate courses require some prior preparation in a related area. Advanced courses require specific competencies or knowledge relevant to the topic prior to enrollment.*

Response:  
Advanced

- 1000 level = Introductory undergraduate
- 2000 level = Introductory undergraduate
- 3000 level = Intermediate undergraduate
- 4000 level = Advanced undergraduate
- 5000 level = Introductory graduate
- 6000 level = Intermediate graduate
- 7000 level = Advanced graduate
- 4000/5000= Joint undergraduate/graduate
- 4000/6000= Joint undergraduate/graduate

*\*Joint undergraduate/graduate courses must be approved by the UCC and the Graduate Council)*

### **Lab Code**

*Enter the lab code to indicate whether the course is lecture only (None), lab only (L), or a combined lecture and lab (C).*

Response:

None

### **Course Title**

*Enter the title of the course as it should appear in the Academic Catalog.*

Response:

Human Genomics

### **Transcript Title**

*Enter the title that will appear in the transcript and the schedule of courses. Note that this must be limited to 21 characters (including spaces and punctuation).*

Response:

Human Genomics

### **Degree Type**

*Select the type of degree program for which this course is intended.*

Response:

Baccalaureate

### **Delivery Method(s)**

*Indicate all platforms through which the course is currently planned to be delivered.*

Response:

Online, UF Online - Please attach a letter of support from the Director of the UF Online program

### **Co-Listing**

*Will this course be jointly taught to undergraduate, graduate, and/or professional students?*

Response:

No

**Effective Term**

Select the requested term that the course will first be offered. Selecting "Earliest" will allow the course to be active in the earliest term after SCNS approval. If a specific term and year are selected, this should reflect the department's best projection. Courses cannot be implemented retroactively, and therefore the actual effective term cannot be prior to SCNS approval, which must be obtained prior to the first day of classes for the effective term. SCNS approval typically requires 2 to 6 weeks after approval of the course at UF.

Response:  
Earliest Available

**Effective Year**

Select the requested year that the course will first be offered. See preceding item for further information.

Response:  
Earliest Available

**Rotating Topic?**

Select "Yes" if the course can have rotating (varying) topics. These course titles can vary by topic in the Schedule of Courses.

Response:  
No

**Repeatable Credit?**

Select "Yes" if the course may be repeated for credit. If the course will also have rotating topics, be sure to indicate this in the question above.

Response:  
No

**Amount of Credit**

Select the number of credits awarded to the student upon successful completion, or select "Variable" if the course will be offered with variable credit and then indicate the minimum and maximum credits per section. Note that credit hours are regulated by Rule 6A-10.033, FAC. If you select "Variable" for the amount of credit, additional fields will appear in which to indicate the minimum and maximum number of total credits.

Response:  
3

**S/U Only?**

Select "Yes" if all students should be graded as S/U in the course. Note that each course must be entered into the UF curriculum inventory as either letter-graded or S/U. A course may not have both options. However, letter-graded courses allow students to take the course S/U with instructor permission.

Response:

No

### **Contact Type**

Select the best option to describe course contact type. This selection determines whether base hours or headcount hours will be used to determine the total contact hours per credit hour. Note that the headcount hour options are for courses that involve contact between the student and the professor on an individual basis.

Response:

Regularly Scheduled

- Regularly Scheduled [base hr]
- Thesis/Dissertation Supervision [1.0 headcount hr]
- Directed Individual Studies [0.5 headcount hr]
- Supervision of Student Interns [0.8 headcount hr]
- Supervision of Teaching/Research [0.5 headcount hr]
- Supervision of Cooperative Education [0.8 headcount hr]

Contact the Office of Institutional Planning and Research (352-392-0456) with questions regarding contact type.

### **Weekly Contact Hours**

Indicate the number of hours instructors will have contact with students each week on average throughout the duration of the course.

Response:

3

### **Course Description**

Provide a brief narrative description of the course content. This description will be published in the Academic Catalog and is limited to 50 words or fewer. See course description guidelines.

Response:

This course will discuss how human genome sequence data is obtained, analyzed, and interpreted with an emphasis on what can be learned from an individual's genome. Genome-based strategies are used for the detection, treatment, and prevention of many diseases.

### **Prerequisites**

Indicate all requirements that must be satisfied prior to enrollment in the course. Prerequisites will be automatically checked for each student attempting to register for the course. The prerequisite will be published in the Academic Catalog and must be formulated so that it can be enforced in the registration system. Please note that upper division courses (i.e., intermediate or advanced level of instruction) must have proper prerequisites to target the appropriate audience for the course.

Courses level 3000 and above must have a prerequisite.

Response:

BSC 2010 & BSC 2011 & (PCB 3134 OR PCB 4522 OR BCH 4024 OR BCH 3025)

Completing Prerequisites on UCC forms:

- Use "&" and "or" to conjoin multiple requirements; do not use commas, semicolons, etc.
- Use parentheses to specify groupings in multiple requirements.
- Specifying a course prerequisite (without specifying a grade) assumes the required passing grade is D-. In order to specify a different grade, include the grade in parentheses immediately after the course number. For example, "MAC 2311(B)" indicates that students are required to obtain a grade of B in Calculus I. MAC2311 by itself would

only require a grade of D-.

- Specify all majors or minors included (if all majors in a college are acceptable the college code is sufficient).
- "Permission of department" is always an option so it should not be included in any prerequisite or co-requisite.

*Example: A grade of C in HSC 3502, passing grades in HSC 3057 or HSC 4558, and major/minor in PHHP should be written as follows:*

*HSC 3502(C) & (HSC 3057 or HSC 4558) & (HP college or (HS or CMS or DSC or HP or RS minor)*

### **Co-requisites**

*Indicate all requirements that must be taken concurrently with the course. Co-requisites are not checked by the registration system. If there are none please enter N/A.*

Response:

N/A

### **Rationale and Placement in Curriculum**

*Explain the rationale for offering the course and its place in the curriculum.*

Response:

We are in the era of precision medicine, which began with the sequencing of the human genome and is based on the personalized analysis of individual genomes. It is important for life science majors to understand the structure and function of the human genome and how that information is studied, interpreted and applied. Human genomics, and its advances, is a field that encompasses medicine, biomedical research, agriculture, environment, and increasingly, ethical/social/societal/legal issues. This course is for life sciences majors. The course is taught at a 4000 level because it requires prerequisite knowledge of eukaryotic molecular biology and classical genetics. Its appropriate and valuable preparation for students considering medical, research, biotech, education, public health, communication, and social science fields of study and careers. The course will serve as an elective for the Microbiology and Cell Science major. Course will be offered once a year in the fall semester and is currently being taught as a special topic course in the fall semester and is in its 3rd iteration. The course averages 80 - 150 students per year.

### **Course Objectives**

*Describe the core knowledge and skills that student should derive from the course. The objectives should be both observable and measurable.*

Response:

At the conclusion of this course, the student will be able to:

1. Describe how the genome determines traits, including susceptibility to disease.
2. Assess the role of the genome in the development, detection, prevention and treatment of disease.
3. Conduct and evaluate human genomics research approaches and outcomes.
4. Illustrate and discuss how advances in biotechnology and genomics are personalizing all aspects of medicine including prevention, diagnostics, and treatment.
5. Lead broader discussions of the ethics and complexities of this era of biotechnology and precision medicine.

### **Course Textbook(s) and/or Other Assigned Reading**

*Enter the title, author(s) and publication date of textbooks and/or readings that will be assigned. &nbsp;&nbsp;&nbsp;Please provide specific examples&nbsp;&nbsp;&nbsp;to evaluate the course.*

Response:

Genetics From Genes to Genomes by Hartwell, Goldberg, Fischer, Hood. 6th Edition. Published by McGraw Hill, 2018.

### **Weekly Schedule of Topics**

*Provide a projected weekly schedule of topics. This should have sufficient detail to evaluate how the course would meet current curricular needs and the extent to which it overlaps with existing courses at UF.*

Response:

Structure and Function of Genome

Diversity and evolution – sources of diversity

Tracking inheritance in the genomic era

Advanced Genetic Technology

Genomic Sequencing - then and now

Bioinformatics

Genomics approaches for Mendelian and rare disorders – Exome sequencing and whole genome analysis

Genomics approaches for common disorders – GWAS

Epigenomics – Epigenome mapping

Cancer Genomics

Molecular Diagnostics and Detection – liquid biopsy, cfDNA analysis, pathogen detection

Genetic Testing including DTC

Gene and genome-based treatments

Pharmacogenomics and Precision Medicine

### **Grading Scheme**

*List the types of assessments, assignments and other activities that will be used to determine the course grade, and the percentage contribution from each. This list should have sufficient detail to evaluate the course rigor and grade integrity. Include details about the grading rubric and percentage breakdowns for determining grades.*

Response:

Students will be evaluated and their grades will be determined through proctored exams, low stakes quizzes, two assignments, discussion and participation, and a final project.

Three proctored, non-cumulative exams will be administered throughout the semester. Each exam is worth 18% of grade.

Brief quizzes will be given each week that cover each module. Quizzes can be taken up to two times each and only your highest score of each week's quiz will be recorded for a grade. The quiz average will count for 15% of final grade. The 3 lowest quiz grades will be dropped.

There will be two assignments (each worth 8% of final grade). The assignments are activities in which students analyze real genomic data from an ongoing study to identify associations between genetic variants and dietary traits. The students will then use online tools and resources, including those from NCBI and the primary literature to synthesize a biological hypothesis to support their associations and to contribute to the field of genomics.

Students will receive points for participation in Discussion Boards on Canvas. Participation is worth 2% of their final grade.

A final paper/presentation will be worth 18% of final grade. Students will have the option to write a paper or prepare a brief video presentation on a recent genomic discovery or development. This assignment will allow students to explore a specific disease, treatment, or technology of interest more deeply. Students will use tools and resources such as PubMed, GenBank, GENE and other resources that they used in the course.

### **Instructor(s)**

*Enter the name of the planned instructor or instructors, or "to be determined" if instructors are not yet identified.*



Response:  
Jennifer Drew

### **Attendance & Make-up**

*Please confirm that you have read and understand the University of Florida Attendance policy.*

*A required statement related to class attendance, make-up exams and other work will be included in the syllabus and adhered to in the course. Courses may not have any policies which conflict with the University of Florida policy. The following statement may be used directly in the syllabus.*

- *Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at:  
<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>*

Response:  
Yes

### **Accommodations**

*Please confirm that you have read and understand the University of Florida Accommodations policy.*

*A statement related to accommodations for students with disabilities will be included in the syllabus and adhered to in the course. The following statement may be used directly in the syllabus:*

- *Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, [www.dso.ufl.edu/drc/](http://www.dso.ufl.edu/drc/)) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.*

Response:  
Yes

### **UF Grading Policies for assigning Grade Points**

*Please confirm that you have read and understand the University of Florida Grading policies.*

*Information on current UF grading policies for assigning grade points is require to be included in the course syllabus. The following link may be used directly in the syllabus:*

- *<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>*

Response:  
Yes

### **Course Evaluation Policy**

*Course Evaluation Policy*

*Please confirm that you have read and understand the University of Florida Course Evaluation Policy.*

*A statement related to course evaluations will be included in the syllabus. The following statement may be used directly in the syllabus:*

- *Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.ua.ufl.edu/public-results/>. Students will be notified when the evaluation period opens, and can complete evaluations through the*

email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

&nbsp;

Response:

Yes

External Consultation Results (departments with potential overlap or interest in proposed course, if any)

Department	Name and Title
_____	_____
Phone Number	E-mail
_____	_____
Comments	

Department	Name and Title
_____	_____
Phone Number	E-mail
_____	_____
Comments	

Department	Name and Title
_____	_____
Phone Number	E-mail
_____	_____
Comments	

External Consultation Results (departments with potential overlap or interest in proposed course, if any)

Department	Name and Title
_____	_____
Phone Number	E-mail
_____	_____
Comments	

Department	Name and Title
_____	_____
Phone Number	E-mail
_____	_____
Comments	

Department	Name and Title
_____	_____
Phone Number	E-mail
_____	_____
Comments	

May 21, 2020

University Curriculum Committee  
Office of Undergraduate Affairs  
235 Tigert Hall  
Gainesville, FL 32611

Dear members of the University Curriculum Committee:

With this letter, I would like to offer my support for the College of Agricultural and Life Sciences (CALs) to offer Human Genomics (PCB 4XXX) via the University of Florida (UF) Online pathway. I believe that this course will contribute positively to the needs of students and fortify an already robust program.

UF Online looks forward to seeing this program thrive for many years to come!

Sincerely,



Evangeline J. Tsibris Cummings  
Assistant Provost and Director of UF Online

Cc:

Dr. Jennifer Drew, Department of Microbiology and Cell Science, College of Agricultural and Life Sciences



UNIVERSITY of FLORIDA  
Institute of Food and Agricultural Sciences  
Department of Microbiology and Cell Science

1355 Museum Drive  
PO Box 110700  
Gainesville, FL 32611-0700  
352-392-5430  
ewt@ufl.edu

October 28, 2019

To all members of the University Curriculum Committee:

We have carefully examined the distinguishing characteristics between the Molecular Genetics of Disease course (ANT 4531) offered by Professor Connie Mulligan and the proposed Human Genomics course (PCB 4XXX) to be taught by Dr. Jennifer Drew. The two courses are complimentary, not competing.

Our proposed course, Human Genomics, will be an elective for our major. In its third year as an experimental course, enrollment has grown from 60 to 106 students. In addition, 87% of the students are Microbiology and Cell Science majors. It is clearly a course that serves primarily our own majors.

As background, it requires a year of introductory biology and additional course such in genetics, molecular biology or biochemistry. In contrast, ANT 4531 has no prerequisites listed and is open to all students. These differences are also reflected in course content. ANT 4531 is taught by a series of excellent guest lecturers who provide very nice overviews of important topics that relate genetics and human disease. PCB 4XXX teaches students the content and the tools of the trade with a variety of bioinformatics exercises that have access to IRB approved human genetic data with associated metadata acquired from UF student saliva. Students in PCB 4XXX get hands-on big data analysis exercises that are NOT offered in ANT 4531. Thus, the content overlap is very small. The two courses are also offered from different perspectives and to different audiences.

In addition, ANT 4531 is offered irregularly (every 2-3 years) and hasn't been offered since 2017. PCB 4XXX will be offered every fall semester. ANT 4531 is also only offered in-person while PCB 4XXX is accessible to all life science majors whether they be on-campus or online.

I ask that our Human Genomics course be given official status. Both of these courses would serve as excellent cornerstones for a new minor in human genetics that would be very popular and offered by multiple departments.

Sincerely,

A handwritten signature in cursive script that reads 'Eric W. Triplett'.

Eric W. Triplett  
Professor and Chair

## **PCB4XXX: Human Genomics**

3 Credits

Online

### **Instructor**

Dr. Jennifer Drew

Department: Microbiology & Cell Science

Email: [jdrew@ufl.edu](mailto:jdrew@ufl.edu)

Office hours: Tuesdays 9am – 11 am or by appointment. Office hours will be with Zoom

### **Office Hours and Communication**

Since this is a web-based course and Dr. Drew is located off-campus, office hours will be online by appointment. Dr. Drew is also available to answer questions by email.

### **Pre-requisites**

Two semesters of college biology or equivalent (BSC 2010 and BSC 2011) OR PCB 3134 OR PCB 4522 OR BCH 4024 OR BCH 3025 or equivalents

### **Course Description**

This course will discuss how human genome sequence data is obtained, analyzed, and interpreted with an emphasis on what can be learned from an individual's genome. Genome-based strategies are used for the detection, treatment, and prevention of many diseases.

### **Course Background**

Increasingly, researchers and health care providers are mining the genome to uncover the basis of disease susceptibility and treatment. Genome-based strategies are used for the detection, treatment, and prevention of many diseases. This course will discuss the field of genomics, how genome sequence data is obtained and analyzed, and most importantly, what can be learned from an individual's genome. Students will work with anonymous human genome data and conduct a small analysis of associations between genetic variants and the diet. The course will address cutting-edge research in epigenetics, pharmacogenomics, molecular diagnostics, and the microbiome. The course will also include timely topics such as GMO's, stem cells, genetic testing and genome editing. This course will reinforce fundamental concepts in molecular biology and genetics.

We are in the era of precision medicine, which began with the sequencing of the human genome and is based on the analysis of individual genomes. It is important for life science majors to understand the basic structure and function of the human genome and how that information is studied, interpreted, and applied.

The reading assignments, course lecture materials and online activities will be posted each week. There will be a quiz each week over the module's material. All exams will be proctored and taken with HonorLock. Specific information about exam proctoring procedures will be posted closer to exam time.

This is a Classroom Undergraduate Research Experience (CURE) course, which means that students will become part of the research team to analyze associations of human genome variants. The findings generated by the students will contribute to the body of knowledge about the human genome. The research tools and methods are online, web-based or open source and are used by human genome researchers and those used by direct to consumer genetic providers like ancestry.com and 23andme. Thus, in addition to contributing to the body of knowledge of human genomics, students will take away skills that they can use to analyze their own genetic data should they ever acquire it.

The data that will be analyzed in this course is derived from an ongoing study called "Associations between the oral microbiome, diet, depression, and human genotype among University of Florida undergraduate and graduate students." It is approved under IRB 201801744. Students in this course will be given the opportunity to volunteer as a research subject this study, which is completely optional. More information will be provided in class.

### **Course Goals**

At the conclusion of this course, the student will be able to:

1. Describe how the genome determines traits, including susceptibility to disease.
2. Assess the role of the genome in the development, detection, prevention and treatment of disease.
3. Conduct and evaluate human genomics research approaches and outcomes.
4. Illustrate and discuss how advances in biotechnology and genomics are personalizing all aspects of medicine including prevention, diagnostics, and treatment.
5. Lead broader discussions of the ethics and complexities of this era of biotechnology and precision medicine.

### **List of Weekly Modules and Topics**

<b>Mod</b>	<b><u>Topic</u></b>	<b><u>Readings Resources</u></b>	<b><u>Key Specific Learning Objectives (does not include all SLOs per module)</u></b>
Welcome Module including Syllabus Quiz and Honorlock Quiz			
1	Structure and Function of Genome <i>What is a genome? What is the broad purpose of a genome?</i> <i>Molecular Biology Bootcamp (for an optional review)</i>	Ch 1, 6.1-6.4, 8.1-8.4	Molecular Biology Bootcamp SLOs:  Outline and compare the processes of replication, transcription and translation including the identification of the major players and their roles in the process.
2	Diversity and evolution – <i>What is the source of genetic diversity?</i> <i>How similar and how different are we?</i>	Ch 7	Identify different sources of diversity Classify and predict the effect of mutations on protein structure, function and phenotype.
3	Tracking Inheritance in the genomic era <i>How are traits inherited from generation to generation? How can inheritance be tracked and predicted?</i>	Ch 2 – 4 Online Mendelian Inheritance in Man (OMIM)	Draw a 3generation pedigree Predict conditional probabilities of inheritance Use OMIM.org to research molecular mechanism of disease.



4	Advanced Genetic Technology <i>What are the tools, applications, and limitations of genetic technology? (PCR, microarrays, recombinant DNA technology, DNA profiling, genome editing, stem cells)</i>	Ch 9.1, 9.2, 11.2, 11.3, 14.3, 18	Determine appropriate applications of tools and techniques to varied case scenarios  Identify the key characteristic of a GMO and summarize the GMO controversy with Golden Rice as an example.
Exam 1 (Modules 1 - 4)			
5	Genome Sequencing – Then and Now <i>How do we sequence and analyze a genome? How has genome sequencing advanced to high throughput, multi-parallel analysis?</i>	Ch 9.3, 10	Compare DNA sequencing technologies with respect to read length, throughput, quality. Determine the best sequencing technology for design of the experiment.
6	Bioinformatics <i>How do we interpret and analyze genome data? What are the common tools?</i>	Multiple tools at the National Center for Biotechnology Information ncbi.nlm.nih.gov	Determine the best sequence alignments of DNA with matrix. Use bioinformatics tools including CAP3, BLAST, ORF Finder to analyze and assemble and annotate DNA sequence results.
7	Genomic approaches for Mendelian and rare disorders <i>How are they inherited? What is their cause? How are they studied and tracked? Exome sequencing, WGS</i>	Ch. 2 and 3; Sections 4.2, 4.7, 15.1, 15.5	Use case examples to determine genetic mechanism of disease Interpret linkage results.
8	Genomic approaches for Complex disorders <i>How are they inherited? What is their cause? How are they studied and tracked? GWAS and statistical genomics</i>	Ch 22	Calculate heritability using a method based on relatedness and concordance  Interpret GWAS results Determine which strategy to use when mapping single gene or common diseases
EXAM II (Modules 5 – 8)			
9	Genotype and Phenotype Analysis <i>Participate in ongoing course-based research project to determine associations between genetic variants (SNPs) and dietary habits (phenotype)</i>		Use chi squared tests to find significant associations between SNPs and phenotype, calculate odds ratio and use GWAS catalog, dpSNP and ClinVar to annotate associations *Activity is split between 2 assignments. Part 1 due at the end of this week.
10	Epigenomics <i>How is gene expression controlled and what is the effect on human health and</i>	Ch. 17	Interpret results of BPA testing using the Agouti Mouse Model of Epigenome Sensing

	<i>disease? Epigenome mapping</i>		
11	Cancer Genomics <i>What is the role of the genome in cancer development, progression, detection and treatment?</i>	Ch. 20 Revisiting the hallmarks of cancer (Fouad and Aanei, 2017)	Recognize the hallmarks of the cancer development process including any highlighted genes and their roles Use and interpret data from the American Cancer Society Facts and Figures 2019 *Genotype/phenotype assignment Part 2 is due at the end of this week.
12	Molecular Diagnostics and Detection <i>How can genomic information and biotechnology be used to detect and diagnose disease?</i>	Ch 4 and Ch 11 ncbi.nlm.nih.gov/gtr/	Evaluate and compare genetic testing strategies Determine the appropriate genetic test or screen based on clinical information and distinguish the differences between them Use Genetic Testing Registry to identify genetic tests
13	Gene and Genome-based treatments <i>How can the genome be modified for treatment of disease?</i>	Ch. 18 Rossidis, et al., 2018 FDA statement on first gene therapy approved for genetic disease FDA statement on first RNAi therapy	Recognize the technical challenges and ethical concerns of gene therapy  Outline overall scheme of gene therapy including delivery mechanisms  Determine best viral vector to use in given gene therapy scenarios
14	Pharmacogenomics and Precision Medicine <i>How can personal genomic data affect drug choice, dosage and outcomes? What are ELSI issues stemming from DTC?</i>	Ashley, 2016 Towards Precision Medicine, Nature Reviews Genetics Amare et al, 2017 Pharmacogenomics in the treatment of mood disorder: Strategies and opportunities for personalized psychiatry. EPMA Journal. Pharmacogenetics Knowledge base	Use pharmacogenomic resources (online), results and case information to evaluate scenarios (see pharmacogenomic review for major depressive disorder (MDD) and SSRI treatments as an example)  Identify and evaluate ELSI issues stemming from personal genomics and DTC providers including forensic use of ancestry DNA data and its privacy implications  Distinguish clinical vs. research lab testing  Use pharmgkb.org to drug selection and dosing based on genotypic info

15	Reflections and Synthesis		Projects Due (papers or presentations) to share with class Facilitate Discussion on project
Exam III (Modules 10 – 14)			

### **Textbook**

The textbook is recommended. Genetics From Genes to Genomes by Hartwell, Goldberg, Fischer, Hood. 6th Edition. Published by McGraw Hill, 2018.

The book is available in digital form or in hardback, to rent or buy.

Other online resources will be posted.

### **Basic course structure and flow – how it works**

Welcome to the course. Login to Canvas, select this course, and then go to the “Start Here” Module. This module will highlight all the important policies, features, and flow of the course. I’ve included an intro video of myself too so you can get to know me.

New modules are posted each week of the semester. For each module, there will be several items to complete. Click on the link for each item. The first item will always list the **learning objectives** for the week. Keep the learning objectives in mind as you learn the material. After reading the learning objectives, please go through the material in the order presented. The next item in the list will usually be the reading assignment, followed by the lectures, and links to any online tutorials or modules. After you go through the material in the order presented, you are always free to return and visit any of the content. The welcome video will give an example of the types of course content and how it will be presented. The pdf of the lecture slides of each module will also be posted for your convenience. This convenience is for students who wish to print out the slides and follow along with the lecture, study the notes later, etc. The lectures slides will only be available in pdf format.

Each module includes a quiz. The quizzes are due on the last day of the module week by 11:59 PM. The material will be available to you throughout the semester, but once a quiz due date passes, this means that you can no longer access the quiz. This means that both of your quiz attempts must be completed by midnight. If you only attempt a quiz once before due date, that quiz grade is the only one that will count. (See below for more info on quizzes).

### **Tips for Success**

After teaching online for 10 years, I’ve accumulated some tried and true tips for success in an online course. These are real tips from my past students:

- Schedule "class times" for yourself. It is important to do the coursework on time each week.
- Read ALL of the material contained on this site. There is a lot of helpful information that can save you time and help you meet the objectives of the course.
- Do not wait to ask questions! Waiting to ask a question might cause you to miss a due date.
- Don’t wait for the last minute. Even a little bit a deadline anxiety can affect your performance. Give yourself some breathing room.

- Always have a backup plan: do you have the power cord ready in case your battery goes down in the middle of an exam? What if your internet is out on the day of any exam?
- Use the learning objectives to study! (of students who regularly use the learning objectives, 100% said they were extremely helpful and valuable).

### **Grading**

Students grades will be determined through three proctored exams, low stakes quizzes, two assignments, discussion and participation, and a final project.

### **Exams**

Three proctored, non-cumulative exams will be administered throughout the semester. Each exam is worth 18% of your grade. All exams will be proctored. Exam dates will be announced during the first week of class, but you can see where they fall in the semester in the list to topics above. If an exam is taken without approved proctoring arrangements and without adhering to proctoring criteria (eyes only on the screen, closed book/notes, no talking or other devices, etc) credit will not be given and the score will be a zero. If it is detected that a student's LMS account was signed into by more than one instance during an exam (i.e., two individuals signed into the same student account during an assessment), credit will not be given and the score will be zero.

There are no make-ups for exams without prior notification and proper documentation for an excused event or activity.

### **Quizzes**

Brief quizzes will be given each week that cover each module. Quizzes can be taken up to **two times each** and only your highest score of each week's quiz will be recorded for a grade. Your quiz average will count for **15%** of your final grade. The 3 lowest quiz grades will be dropped. A missed quiz for any reason will be a zero and can count towards a quiz drop.

There are 15 total quizzes. One of the quizzes is a syllabus quiz to make sure the policies and format of the course are understood. Another quiz is an Honorlock practice quiz to ensure students understand the process to take an assessment with Honorlock.

### **Point Adjustment Requests**

Following the close of each quiz window and for exams 1 and 2, you have 10 calendar days to contest your quiz/exam grade in an email. Any requests for points must include a clear justification of your response and why it is as complete or better than the correct one.

Please note that questions and comments about any quiz/exam question are welcome at any time during the semester for the purposes of understanding and education.

### **Research Activity Assignments**

There will be two assignments (each worth 8% of final grade). Instructions will be given in class. The assignments are activities in which students analyze real genomic data from an ongoing study to identify associations between genetic variants and dietary traits. The students will then

use online tools and resources, including those from NCBI and the primary literature to synthesize a biological hypothesis to support their associations and to contribute to the field of genomics.

### **Participation**

Students will receive points for participation in Discussion Boards on Canvas. Participation is worth 2% of their final grade.

### **Final Project**

A final paper/presentation will be worth 18% of your final grade. More details will be provided in class. Students will have the option to write a paper or prepare a brief video presentation on a recent genomic discovery or development of their choice. This assignment will allow students to explore a specific disease, treatment, or technology of interest more deeply. Students will use tools and resources such as PubMed, GenBank, GENE and other sites that they used in the course.

### **Course Grade Breakdown:**

Exams (3 total each worth 18%)	54%
Final presentation	13%
Quizzes	15%
Assignments	16%
Discussion	2%
<hr/>	
Total	100%

### **Grading Scale**

	<b>Percentage</b>
A	93.0 - 100
A-	89.0 – 92.99
B+	86.0 – 88.99
B	82.0 – 85.99
B -	79.0 – 81.99
C+	76.0 – 78.99
C	72.0 – 75.99
C-	69.0 – 71.99
D+	66.0 – 68.99
D	62.0 – 65.99
D -	59.0 – 61.99
E	58.99 and below

## **UF grading policies**

Please see the UF grading policies at this site: <https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/>

## **Attendance policy**

Requirements for class attendance and make-up exams and assignments in this course are consistent with university policies that can be found at: [catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/](https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/) Makeup exams will be provided for students who miss an exam due to extreme, documented circumstances that are consistent with the excused absences described in the university policy.

## **Students with Disabilities**

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, [dso.ufl.edu/drc](https://dso.ufl.edu/drc) ) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester. Please submit any accommodations by Sept 15 of the fall semester.

## **Course Evaluation**

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at [gatorevals.aa.ufl.edu/students/](https://gatorevals.aa.ufl.edu/students/). Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via [ufl.bluera.com/ufl/](https://ufl.bluera.com/ufl/). Summaries of course evaluation results are available to students at [gatorevals.aa.ufl.edu/public-results/](https://gatorevals.aa.ufl.edu/public-results/).

## **E-learning system - Canvas**

The course will be managed entirely through the e-Learning in Canvas. The LSS homepage contains tips and tutorials for students as well as [computer requirements](#). It is your responsibility to become familiar with e-Learning in Canvas and to ensure that you have the appropriate browsers, settings, internet speed, etc. For any technical questions regarding Canvas, please visit the LSS site (<https://wiki.helpdesk.ufl.edu/FAQs/E-Learning>) and/or the UF Help desk (<http://helpdesk.ufl.edu/>). They can address technical issues such as not being able to view course materials, not being able to access the quizzes, not being able to send mail, etc. **All technical issues/questions/comments should go to the Help Desk (352-392-HELP).**

## **Student Computing Requirements**

Please refer to the Student Computing Requirement policy from UF: <https://it.ufl.edu/policies/student-computing-requirements/>

Access to and on-going use of a computer is required for all students. Competency in the basic use of a computer is required. Course work will require use of a computer with a webcam for proctoring and a broadband connection to the internet.

## **Communications**

All email communication regarding this course will be done through the Conversations tool (Inbox) of Canvas. This mail system is private and secure. I will respond to your questions and emails as promptly as I can. By maintaining all email communication through Canvas instead of other email domains, it reduces the chance that discussions will get lost among our outside accounts.

Announcements will be made regularly through the Announcement feature. It is your responsibility to check your Canvas mail and Announcements **frequently** to stay updated on the course. Please check the course site a minimum of two times per week to be certain that you are not missing any important communications.

### **Academic Honesty**

UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code ([sccr.dso.ufl.edu/process/student-conduct-code/](https://sccr.dso.ufl.edu/process/student-conduct-code/)) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Please see the Student Honor Code and Student Conduct Code here:

<https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>

### **Additional comments regarding course decorum:**

Students are encouraged to discuss material with each other from the course, help each other understand concepts, study together, and even discuss assessment questions with each other once the quiz window is closed. However, the following violate the student honor code:

- Have another person complete a quiz in this course
- Copy another student’s quiz in this course
- Collaborate with anyone while taking a quiz in this course
- Discuss the questions and answers of a quiz with other students while the quiz window is still open
- Manipulate and/or distribute any materials provided in this course for any purpose (including course lecture slides).

### **Campus Resources**

#### 1. Health and Wellness

*U Matter, We Care:* If you or someone you know is in distress, please contact [umatter@ufl.edu](mailto:umatter@ufl.edu), 352-392-1575, or visit [umatter.ufl.edu/](http://umatter.ufl.edu/) to refer or report a concern and a team member will reach out to the student in distress.

*Counseling and Wellness Center:* Visit [counseling.ufl.edu/](http://counseling.ufl.edu/) or call 352-392-1575 for information on crisis services as well as non-crisis services.

*Student Health Care Center:* Call 352-392-1161 for 24/7 information to help you find the care you need, or visit [shcc.ufl.edu/](http://shcc.ufl.edu/).

*University Police Department:* Visit [police.ufl.edu/](http://police.ufl.edu/) or call 352-392-1111 (or 9-1-1 for emergencies).

*UF Health Shands Emergency Room / Trauma Center:* For immediate medical care call 352-733-0111 or go to the emergency room at 1515 SW Archer Road, Gainesville, [ufhealth.org/emergency-room-trauma-center](http://ufhealth.org/emergency-room-trauma-center).

## 2. Academic Resources

*E-learning technical support:* Contact the UF Computing Help Desk at 352-392-4357 or via e-mail at [helpdesk@ufl.edu](mailto:helpdesk@ufl.edu).

*Career Connections Center:* Reitz Union Suite 1300, 352-392-1601. Career assistance and counseling services [career.ufl.edu/](http://career.ufl.edu/).

*Library Support:* [cms.uflib.ufl.edu/ask](http://cms.uflib.ufl.edu/ask) various ways to receive assistance with respect to using the libraries or finding resources.

*Teaching Center:* Broward Hall, 352-392-2010 or to make an appointment 352- 392-6420. General study skills and tutoring. [teachingcenter.ufl.edu/](http://teachingcenter.ufl.edu/)

*Writing Studio:* 2215 Turlington Hall, 352-846-1138. Help brainstorming, formatting, and writing papers. [writing.ufl.edu/writing-studio/](http://writing.ufl.edu/writing-studio/)

*Student Complaints On-Campus:* [sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/](http://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/)

*On-Line Students Complaints:* [distance.ufl.edu/student-complaint-process/ /](http://distance.ufl.edu/student-complaint-process/)



## Course Conflict

In 2018, we shared a syllabus of Human Genomics with Biology for an external consultation. The Biology Chair did not report any conflicts with their courses, but suggested we contact Anthropology regarding a potential conflict with a course called Molecular Genetics of Disease (ANT 4531). We did, and they responded in opposition to the creation of the course citing too much overlap and that they had intentions to expand enrollment and offer their course online.

Human Genomics has been taught under a special topics designation MCB4934 since 2017 and is in its 3<sup>rd</sup> iteration. The enrollment trends from the past 3 years provide some indication of the interest level of the students.

We feel that the two courses are distinct in many ways including their size, intended audience, frequency, scope and mode of delivery. Here, we summarize key distinctions between the two courses in the table below.

	Human Genomics	Molecular Genetics of Disease – (from the attached syllabus)
Prerequisite	Biology 1 and 2 as well as a molecular biology, genetics OR a biochemistry course BSC 2010 & BSC 2011 & (PCB 3134 OR PCB 4522 OR BCH 4024 OR BCH 3025)	No one specific course listed in the syllabus but some knowledge of Mendelian genetics and molecular biology (such as Intro Bio, BCS 2011) is expected
Mode of delivery	Asynchronous, online (currently enrolls UF Online students)	Face to face, 1x per wk for 3 hr
Format	Lectures, activities, quizzes, presentation	Lecture/guest lectures, discussion and substantial participation
Intended Audience	Life science majors – particularly those who are interested in biomedical research or health professional careers <b>Currently, 93% of students are life science majors; 87% are Microbiology and Cell Science Majors</b>	Students from all colleges and majors
Place in Microbiology and Cell Science Curriculum	Approved as dept elective	Not approved as elective
Frequency course is offered	Every Fall semester	Every 2-3 years

Enrollment	60 - 106	5 - 40
Highlights of course	sequence analysis, bioinformatics activities, genotype-phenotype association testing, variant analysis	Rich discussions with diverse perspectives, guest speakers