Biology 210: Principles of Genetics
Section 1
Spring 2018 Course Syllabus

Course and Instructor Information

Meeting times: Lecture: M, T, Th 2:00-2:50 TNR 120
Final Exam: Thursday, May 17, 8:00am-10:00am

Professor: Dr. Matt Rogge
Office: TNR 435
Phone: 346-2506
Email: mrogge@uwsp.edu

Office hours: T, Th 10:00-10:50
Other times by appointment

Course Description Genetics is the study of how physical traits are inherited and the chemical structures that influence those traits. Genetics is increasingly important in all biological fields. It is important that students in any biologically-related field have a fundamental understanding of how physical and physiological traits are determined and passed to the next generation, as it is likely that they will encounter this at some point in their career. In this class, you will study DNA as the genetic material of all organisms, how it is replicated and transferred, how it controls phenotypic traits of organisms, and how changes in the DNA sequence result in variation within populations of species, ultimately leading to evolutionary change.

Course objective Describe the basic principles of inheritance at the molecular, cellular, organismal, and population levels.

General learning outcomes

1. Explain the basic principles of how genetic material is arranged and transmitted
2. Describe how a change in genetic material influences function
3. Apply knowledge of genetic material to its manipulation
4. Relate population genetics to evolution
5. Articulate the importance of genetics to societal, medical, and personal issues

What you should acquire from this class

Students will understand that…

- The physical and physiological traits exhibited by an organism are a product of the genetic information found within the organism
- Genetic information is passed from parent to offspring, and the inherited traits can be predicted
- The genetic information can change, leading to modified physical or physiological traits, which is the basis for variation, adaptation, and evolution

Course Learning outcomes

Knowledge:

Students will…

- Describe the central dogma of molecular biology
- Describe the chemical and structural characteristics of DNA, RNA, proteins, and chromosomes
- Explain how genetic information changes, leading to variation within a population and adaptation and evolution of a species
- Explain similarities and differences in mitosis and meiosis
- Describe how traits are passed from parents to offspring

Skills:

Students will…

- Identify important sequences related to gene expression
- Determine the amino acid sequence of a protein from its DNA sequence
- Demonstrate the ability to predict the outcomes of genetic crosses
- Use chi-square to determine if expected outcomes match predicted outcomes
- Use the Hardy-Weinberg equation to determine genotype frequencies in a population

Dispositions:

Students will…

- Recognize the relatively simple nature of the genetic code, and how changes over time can lead to complex organisms
- Critically analyze the advantages and disadvantages of genetic manipulation
- Appreciate that physical variation observed in the members of a population is attributed to subtle differences in the individuals' genetic makeup

Required Texts

Brooker, R. J. Genetics: Analysis and Principles, 6th edition. McGraw-Hill, New York, New York. Available from text rental.

Attendance

Attendance in lecture is required to ensure exposure to all material covered in class, but no formal attendance will be taken. Attendance at scheduled exam times is **REQUIRED**. Make-up exams will only be administered in the event of illness or emergency, which will also require documentation. If you are aware ahead of time of a conflict with an exam period, a meeting with the professor is required at least a week in advance of the exam to discuss the situation, and rescheduling **may** occur at the **PROFESSOR'S** discretion.

Grading

Online quizzes: 75 pts (20% of your grade)

Between exams, there will be online quizzes through D2L. There will be five quizzes, each worth 15 pts. The quizzes will be available to take 1-2 weeks before each exam, and you will have one week to complete the quiz once the quiz becomes available. Once you begin the quiz, you will have two hours to complete it. You can take the quiz as many times as you would like in your two-hour block, but the grade you receive will be the ***average score*** of all of your attempts. Consider the quizzes to be open book/notes. The format of the quizzes will be any combination of multiple choice, true/false, matching, and ordering.

Exams: 300 pts (80% of your grade)

There will be four exams during the semester (50 points each) and one during finals week (100 points). The material throughout the semester builds upon itself, so each exam will have **cumulative** ideas related to material covered on previous exams. In other words, view the semester continuously, not as five units broken up by exams. ***Prepare accordingly.*** The exams will be short answer, diagramming, multiple choice, fill in the blank, and matching. The only acceptable excuses for missing an exam are a death in the family, violent illness, or accident, and written evidence of some kind will be required in order to make up a missed exam. **NO EXCEPTIONS.** If a makeup exam is allowed, the makeup exam format may differ from the original exam. If you have a conflict with the exam, see me **at least a week before** the scheduled exam to schedule an alternate time. If you do not inform me at least a week in advance, you risk not being able to schedule an alternate time. The **Final Exam** will be worth 100 points, with 25 points coming from the last material covered (recombinant DNA technology, biotechnology, and genetics of cancer) and 75 points of cumulative semester material.

Total Class Points: 375

If you feel an error has been made in grading, **you have 48 hours** from the time you receive the graded assignment to contact the professor with your reasoning. The student will meet with the professor to discuss the grading, and the exam will be re-graded and returned.

Grades will be calculated by dividing the total points received by the total points possible and multiplied by 100. The following scale will be used to assign a final grade.

93 to 100%	A	80 to 82%	B-	67 to 69%	D+
90 to 92%	A-	77 to 79%	C+	60 to 66%	D
87 to 89%	B+	73 to 76%	C	<60%	F
83 to 86%	B	70 to 72%	C-		

ROUNDING: Percentages with a decimal value of xx.50 or higher will be rounded **up** to the next whole percentage (e.g., 89.500% → 90%). Percentages with a decimal value less than xx.50 will be rounded **down** to the next whole percentage (e.g., 89.49999999% → 89%). NO EXCEPTIONS.

Future Letters of Recommendation and References

In the future, you may need a former professor to write a letter of recommendation or be a reference for your employment application, application for graduate school, awards and scholarships, or other future endeavors. If you decide that you want to ask me to be a reference for you, you need to consider what you have provided for me to write or talk about. Were you an average, above-average, or excellent student? Were you engaged in class and excited about the material? Am I familiar with you outside of class and your goals for your life and career? Have you separated yourself from other students I have had in terms of interest, motivation, or academic success? What am I going to be able to say about you to convince someone else that you are better than other applicants? Furthermore, have you exhibited any negative characteristics that I might mention in my letter? The information I give reflects my honesty, and I will not give false or misleading information, because that may affect my ability to vouch for future students. Serving as a reference in no way guarantees that the reference will be a *positive* one. You need to consider these things for *any* person you hope to be a reference, not just me.

If you do ask me to be a reference or write a letter, I require the request to be in writing and an in-person meeting scheduled to discuss the position(s) for which you are applying. Before I give a recommendation, I require a current CV and/or transcript, copies of or links to forms I need to fill out, and all necessary contact information (names, addresses, phone numbers) required for me to submit the recommendation. Finally, I require these materials be delivered a minimum of **two weeks** before a recommendation is due. If any of these criteria are not met, I will not have time, nor will I be well enough informed to write a letter.

Tutoring

A tutoring group has been set up for this section of Biol 210 through the UWSP TLC. A schedule can be found on the TLC website http://www.uwsp.edu/tlc.

Expectations

You are responsible for attending lecture in order to ensure exposure to all the material covered. You are responsible for asking questions for clarification of topics that you do not fully understand. I am more than willing and happy to meet with you outside of class to further explain any topics. You can stop by during office hours or call/email/see me after class to set up an appointment outside of office hours. If there is any way I can assist you in this class, do not hesitate to ask, and I will do my best to help.

UWSP values a safe, honest, respectful, and inviting learning environment. In order to ensure that each student has the opportunity to succeed, we have developed a set of expectations for all students and instructors. This set of expectations is known as the *Rights and Responsibilities* document, and it is intended to help establish a positive living and learning environment at UWSP.

Academic integrity is central to the mission of higher education in general and UWSP in particular. Academic dishonesty (cheating, plagiarism, etc.) is taken very seriously. Don't do it! The minimum penalty for a violation of academic integrity is a failure (zero) for the assignment. For more information, see the UWSP "Student Academic Standards and Disciplinary Procedures" section of the *Rights and Responsibilities* document, Chapter 14.

How to be successful in this class

- Show up for all scheduled lectures.
- Look at the material you anticipate will be covered in class *before* you arrive to class.
- Develop good note-taking skills. Do not try to write down everything that is said. Sort through the information and make note of the important ideas and concepts being discussed.
- Reading and processing the information is the first step in learning the information. Learn to take notes with abbreviations so that you can spend enough time listening in addition to writing. Leave space in your notes so that you can go back and fill in more details later on.
- Be engaged in class. Process the information and put it in your own words. Answer questions when asked, even if you answer it in your head. If your answer is incorrect or lacking, make notes as to why.
- Do not study *for exams*. Studying that way promotes memorization, not understanding. Instead, study for learning and understanding.
- Do not try to memorize definitions. I will never ask you to define something. You will, however, need to know what words mean in order to understand the questions I am asking on exams.
- Study frequently. Repetition is the key to learning *any* topic. Studying for 40 hours over the span of four weeks will be much more beneficial than studying for 40 hours the weekend before the exam.
- After you have studied and know some or most of the material, meet with other students in the class and actively *discuss* the information. Explain mechanisms, theories, concepts, etc to other students. The other students can help you fill in areas where you are deficient. You will find that explaining these things to someone else is one of the best ways to ensure you know and understand the information. Then have another student explain a different idea or concept, and help them identify areas in which they are deficient.
- Begin studying your notes beginning with "big picture" ideas. Find the bigger concepts and make sure you have a basic understanding of those ideas. Once those bigger concepts are understood, add additional details relating to those ideas. By doing this, you construct "compartments" in your mind to store the details rather than simply trying to absorb all the details and hoping that they arrange themselves into a coherent idea. Ultimately, the difference between an A, a B, and a C is the level of detail that you know, but you should ***begin*** by focusing on the bigger picture.
- The level of detail that you will be required to know is the level of detail that I cover in lectures. The book has much more detailed information, which may help you better understand the material I cover, but I will not ask about the details I do not cover.
- When you do not understand something, LOOK IN THE TEXTBOOK! The book can give more detailed explanations and images that may help you better understand the material. Alternatively, use the internet. You have a wealth of information at your fingertips, use it!
- When your notes do not make sense and the book does not help, schedule an appointment with me. I am here to help you learn. I do not expect you to be a geneticist *before* taking the class. I understand that much of this material is new to you, and one or two lectures may not be enough for you to fully grasp the concepts. Do not be too stubborn to ask for help or you will risk falling behind.
- When answering questions on exams, be sure you answer them ***clearly***. You should not expect me to interpret vague answers in your favor. Your ability to explain something clearly is related to your knowledge of the subject. If answers are not clear or direct, my interpretation is that you do not understand that topic very well.
- When I ask you to ***explain*** something, the answer should not be a one or two-word answer. A good explanation will incorporate answers to the following questions:
  - "**What** is happening?"

- "**Why** is it happening?"
- "**How** it is happening?"
- Remember ***WHAT, WHY, and HOW***.

- Watch the following YouTube videos. The first is an hour-long lecture from psychology professor discussing how to study. The second is a 6 minute summary of the longer video.
  - https://www.youtube.com/watch?v=IlU-zDU6aQ0
  - https://www.youtube.com/watch?v=23Xqu0jXlfs

Access for all Students
The Americans with Disabilities Act (ADA) is a federal law requiring educational institutions to provide reasonable accommodations for students with disabilities. For more information about UWSP's policies, visit: http://www.uwsp.edu/stuaffairs/Documents/RightsRespons/ADA/rightsADAPolicyInfo.pdf

If you have a disability and require classroom and/or exam accommodations, please register with the Disability and Assistive Technology Center and then contact me **AT THE BEGINNING OF THE COURSE**. I am happy to help in any way that I can, but you need to be registered. For more information, please visit the Disability and Assistive Technology Center, located on the 6th floor of the Learning Resource Center (the Library). You can also find more information here: http://www4.uwsp.edu/special/disability/

Use of electronics during class
Please turn off/mute/set to vibrate any electronic devices that could interrupt class (lab or lecture) before class begins. If it is a personal emergency, feel free to excuse yourself from the class and communicate outside of the classroom

TENTATIVE SCHEDULE (Subject to change)

Week	Date	Topic	Chapter
1	Jan 22	Syllabus and Intro to Genetics	1
	Jan 23	Intro to Genetics	1
	Jan 25	DNA Structure	9
2	Jan 29	DNA Structure	9
	Jan 30	Chromosome Organization	10
	Feb 1	DNA Replication	11
3	Feb 5	DNA Replication	11
	Feb 6	Transcription	12
		Quiz 1 available	
	Feb 8	**NO CLASS**	
4	Feb 12	Transcription	12
	Feb 13	Translation	13
	Feb 15	**EXAM 1**	
5	Feb 19	Translation	13
	Feb 20	Translation	13
	Feb 22	Regulation of Prokaryotic Genes	14
6	Feb 26	Regulation of Prokaryotic Genes	14
	Feb 27	Regulation of Eukaryotic Genes	15
		Quiz 2 available	
	Mar 1	DNA Mutation and Repair	19
7	Mar 5	DNA Mutation and Repair	19
	Mar 6	DNA Recombination	20
	Mar 8	DNA Recombination	20
8	Mar 12	**EXAM 2**	
	Mar 13	Mitosis and Meiosis	3
	Mar 15	Mitosis and Meiosis	3
9	Mar 19	Mitosis and Meiosis	3
	Mar 20	Chromosome Structure and Number	8
	Mar 22	Chromosome Structure and Number	8
	Mar 26 - 29	**SPRING BREAK – NO CLASS**	
10	Apr 2	Mendelian Inheritance	2
		Quiz 3 available	
	Apr 3	Mendelian Inheritance	2
	Apr 5	Chi Square and Pedigree Analysis	2
11	Apr 9	Inheritance Patterns and Sex-Linked Traits	4
	Apr 10	Inheritance Patterns and Sex-Linked Traits	4
	Apr 12	**EXAM 3**	
12	Apr 16	Non-Mendelian Inheritance	5
	Apr 17	Genetic Linkage	6
	Apr 19	Genetic Linkage	6
13	Apr 23	Genetic Linkage	6
		Quiz 4 available	
	Apr 24	Population Genetics	27
	Apr 26	Population Genetics	27
14	Apr 30	Population Genetics	27
	May 1	Molecular Technologies	21
	May 3	**EXAM 4**	
15	May 7	Molecular Technologies/Biotechnology	21/22
	May 8	Biotechnology	22
		Quiz 5 available	
	May 10	Genetics of Cancer	27
16	**FINAL EXAM: THURSDAY, MAY 17, 8:00am-10:00am**		