

# BIO 1306.020

## Principles of Biology I

### Spring 2022

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#### Instructor: Dr. Russell Wilke

**Email:** [rwilke@angelo.edu](mailto:rwilke@angelo.edu) (preferred contact; please include your full name, ASU ID, and course section)

**Phone:** 325-486-6638 (Leave a call back #)

**Office:** CAV 108A (first floor)

**Office Hours:** MTWR, 2-330 and by special appointment. In-person office hours may be moved to outdoor spaces (weather permitting), on board the *Milano* or the *Benatar* (whichever ship is available) or to a virtual meeting place. In person visits will be limited to 15 minutes. Masks are required.

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#### Course Description

This course introduces the integration between structure and function of biological organization. You will be asked to use processes of science to apply principles of evolution, biological chemistry, energetics and homeostasis, cell structure and function, gene expression, and patterns of inheritance in living systems. Observation, experimentation, and investigation are emphasized. Biology 1306 requires a conceptual understanding of the material rather than the simple memorization and regurgitation of facts. This course will challenge you to analyze and apply information, solve problems, and make connections different from the context in which they were learned. These are critical skills in biology. *This course is intended for Biology majors and minors or those for which it is a degree requirement or necessary for other reasons. It is not recommended for non-majors just to fulfill a general education requirement for a science/laboratory course.*

I expect you to come prepared for class, complete assignments on time, and follow instructions...and of course I also expect you to behave as a responsible adult. You are always invited to ask questions or stop by for a chat! As a member of the class you are also invited to:

- Ask questions, no matter how naive they seem to you. I will do my best to offer you a satisfactory answer. The only stupid question is one that isn't asked.
- Ask for help and/or clarification. Don't suffer in silence. I can't help you learn if I don't know you're confused or if my instructions are unclear.
- Use your group members as study partners! Review exam review questions (on Bb) or notes together. Group learning can be powerful and is often beneficial in a course like biology.

## PLEASE NOTE

- There are separate Blackboard and separate Top Hat Courses for lecture and lab. You will be sent separate invitations to Top Hat for lecture and lab.
- Biology 1306 and 1106 are face-to-face courses with strong online components. We will be meeting physically on campus AND completing course work and assessments online (see the Required Course Materials section of your syllabus for the necessary technology).

## Prerequisite and Co-requisite Courses

Biology 1306 – Principles of Biology is a co-requisite with Biology 1106 – Biology Lab. This means you must enroll in both the lecture and the lab to earn credit for each. An overall grade will be calculated and assigned to both the lecture and lab sections. Because the lab is required and a co-requisite of the course, your final grade in lab will be the same as your overall grade in the course. This course is not recommended for non-majors who wish to fulfill a general education requirement for a laboratory course.

## Prerequisite Skills

Accessing Internet websites, using ASU Library resources, and proficiency with Microsoft Word, Excel and/or PowerPoint are expectations of the course. Google products are not compatible with course software.

## Student Learning Outcomes/Objectives/Goals

Please see the comprehensive list at the end of this document.

## Course Delivery-

### Statement for Synchronous Remote Sessions

To maintain academic quality while accommodating social distancing needs this semester, this course will use a split delivery model that combines face-to-face teaching with remote instruction. When you are not in the physical class, you will attend recorded or live remote sessions (at the same time as our scheduled course) to engage with the material. You will also be expected to complete coursework via Top Hat or Blackboard.<sup>1</sup>

Please refer to this [Health and Safety web page](#)<sup>2</sup> for updated information about campus guidelines as they relate to the COVID-19 pandemic.

**Class Preparation Blackboard (Bb) and Connect Plus:** Much of your learning about biology must take place outside of the formal class meetings. You should be a frequent visitor to the course Blackboard site (<http://blackboard.angelo.edu>). Please check Bb regularly. All of the material you need to prepare for class is available from the Bb site: reading assignments for each unit, lecture presentations, homework assignments, in-class activity handouts, helpful handouts (for some concepts), and links to outside review materials (for some concepts). If you are a first time Bb user, your password is your ASU PIN (usually your 6-digit birth date unless you have changed it). You can change your password and update your personal information by adding your email address and a telephone number where you can be reached this semester. Many of the homework assignments are available through Bb and link directly to the online homework system Connect Plus.

**TopHat:** TopHat is a web based platform that allows you to answer questions in class that are projected on your personal device (cell phone, laptop, or tablet). It allows you to check on how you are learning and helps your instructor identify when the class may be doing great or struggling a bit with a concept. We use TopHat because it lets us see how students are doing with a particular concept or idea--in real time! We use TopHat in class so that you can answer questions and see the results. If the class is doing great, we move on to the next subject for the day. If not, it lets us help you learn what you might be struggling with before we move on to the next activity or topic. We also will use it for quizzes in class.

**Please register by the end of the first week of classes.** By Friday of the first week of classes, you will have received an email from your instructor with instructions for enrolling in their specific TopHat course. If you did not receive this email, please contact your instructor IMMEDIATELY to request the link to the TopHat website. Otherwise, complete the information to pay with a credit card. It is important that you sign up for your lecture instructors website or you will not be able to participate (and earn points) in class.

**Class Preparation & ASU email:** Since class announcements will be routinely distributed via email, you will need to regularly check your ASU email account and follow instructions. **Please check you ASU email daily.** All course correspondence will be through your ASU email only (I will not respond to email from other accounts). Please see the email policy in Bb for more details. ASU provides Internet and email services to you at any of the computer labs on campus. Call 942-2911 to set this up if necessary.

**Lecture:** A typical class meeting will combine mini-lectures, discussions, group activities, multimedia presentations, and other demonstrations and activities to give you an opportunity to learn biological concepts in as active a manner as possible. Each segment of the course is structured around one or more conceptual units that can be interpreted or solved by applying selected biological concepts. You can accumulate up to 200 points toward your final semester grade from unannounced group or individual in-class activities (no make-ups) or homework assignments. We will also use Top Hat questions for in class activities.

**Use of electronics for non-class related activities:** More and more students are bringing their laptops/tablets, etc. to class to take notes. Sadly, some students use these devices for non-class related activities. Viewing movies, videos, checking social media, etc. can be distracting to other students. This will not be tolerated. You will be given one warning and then asked to leave and points deducted from your grade. You will have to make an appointment with the Student Life Office and me to search for a resolution before you will be allowed re-entry to class.

**Course Groups:** While taking exams is an individual activity, almost all other activities will require your participation with other class members. We will form groups the first week of class. Many of the lecture exercises will be solved collaboratively.

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## Required Texts, Materials, and Technology

- **Encouraged** – *Masks and Distancing at all times.*
- **Required** - Wi-Fi and broadband internet with access to a desktop or laptop computer with Google Chrome Browser. Note Google Docs, Google Slides, and Google Sheets will not work with class technology. .
- **Required** - Microsoft Office 365. You have free access to this software as an ASU student. You must use the downloaded, not the web, version of this software. You are expected to complete assignments in both Word, Power Point and Excel. Instructions for how to find and install this software will be provided in the Lab Blackboard
- **Required Text-** Textbook: Brooker, R.J., E.P. Widmaier, L.E. Graham, and P.D. Stiling. 2020. Biology. 5th Edition. McGraw-Hill: NY with CONNECT™ (Connect is an online homework software program)
  - The text and software program are both required.
    - Option 1 eBook with CONNECT™– ISBN: 9781260933437/9781264114573
    - Option 2 Loose leaf Book AND CONNECT™ ISBN: 9781260933437/9781260933437
- **Required Lab Manual** - Heimann C.P. and D.P. French. 2021. Principles of Biology I – Biological Investigations. Fountain Head Press: Southlake TX. ISBN: 9781644852750. This lab manual is ONLY

available via **TopHat**. It is essentially an online lab manual that allows you to submit assignments and answer questions online. (You can sign up for a 2 week free trial at <https://app.tophat.com/register/>. The Top Hat join code for all lab sections is **884997**.)

- **Required** - access to <https://blackboard.angelo.com>. Many course materials for lab are located here.
- **Required - TopHat Access:** Mobile/Electronic device driven platform we will use for attendance, quizzes, readings, AND homework activities. Information concerning purchasing this service will be provided during the first week of classes. This program is required for lecture and lab. There is an app for both android and apple based smart phones and tablets, so you can take Biology anywhere. It also works well with and without Wi-Fi although Wi-Fi is strongly recommended.
  - TopHat Access may be purchased online directly (suggested) or from the ASU bookstore. There are several courses at ASU that use this same service. The online purchase will be more economical over the long run. If you transfer to another university that uses TopHat the account moves with you.
  - You may join with a free trial that can last up to two weeks. <https://app.tophat.com/register/>.
  - **NOTE: The JOIN CODE is 127614. You will also receive an email to join the class through Top Hat Monocle.**
  - **This will also require access to a smartphone or tablet**
- **Required** - ASU email account that you check DAILY. Call the ASU IT Dept if you need one or have forgotten how to access it (325-942-2911)

## Communication

I will respond to email and/or telephone messages within 24 hours during working hours Monday through Friday. Weekend messages may not be returned until the following Monday or workday.

**Written communication via email:** All private communication will be done exclusively through your ASU email address. Check frequently for announcements and policy changes. In your emails to faculty, include the course name and section number in your subject line.

**Virtual communication:** Office hours and/or advising may be done with the assistance of the telephone and/or Blackboard Collaborate.

## Evaluation and Grades

Course grades will be determined as indicated in the table below.

**METHODS OF ASSESSING OBJECTIVES:** The student learning outcomes will be assessed by exams, tutorials, lecture activities, and the laboratory.

Component	Maximum Points	Grading Scale
Class participation Activities & Homework	200 points from many 1 to 20 pt activities/homework/quizzes (note ~250 points will be available)	A = 900-1000 pts B = 800-899.9 pts C = 700-799.9 pts D = 600-699.9 pts F = 0-599.9 pts
Exam 1	100 points	
Exam 2	100 points	
Exam 3	100 points	
Final Exam	200 points	
Laboratory	300 points More details given in lab	
Total Points	1000	

**Class Activities & Homework:** A maximum of 200 points is allowed from lecture activities and both online and offline homework; however, there will be opportunities to earn 230-240 of these points. Lecture Activities are NOT attendance points, but you must be present to earn them since there are no make-ups. (In other words, you can make up the points, but not the individual activity). Note that this constitutes 20% of your overall grade. Participation is expected. If you do not earn points on a given assignment, you will have an opportunity to earn them on another, but are still responsible for the material covered in the assignment. It also means, I do not accept late work. Pay your premiums - use the extra-credit opportunities early in the semester! Use every opportunity early and throughout the semester to complete these activities to be sure that you will have 200 points by the end of the semester. No last-minute offers of extra-credit are made in this course, so please don't ask. It wouldn't be fair to your classmates that have done all the work to earn their grade. Many homework assignments are on-line so that you can work on them at your convenience and get immediate feedback on your learning.

**Exams:** All exams, including the final exam are cumulative. Exams cover material from LECTURE and LAB. Please refer to the learning outcomes/objectives at the end of this document for specifics. Questions typically require interpretation of data and application of concepts in addition to factual recall. While emphasis will be placed on material specifically discussed in lectures, exams also include questions covered in other assigned materials, readings and LAB. Exam questions are objective format (multiple choice or matching) and given on paper, Blackboard, or Top Hat. More information will be provided in class.

**Laboratory:** This portion of the course offers you the opportunity to explore and apply concepts to answer research questions with hands-on learning. Success in the laboratory involves teamwork in designing and conducting experiments, performing pre-lab and lab activities and report writing. In addition, you will conduct activities designed to develop and improve critical thinking and problem-solving skills related to the topics discussed in lectures. Even though BIOL 1306 and 1106 are different courses, you only get one grade for the combined points for each course (see table above). Your course grade in 1306 will be the letter grade reported for both courses on your transcript. **You must earn a minimum of 60% of the lab points( 180 out of 300) to pass the course!! You WILL NOT pass the class if you fail the lab!!**

#### **Make-Up Exams:**

- **Individual Make-up Exams are not provided.**
- If you miss one of the first four exams, the final exam will be used to determine a substitute grade for the missed exam. For example, if exam scores are 55, 0, 64, and 105. The missed exam score will be adjusted to "make-up" the missed points. To calculate this, your score on the final exam is divided by the number of points available on the final multiplied by 100. For example,  $140/200 * 100 = 70\%$ . 70% of 100 (the # of points available on exam 2) is 70 points which would be substituted for your score on exam 2.
- You will only be allowed to "make-up" one exam during the semester by substituting it with a percentage from your final exam. If you miss more than one exam, for any reason, you **may not pass** this course.
- Everyone ***MUST*** take the final exam. You **may not** pass this course if you miss the final exam.
- **If you have taken exams 1, 2, 3, & 4, the grade on your final exam (if higher than your lowest test score) will be used to replace your lowest exam score as calculated above.** You may replace only one exam score. If you have missed an exam, you do not have this option.

All grades will be calculated in the same way, regardless of extenuating circumstances or any reason not related to your actual performance in the course. However much I may sympathize with your personal circumstances, I never consider them to be a basis for grade assignments. The activity and homework points

serve as an extremely generous, built-in curve. I strongly encourage you to take advantage of them when they become available because once assigned they cannot be made up. Therefore you should always attend class and strive to do your best, so that **you** may **earn** the grade you want. It is your responsibility to keep up with your point total. **Don't worry I will help you, if you just ask!**

See ASU Operating Policy 10.11 [Grading Procedures](#)<sup>3</sup> for more information.

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## General Policies Related to This Course

All students are required to follow the policies and procedures presented in these documents:

- [Angelo State University Student Handbook](#)<sup>4</sup>
- [Angelo State University Catalog](#)<sup>5</sup>

### Attendance and Drop Date

You are expected to attend all scheduled class meetings. You are expected to arrive on time and stay for the entire period. Missed lecture activity points CANNOT be made up, but you will have the opportunity to make up the points. See make-up policies above. Attendance will be checked at each class meeting via the Top Hat system at random. Please inform me well ahead of time if you will need to be absent for any reason including religious holidays. NOTE: You are NOT automatically dropped if you stop attending class. **April 30<sup>th</sup> is the last day to drop a course.** Please see me first if you intend to drop. It might not be as bad as you think!

### Academic Integrity

Students are expected to maintain complete honesty and integrity in all work. Any student found guilty of any form of dishonesty in academic work is subject of disciplinary action and possible expulsion from ASU. . Students are responsible for understanding the [Academic Honor Code](#) and the ASU policies on academic dishonesty, which is contained in both print and web versions of the Student Handbook. The penalty for ANY act of dishonesty in this class, including any form of cheating or plagiarism: 1) is a grade of ZERO on the assignment and, 2) disciplinary action as warranted in accordance with university guidelines. Please do NOT jeopardize your career; it's not worth it.

The College of Science and Engineering adheres to the university's [Statement of Academic Integrity](#).<sup>6</sup>

### Accommodations for Students with Disabilities

ASU is committed to the principle that no qualified individual with a disability shall, on the basis of disability, be excluded from participation in or be denied the benefits of the services, programs or activities of the university, or be subjected to discrimination by the university, as provided by the Americans with Disabilities Act of 1990 (ADA), the Americans with Disabilities Act Amendments of 2008 (ADAAA) and subsequent legislation.

Student Disability Services is located in the Office of Student Affairs, and is the designated campus department charged with the responsibility of reviewing and authorizing requests for reasonable accommodations based on a disability. It is the student's responsibility to initiate such a request by contacting an employee of the Office of Student Affairs, in the Houston Harte University Center, Room 112, or contacting the department via email at [ADA@angelo.edu](mailto:ADA@angelo.edu). For more information about the application process and requirements, visit the [Student Disability Services website](#).<sup>7</sup> The employee charged with the responsibility of reviewing and authorizing accommodation requests is:

Dallas Swafford  
Director of Student Disability Services  
Office of Student Affairs  
325-942-2047  
[dallas.swafford@angelo.edu](mailto:dallas.swafford@angelo.edu)  
Houston Harte University Center, Room 112

## Student Absence for Observance of Religious Holy Days

A student who intends to observe a religious holy day should make that intention known in writing to the instructor prior to the absence. See ASU Operating Policy 10.19 Student Absence for [Observance of Religious Holy Day](#)<sup>8</sup> for more information.

## Title IX at Angelo State University

The University prohibits discrimination based on sex, which includes pregnancy, sexual orientation, gender identity, and other types of Sexual Misconduct. Sexual Misconduct is a broad term encompassing all forms of gender-based harassment or discrimination including: sexual assault, sex-based discrimination, sexual exploitation, sexual harassment, public indecency, interpersonal violence (domestic violence and/or dating violence), and stalking. As a faculty member, I am a Responsible Employee meaning that I am obligated by law and ASU policy to report any allegations I am notified of to the Office of Title IX Compliance.

Students are encouraged to report any incidents of sexual misconduct directly to ASU's Office of Title IX Compliance and the Director of Title IX Compliance/Title IX Coordinator at:

Michelle Miller, J.D.  
Special Assistant to the President and Title IX Coordinator  
Mayer Administration Building, Room 210  
325-486-6357  
[michelle.boone@angelo.edu](mailto:michelle.boone@angelo.edu)

You may also [file a report online](#)<sup>9</sup> 24/7.

If you wish to speak to someone about an incident in confidence you may contact the University Health Clinic and Counseling Center at 325-942-2173 or the ASU Crisis Helpline at 325-486-6345.

For more information, visit the [Title IX website](#).<sup>10</sup>

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## Use of Masks/Facial Coverings by Students

As a member of the Texas Tech University System, Angelo State University has adopted the [Facial Covering Policy](#)<sup>11</sup> to ensure a safe and healthy classroom experience. Current research on the COVID-19 virus suggests there is a significant reduction in the potential for transmission of the virus from person to person by wearing a mask/facial covering that covers the nose and mouth areas. Therefore, in compliance with the university policy students in this class are **strongly encouraged** to wear a mask/facial covering before, during, and after class. Faculty members may also ask you to display your daily screening badge (rampart wellness screening) as a prerequisite to enter the classroom. You are also asked to maintain safe distancing practices to the best of your ability.

## Modifications to the Syllabus

This syllabus, including grade evaluation and course schedule, is subject to modification. In particular, the COVID-19 pandemic may require significant changes in course delivery and content on potentially short notice.

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### Course Schedule

Week 1/Jan 18 Science and The Chemistry of Life

Week 2/Jan 25 Cells

Week 3/Jan 31 The Nerve Cell

Week 4/Feb 7 Exam Review and Exam One

**EXAM ONE 2/10 – 2/11**

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Week 5/Feb 14 Enzymes and the Energy of Life

Week 6/Feb 21 Metabolism and Cellular Respiration

Week 7/Feb 28 Photosynthesis

Week 8/Mar 7 Exam Review and Exam Two

**EXAM TWO 3/10 – 3/11**

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SPRING BREAK - No Classes March 4-8

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Week 9/Mar 21 DNA Structure, DNA Replication, and Gene Function

Week 10/Mar 28 Cell Cycle, Mitosis, Meiosis, and Sexual Reproduction

Week 11/Apr 4 Review and Exam 3

**EXAM THREE 4/7-4/8**

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Week 12/Apr 11 Patterns of Inheritance I

Week 13/Apr 18 Patterns of Inheritance II

Week 14/Apr 25 DNA Technology

April 28 Last Day to Drop/Withdraw Regular Term, Spring 2021

Week 15/May 2 Review and Exam Review

Week 16/May 9 Final Exam Week

**FINAL EXAM Date 5/11 @ 8am-10am**

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# 1306/1106 LEARNING OUTCOMES/OBJECTIVES - Spring 2022

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## EXAM 1

### THE SCIENTIFIC STUDY OF LIFE

1. List and describe the characteristics of science
2. Differentiate between observations, hypotheses, theories and laws
3. Identify and describe elements of the scientific method and how biology is investigated
4. Identify and describe the elements of a controlled experiment including appropriate experimental and control groups.
5. Identify and distinguish between independent, dependent and standardized variables.

### THE CHEMISTRY OF LIFE

1. Explain the chemical nature of biological molecules
2. Identify the primary elements in living organisms
3. Describe the structure of atoms
4. Compare and contrast the different types of bonds
5. Differentiate between atoms and molecules.
6. Explain how the structure of water affects its chemical properties
7. Explain how monomers are used to form polymers
8. Compare and contrast the structures and functions of the four classes of biological molecules.

### CELLS (MEMBRANES, ORGANELLE STRUCTURE AND FUNCTION, CELL COMMUNICATION AND TRANSPORT)

1. Describe the properties of a cell.
2. Identify the components common to all cells.
3. Compare and contrast the cells that characterize the three domains of life.
4. Explain how the chemical structure of phospholipids enables them to form a bilayer in water.
5. Explain why a biological membrane has selective permeability.
6. Identify different functions of membrane proteins.
7. Compare and contrast the ways that molecules move across membranes.
8. Explain the relationship between diffusion and concentration gradients.
9. Explain how processes of passive transport work including Osmosis and Diffusion
10. Explain how mechanisms of active transport work including the Sodium-Potassium Pump
11. Explain how larger objects/molecules cross membranes including: Exocytosis and Endocytosis
12. Predict when each of these transport mechanisms might be in use
13. Identify the functions of the organelles in eukaryotic cells.
14. Describe how organelles interact in carrying out a cell's function.
15. Compare and contrast the structure and function of cytoskeletal proteins
16. Compare and contrast different cell junctions in animal cells.
17. Explain the function of plasmodesmata in plant cells.

### THE NERVE CELL

1. Describe the structure of a neuron.

2. Describe the forces that maintain the resting potential in a neuron.
3. Understand what is meant by electrochemical gradient
4. Compare and contrast a graded potential, the threshold potential, and an action potential.
5. Diagram and describe the events of an action potential.
6. Diagram and describe how chemical and electrical synapses work.
7. Explain the function of neurotransmitters.
8. Propose hypotheses for the appearance of paralysis or convulsions under various conditions, for example in response to different neuro-active drugs.

## **EXAM 2**

### ENZYMES AND ENERGY OF LIFE

1. Describe the energy transfers that are common to life.
2. Describe how cells use energy to do work.
3. Compare and contrast potential and kinetic energy.
4. Explain how physical laws constrain energy use in organisms.
5. Compare and contrast exergonic and endergonic reactions.
6. Explain how oxidation and reduction reactions are linked.
7. Explain how ATP is used in coupled reactions.
8. Explain how enzymes catalyze reactions.
9. Describe how negative and positive feedback regulate reaction rates.
10. Be able to explain homeostasis, feedback loops and their importance to biology.
11. List the factors that influence enzyme activity.
12. Explain how acids and bases affect pH
13. Explain a gradient (thermal, concentration, etc.)
14. Indicate the direction of energy or material flow under different conditions
15. Predict the permeability of membranes under different conditions

### Metabolism and Cellular Respiration

1. Explain how cells use energy in food to produce ATP.
2. Draw and explain the net reaction in aerobic respiration.
3. Compare and contrast the events of glycolysis, the Krebs cycle, and the electron transport chain.
4. Describe where, in a eukaryotic cell, each step in respiration occurs.
5. Draw and explain the net reaction in glycolysis.
6. Draw and explain the net reaction in the Krebs cycle.
7. Diagram and explain the flow of electrons in the electron transport chain.
8. Explain the role of O<sub>2</sub> in respiration.
9. Explain what would happen in each part of cellular respiration if the cell is deprived of O<sub>2</sub>.
10. Explain why fermentation is necessary in O<sub>2</sub> deprived cells. Compare and contrast aerobic respiration, anaerobic respiration, and fermentation.
11. Compare and contrast respiration and photosynthesis.
12. Compare and contrast homeothermic, poikilothermic, endothermic, and ectothermic and give examples.

## PHOTOSYNTHESIS

1. Predict the effects of various factors on the rate of photosynthesis, e.g.

1. light intensity

2. color of light

3. temperature

4. pH (concentration of hydrogen ions)

5. presence of inhibitors

2. Describe the function of photosynthesis

3. Describe the structures in a leaf that are involved in photosynthesis.

4. Describe how plants use the movement of ions, and osmosis, to control the opening and closing of the stomata.

5. Describe the components of the chloroplast and their roles in photosynthesis

6. Describe the components of the light-dependent & light-independent portions of photosynthesis

7. Identify the reactants (chemical inputs) and products (chemical outputs) of the light-dependent & light-independent portions of photosynthesis

8. Describe how to measure photosynthesis in various ways

9. Explain how the light-dependent & light-independent portions of photosynthesis work, how they are linked, and their similarities to cellular respiration

## EXAM 3

### DNA STRUCTURE AND GENE FUNCTION

1. Understand the structure of DNA and RNA

1. Explain how information is passed from DNA to proteins

2. Identify the components of double-stranded DNA

3. Explain the roles of DNA, RNA, and protein in the central dogma

4. Describe the events in transcription including the structure and function (role) of each of the following:

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- transcription factors
- promoter regions
- RNA polymerase
- mRNA

5. Describe the events in translation including the structure and function (role) of each of the following:

- mRNA
- rRNA
- tRNA
- Amino acids
- chaperone proteins

6. Use the genetic code to translate a nucleic acid sequence into protein

7. Diagram and explain the relationship between codons and amino acids

8. Understand the ways that mutations can impact protein sequences.

### DNA REPLICATION, CELL CYCLE, AND MITOSIS

1. Explain how cells divide to give rise to identical cells

2. Describe the steps of replication and the function of enzymes in each step including:

- A. helicases
- B. RNA polymerase
- C. DNA polymerases
- D. ligases

3. Explain what features of DNA allow semi-conservative replication to occur

4. Describe the steps that occur as a chromosome folds into chromatin

5. Explain what is happening in a cell at each stage of the cell cycle

6. Diagram and identify the phases in mitosis

7. Explain what is meant by a cell cycle checkpoint and how these relate to cancer

8. Understand how mutations affecting the cell cycle can lead to cancer.

9. Compare and contrast the role of an oncogene and tumor suppressor in cancer

10. Compare and contrast the growth of a normal cell and a stem cell

### SEXUAL REPRODUCTION AND MEIOSIS

1. Explain how genetic information is passed from one generation to the next

2. Describe the role of homologous chromosomes in sexual reproduction

3. Explain the purpose of meiosis and gamete formation

4. Differentiate between haploid and diploid cells

5. Diagram and identify the steps in meiosis

6. Diagram and explain how meiosis generates genetic variability in offspring

7. Compare and contrast the impact of crossing over, independent assortment and random pairing during fertilization on variability in offspring

8. Compare and contrast mitosis and meiosis

9. Compare and contrast stem cells and differentiated cells.

10. Compare and contrast pre-implantation genetic diagnosis, genetic testing, and gene therapy.

11. Identify ethical issues associated with the use of DNA technology in medicine

### **EXAM 4-Please note this is a comprehensive exam.**

#### PATTERNS OF INHERITANCE

1. Explain how genetic traits are passed from one generation to the next.

2. Describe the role of chromosomes in inheritance.

3. Differentiate between the terms gene, allele, locus and chromosome.

4. Explain how meiosis and the production of gametes are associated with inheritance.

5. Explain the relationship between dominant and recessive alleles of a gene.

6. Compare and contrast genotype and phenotype.

7. Differentiate between homozygous and heterozygous.

8. Use a Punnett square to diagram and explain the inheritance of one gene.

9. Explain how meiosis contributes to Mendel's law of segregation.

10. Explain how meiosis contributes to the independent assortment of alleles.

11. Compare and contrast incomplete dominance and co-dominance.

12. Explain how pleiotropy and epistasis can influence phenotype.
13. Diagram and explain why males express X-linked recessive traits more than females.
14. Explain why one X chromosome is typically inactivated in female cells.
15. Analyze a pedigree to determine what pattern of inheritance a trait displays.
16. Explain how the environment and polygenic traits can influence phenotype.
17. Understand how ABO markers contribute to human blood type.
18. Explain how blood type compatibility is determined.

#### DNA TECHNOLOGY

1. Describe how transgenic organisms are made.
2. Describe the uses of Biotechnology especially, recombinant DNA and transgenic organisms.

## Information Sheet–BIOLOGY 1306 – Spring 2021 – R. Wilke

You are required to sign and return this sheet to me by the date indicated in lecture class (must be present to win). By doing so you acknowledge that you have received, read, and understand the syllabus and what is required of you to be successful in this course.

The information contained in this syllabus is your guide to the rules of this course. If you do not understand what is expected of you or the impact of your actions (i.e. missing a class), you should come and see me ASAP (within the first week of class).

YOUR NAME (PRINT): \_\_\_\_\_

(Note: If you prefer to go by your middle name or a nickname, please indicate that in parentheses. Ex. Joseph Student (Joe))

MAJOR: \_\_\_\_\_

Lab Section (day & time): \_\_\_\_\_

Lab Instructor's Name: \_\_\_\_\_

I acknowledge that I have received and accept the responsibility for the information in the class syllabus. **I also acknowledge that I have read and will abide by the ASU Honor Code.**

NAME (signature): \_\_\_\_\_

To receive full credit, answer every question in complete sentences.

1. Tell me why you are here.
2. Name one thing you are proud of and one thing that is important to you and explain why you chose each one.
3. Read the course description on page 1. Based on those topics, what would you like to learn about this semester?
4. What strategies will you use in order to be academically successful in this course?

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- 1 <https://angelo.blackboard.com/>
  - 2 <https://www.angelo.edu/covid-19/returning-to-campus/health-and-safety.php>
  - 3 <https://www.angelo.edu/content/files/14197-op-1011-grading-procedures>
  - 4 <https://www.angelo.edu/current-students/student-handbook/>
  - 5 <https://www.angelo.edu/academics/catalog/>
  - 6 <https://www.angelo.edu/live/files/27603-student-handbook-2020-21#page=96>
  - 7 <https://www.angelo.edu/current-students/disability-services/>
  - 8 <https://www.angelo.edu/content/files/14206-op-1019-student-absence-for-observance-of>
  - 9 <http://www.angelo.edu/incident-form>
  - 10 <https://www.angelo.edu/title-ix>
  - 11 <http://www.texastech.edu/downloads/ttus-policy-face-coverings.pdf>