Chemistry of the Human Body

Instructor: Dr. Michelle Bertke (michelle.bertke@georgetown.edu)

Office: Reiss Science 240A (the first room inside the chemistry main office)

Office Hours: By appointment

(Virtual office hours https://georgetown.zoom.us/j/99420642628)

Class Meeting Times: MTWR 8:30am – 10:35am

Class Meeting Location: ICC 113

Course Objectives:

1. Explain major chemical principles and how they relate to biological systems.
2. Identify the main chemical reactions that occur in the human body.
3. Describe how the main biological systems of the body work together.
4. Integrate chemistry and biology concepts to describe the human body.
5. Demonstrate an understanding of how science works in the world.

Tentative Topic Schedule: 6/5-7/7

Week	**Dates**	**Topic**	**Material**
1	6/5-6/8	Class Introduction Introduction to Biology and Chemistry	- Course structure and expectations - Chemistry basics: atoms, bonding, introduction to chemical reactions. - Periodic table organization - Biomolecules - Introduction to body systems
2	6/12-6/15	Basics of Reproduction and Development	- Reproductive system - Mitosis and meiosis - Fertilization and development - Gene expression
3	6/19-6/22	Respiratory and	- Organs of the respiratory and digestive system

		Digestive	- Diffusion and concentration gradient - Molecular polarity follow up - Acid, bases, and buffers - Chemical reactions - Enzymes
4	6/26-6/29	Circulatory and Immune System	- Organs in the circulatory and immune system - Hemoglobin and oxygen exchange - Protein-protein interactions - Adaptive immunity - Vaccines
5	No Class July 4th 7/3-7/6	Muscular and Nervous System	- Neurons - Ions - Neurotransmitters - Membrane potential - Muscle contraction - Electron transport chain - Senses

This lecture and activity schedule is subject to change based on class interest. Updated dates and topics will always be posted on Canvas and announced in class.

Grade

Grades in this course follow a non-traditional grading format. You will not have standard exams with traditional points-based evaluation. Your final assessment in the class will be based on your overall performance on several categories (unit assignments, in-class assignments, quizzes, and presentations).

Specifics about the final grade in the class are listed in the table below. For example, if you would like to earn an A in the class, you need to fulfill the requirements listed in the A bracket. Plus/minus grades will be awarded when students fall somewhere between the expectation criteria for two given grades. Examples of adjustments in grades are listed below. **Note – these are not the only combinations. Each person's submissions will be assessed independently of others.**

A-: 99% on Quizzes, Completed all in-class assignments, Excellent on 2 Unit Assignment, Good on 2 Unit Assignments, Excellent level mastery on presentations, Good mastery on final reflection.

B+: 98% on Quizzes, Missing 2 in-class assignments, Excellent on 2 Unit Assignments, Good on 2 Unit assignments, Excellent mastery on all presentations, Excellent mastery on reflection.

If at any point you are wondering about your progress in the course, please reach out to me. **Do not wait until the end of the semester to question the process.**

Grade	Component and mastery that must be completed to receive this grade
A	**Quizzes** – > 95% on the quizzes **In-class assignments** – Complete all in-class assignments (or replacement assignments) **Unit assignments** – Excellent mastery on at least 3 unit assignments, Good mastery on 1 **Presentation assignments** – Excellent level mastery on presentations **Final reflection** – Excellent level mastery on final reflection
B	**Quizzes** – 90-95% on pre-class quizzes **In-class assignments** – Missing 2 in-class assignments (with no replacement assignments) **Unit assignments** – Excellent mastery on at least 2 unit assignments, Good mastery on 2 **Presentation assignments** – Excellent mastery on at least 1 presentation, Good mastery on others **Final reflection** – Excellent level mastery on final reflection
C	**Quizzes** – 90-80% on pre-class quizzes **In-class assignments** – Missing 4 in-class assignments (with no replacement assignments) **Unit assignments** – Good mastery on at least 3 unit assignments, Adequate mastery on 1 **Presentation assignments** – Good mastery on all presentations **Final reflection** – Good level mastery on final reflection
D	**Quizzes –** <80% on pre-class quizzes **In-class assignments** – Missing 6 in-class assignments (with no replacement assignments) **Unit assignments** – Good mastery on at least 2 assignments **Presentation assignments** – Good mastery on at least 1 presentation **Final reflection** – Adequate mastery on final reflection
F	Does not meet any of the above categories

Components in the course.

The numbers in parentheses are approximate. There might be more or less numbers of assignments throughout the course depending on how the semester unfolds. For more specifics about each assignment, see the Canvas page for that assignment.

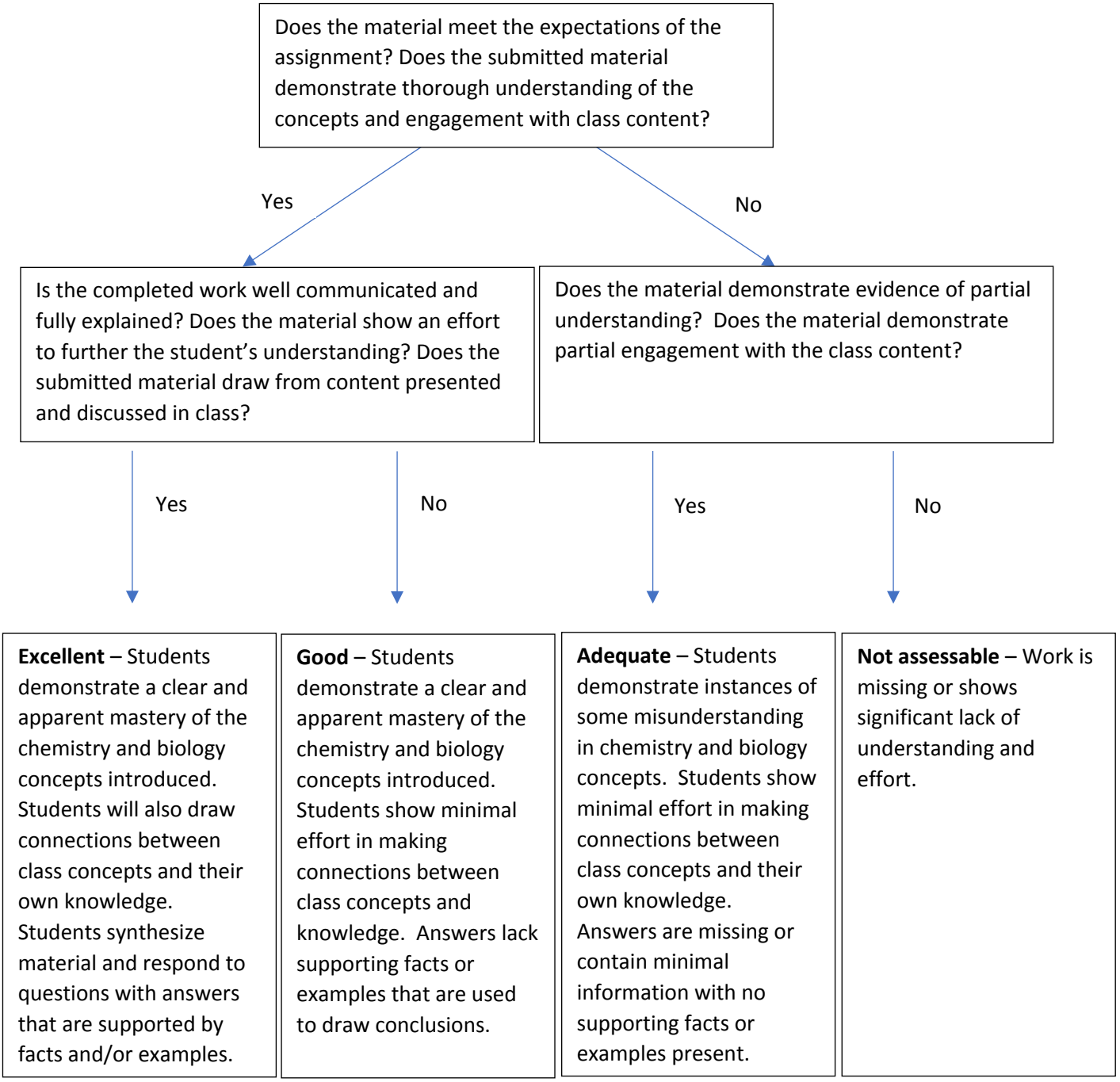
- **Quizzes (10)** – Pre-class assignments that are meant to gauge students' background knowledge. You are expected to review the material on Canvas prior to coming to class

and complete the quiz. The material on Canvas will be a mixture of review and new material depending on your prior chemistry and biology experience. The purpose of the quizzes is to give everyone the expected background. You can retake the quizzes as many times as you want until you master the material. Quizzes will be graded on a traditional points scale.

- **In-class assignments (10)** – In person components of the course that involve worksheets and discussions that will be completed in groups during class. This is the participation/attendance component of the course. The assignments will be introduced on Canvas but handed out and completed in class. You will be expected to attend class in order to complete these. These assignments will be graded on mastery level but will be based on effort and in class participation. You will not be able to make up in-class assignments that you miss. There will be replacement assignments available on Canvas that you can complete if you miss in-class assignments.
- **Unit assignments (4)** – Main assignments that follow each of the content units of the course (Reproduction and Development, Digestive and Respiratory, Circulatory and Immune, Muscular and Nervous). These assignments will be based on understanding of the content from the corresponding unit. These will be completed in class and will be done in your class discussion groups.
- **Presentation assignments (3)** – There will be three presentations throughout the semester – two shorter, pre-recorded presentations and one longer presentation in front of the class (at the end of the semester). The first presentation will involve introducing yourself and considering your goals for the class. The second presentation will be a short pre-recorded presentation you upload the Canvas that will involve research and explanation of a biological process. The last presentation will be in front of the class and will be a longer project explaining a complex biological process in a creative way. The last presentation can pe done with a partner.
- **Final Reflection (1)** – You will not have a traditional final exam in this class, instead you will have a final reflection that will focus on a summary of material from the semester.

<u>Explanation of mastery criteria:</u>

All assignments, with the exception of the quizzes, will be assessed based on the categories of excellent, good, adequate, or not assessable. For these assignments, you will not be given points or letter grades. Instead, you will be provided feedback about the work you submitted and be assigned one of the criteria below. The criteria will be assigned based on the flow chart below and will be based primarily on expectations of the assignment, understanding of the concepts, and integration of the class content and personal knowledge which demonstrates learning.



<u>Checklist for determining progress</u>

Use this checklist for keeping track of your assignment completion. Mark off each box as you complete the assignments. At the end of the semester, the boxes that are checked with indicate which grade bracket you fall into. I will use the same checklist at the end of the semester to determine your final grade.

Mastery	In-class Assignments	Unit Assignments	Presentation Assignments	Final Reflection
Excellent	☐☐☐☐ ☐☐☐☐ ☐☐☐☐	☐☐ ☐☐	☐☐☐	☐
Good	☐☐☐☐ ☐☐☐☐ ☐☐☐☐	☐☐ ☐☐	☐☐☐	☐
Adequate	☐☐☐☐ ☐☐☐☐ ☐☐☐☐	☐☐ ☐☐	☐☐☐	☐

	Quizzes
Complete	☐☐☐☐ ☐☐☐☐ ☐☐ ____%

Course Overview

This course focuses on how chemistry controls the biological systems of the human body. This is meant to be an interdisciplinary course that will cover introduction to biological systems and more in-depth chemical principles associated with those systems. Students do not need to have a strong background in chemistry or biology and all topics and background material will be introduced as needed.

Our course has been named an Engelhard course through Georgetown's Engelhard Project for Connecting Life and Learning. The goal of Engelhard courses is to integrate college health and well-being issues into course content by creating meaningful connections between students' lived experiences and what they are learning.

This semester we will explore these ties through close reflection and direct exploration of how health and well-being issues intersect with our course content. This semester, we will have guest speakers in this class that will tie these concepts together. They will relate the activities and issues of Georgetown University to the readings we will be discussing in this course. It is this connection between the academic and real-life issues that will be one of the bases of your reflection paper due at the end of the semester.

My goal for this course is to provide you with valuable information that you can use in your everyday life. I want to go beyond getting you a course credit and use this opportunity for extending your understanding of your own body.

Course Material

Information, including weekly readings, lecture material, and quizzes will be posted on Canvas. Check regularly to make sure that you are prepared in advance for the course. The posted readings and videos are meant to be a preview of the material before you come to class. Quizzes are meant to test the information from the readings and videos.

Course Expectations

1. Come prepared to class each day. This will involve reviewing material ahead of time and answering quiz questions. Several course sessions will involve in-class work or discussion. Everyone will benefit more from this if each student comes to class prepared to work with the material.
2. When you are present in lecture sessions, be prepared to work. An important component of this class is engagement with the material. This course is not a series of facts to be memorized but a process to work through. Rudeness or disruptive behavior will not be tolerated. There will be in class assignments that will build on the material covered out of class.
3. If for some reason you need to miss a class (due to illness-mental or physical, family emergency, etc.), please email me (michelle.bertke@georgetown.edu) as soon as you can. There are many points built into this course and missing one assignment will not drastically affect your grade. It is important to take care of yourself if you feel the need to miss class.
4. Each assignment will be given a deadline to keep the semester moving forward. I would advise you to complete all the assignments by the assigned deadlines. Many assignments will be completed in class. However, I also understand that sometimes you might need a day or two extra to complete the work to best of your ability. Therefore, the deadlines in this course are flexible to a degree. If this becomes a problem and people begin abusing this, I will reinstate strict deadlines.
5. At the beginning of the session, you will sort into groups for in class discussions and assignments. Each person is expected to participate equally. The goal of these groups is to build community and provide study groups for this class and others. These groups are not set-in stone and can be adjusted if needed.
6. Disrespect or rudeness will not be tolerated in this class, specifically during discussions. As a student of Georgetown, you are held to a high standard of education of the whole

person, *cura personalis*. Part of that in this class is learning how to engage in scholarly debates. Every person is expected to act in a professional manner.

Answering questions satisfactorily:

- Many times in this class, we will focus on the scientific process or the discussion points of a topic and not the ultimate answer. There are certainly times that there is a right or wrong answer (the quiz questions are right or wrong) but other times it is more about your thoughts.
- You will not be graded on correctness for some questions or assignments in this class (for example some of the in-class assignment). Instead, you will be graded on the quality of your answer.
- When answering a question, double check that you are both answering the questions and fully explaining your answers. Your responses should go beyond one sentence, simplified answers.
- Although it is perfectly fine, even recommended, to challenge your classmates' answers/comments and defend your answers, you are expected to do so in respectful and polite manner.
- For an example of what I am expecting for satisfactory answers, see the PDF posted on Canvas.

Collaborative work and presentations:

At the beginning of the semester, you will organize into groups for discussion and presentations throughout the semester. Several class sessions will involve discussion and collaboration on activities. Each person is expected to contribute to this work. These groups will remain the same throughout the semester and should serve as an additional resource for clarification of material and study assistance. The groups can be rearranged if an issue occurs. I encourage you to meet outside of class with your team to review for quizzes, discussions, and to work on homework and worksheets.

There are activities that are turned is as a group and some that are turned in individually. Please make note of what type of assignment it is when you are turning it in. When you work on individual assignments, you are expected to submit original answers. When you collaborate on assignments you should be discussing the concepts or information with your classmates but formulating answers to questions that are in your own words. This class encourages scientific collaboration, but it should be clear that each person has done the necessary work. **Academic dishonesty will not be tolerated!** If you ever have questions about this, ask for clarification!

Access to Literature Articles

Off campus access to library materials (including journals). If you are having trouble viewing primary literature articles, visit the library remote access page https://www.library.georgetown.edu/off-campus-access.

Honor Code:

As a student at Georgetown University, you are expected to uphold the university honor pledge (www.georgetown.edu/honor). There will be times when you can work together in pairs or groups, but everyone is expected to understand the material and turn in their own work.

Students agree that by taking this course all required papers may be subject to submission for a Textual Similarity Review to Turnitin.com for the detection of plagiarism. All submitted papers will be added as source documents in the Turnitin.com reference database solely for the purpose of detecting plagiarism of such papers in the future. Use of the Turnitin.com service is subject to the terms of use agreement posted on the Turnitin.com site.

Harassment/Sexual misconduct:

Under no circumstances will harassment or sexual misconduct be tolerated in the classroom. Everyone will be treated with respect and treat others with respect. I am committed to providing support to those who are victims of harassment or sexual assault. However, as a faculty, I am required to report any incidences of harassment or sexual assault to the Title IX coordinator. If you require a confidential resource, Georgetown offers many professionals to contact. Information about reporting or discussing harassment and sexual assault can be found at sexualassault.georgetown.edu.

Accommodations:

When it comes to issues around health and wellness, you may face challenges in your time at Georgetown. It's important to be aware of the resources available to support you. If you have a disability that may affect your academic work or well-being and for which accommodations may be necessary, come to me within the first two weeks of the course (or, in other circumstances, as soon as possible after accommodation becomes necessary) so that I can arrange for your needs to be met in this regard. You will also need to contact the Academic Resource Center (http://academicsupport.georgetown.edu), located in Leavey Center.

Student Support:

There are many resources on campus available to students for support throughout their time at Georgetown, covering physical and mental well-being. You can find a comprehensive brochure listing these resources at https://studenthealth.georgetown.edu/self-care.

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