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)

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:

Week	**Dates**	**Topic**	**Material**
1	6/3-6/9	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	6/10-6/16	Basics of Reproduction and Development	- Reproductive system - Mitosis and meiosis - Fertilization and development - Gene expression
3	6/17-6/23	Respiratory System	- Diffusion and concentration gradient - Molecular polarity follow up - Acid, bases, and buffers
4	6/24-6/30	Digestive System	- Chemical reactions - Enzymes - Metabolism

5	7/1-7/7	Circulatory System	- Hematopoiesis - Hemoglobin - Oxygen and carbon dioxide exchange
6	7/8-7/14	Immune System	- Protein-protein interactions - Adaptive immunity - Vaccines
7	7/15-7/21	Muscular System	- Muscle contraction - Electron transport chain - Creating ATP
8	722-7/26	Nervous System Presentation	- Neurons - Ions - Neurotransmitters - Membrane potential - Senses - Research Presentations

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

Weekly Course Schedule

Sunday – New module is released. Course content, quizzes, and discussions are available.

Thursday – Quizzes and Discussion post answering the questions are due.

Saturday – Comments on other student's discussion posts are due.

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 (quizzes, weekly discussion assignments, 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, Excellent level mastery on 6 weekly discussion assignments, Good level mastery on 2, Excellent level mastery on one presentation, Good level mastery on one presentation

B+: 98% on Quizzes, Missing 1 weekly discussion assignments, Excellent on one presentation, Good level mastery on one presentation.

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 **Weekly discussion assignments** – Good level mastery on one weekly discussion assignment and comments, Excellent level mastery on all others **Presentation assignments** – Good level mastery on one presentation, Excellent level mastery on others
B	**Quizzes** – 90% - 95% on the quizzes **Weekly discussion assignments** – Good level mastery on three weekly discussion assignments and comments, Excellent level mastery on all others **Presentation assignments** – Good level mastery on two presentations, Excellent level mastery on other
C	**Quizzes** – 85% - 90% on the quizzes **Weekly discussion assignments** – Excellent level mastery on two weekly discussion assignments and comments, Good or below on others, OR missing weekly discussion assignments **Presentation assignments** – Good level mastery on all presentations

D	**Quizzes** – <85% on the quizzes **Weekly discussion assignments** –Good or below on all weekly discussion assignments and comments, OR missing weekly discussion assignments **Presentation assignments** – Less than Good level mastery on presentations
F	Does not meet any of the above categories

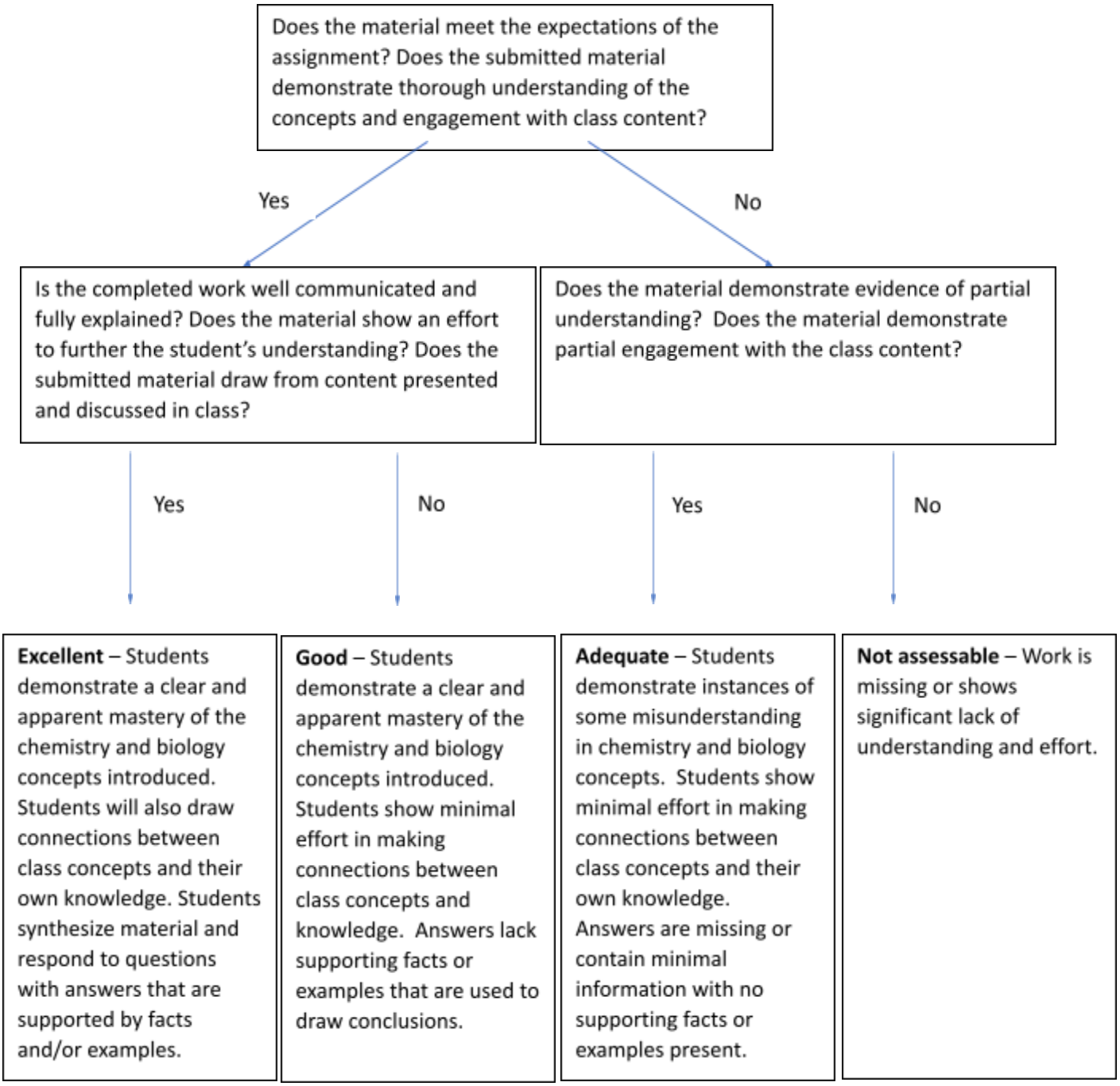
Components in the course.

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 (8)** – Assignments that are meant to gauge students' general knowledge. You are expected to review the material on Canvas 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.
- **Weekly discussion assignments (8)** – Weekly discussion assignments will be the way that you engage with the material and the other students in the class. Even though this class is asynchronous and we will not physically be together, I would like you to have an engagement with the class content. Each week you will be asked to answer a set of questions on the discussion board. You will then be responsible for commenting on two other student's discussion posts. Your comments should go beyond 'I agree!' or 'Good point.'. The discussion answers and comments you make should demonstrate and understanding of the material. I will also make comments on discussion posts to answer any questions or correct and misunderstandings. There is more information about answering discussion posts later in the syllabus.
- **Presentation assignments (3)** – There will be three presentations throughout the semester. The first presentation will involve introducing yourself and considering your goals for the class. The second presentation will involve you researching a molecule from one of the first body systems that we talked about. The last presentation will be to explain a complex biological process in a simplified but still informative way. For more information about each of these presentations, see the specific assignments on Canvas.

Explanation of mastery criteria:

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.



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.

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. Quizzes are meant to test the information from the readings and videos. The discussion questions are your way of engaging with the material along with other members of the class session. The presentations are meant as a way to demonstrate your understanding of the material.

Course Expectations

1. This class will be an eight-week summer session that will involve self-paced asynchronous work. The work will have deadlines to keep the session moving forward and I will check in with students regularly.
2. 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. You will get the most out of the class if you are committed to learning the material and engaging with the material along with others in the class.
3. If for some reason you need to miss a deadline (due to illness-mental or physical, family emergency, etc.), please email me (michelle.bertke@georgetown.edu) as soon as you can. It is important to take care of yourself if you feel the need to miss an assignment. You will have time to make up missed assignments but don't get too far behind.
4. I would advise you to complete all the assignments by the assigned deadlines. The course will follow a predictable schedule with the deadlines clearly listed. 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 (up to four students) for discussion posts. The groups may be changed periodically through the session. Use this group to engage with the material, exchange ideas, and have your questions answered. I will comment on each group's discussion board at several times throughout the semester to make comments and correct misconceptions.
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.

Discussions

Eight discussions will take place. Each discussion will involve topics from the readings and videos. Each student is expected to provide:

1. A discussion entry of one or two short paragraphs responding to the discussion questions. A rubric is provided so that you know how each discussion will be graded. You are expected to use the course material and your own ideas to answer the posted discussion questions.
2. Write at least two substantive responses (can be short) to discussion entries made by other students. The intent here is to encourage engagement and thought. Discussion and questions will be a powerful driver of your learning so keep that in mind and let's work together to engage with the material. The comments should be substantive (more that just 'Good point!') and contain sentences similar to the following format:
   You make a good point about _____ but I was also thinking _____.

   I don't really understand your point about_____. Did you mean_____?

   I agree with what you said about _____ and would add_____.

   You mentioned _____ but I think _____.

   You don't have to include the exact sentences above, these are just to provide a guide.

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.