

Fall 2020

## **BIOL 605-101: Principles of Bioscience Processing**

John Yarotsky

Follow this and additional works at: <https://digitalcommons.njit.edu/bio-syllabi>

---

### **Recommended Citation**

Yarotsky, John, "BIOL 605-101: Principles of Bioscience Processing" (2020). *Biology Syllabi*. 62.  
<https://digitalcommons.njit.edu/bio-syllabi/62>

This Syllabus is brought to you for free and open access by the NJIT Syllabi at Digital Commons @ NJIT. It has been accepted for inclusion in Biology Syllabi by an authorized administrator of Digital Commons @ NJIT. For more information, please contact [digitalcommons@njit.edu](mailto:digitalcommons@njit.edu).

**BIOLOGY 605: Principles of Bioprocessing****INSTRUCTOR:** John Yarotsky, PhD**PHONE:** 973-642-7976**OFFICE:** CKB 340C**EMAIL:** yarotsky@njit.edu**LECTURES:** WebEx Monday 6-9 PM**OFFICE HOURS:** By Request**Students must make an appointment to meet!****DESCRIPTION:**

THIS COURSE COVERS THE MAIN CONCEPTS OF CELL PHYSIOLOGY, MOLECULAR BIOLOGY, AND CELL BIOLOGY. THE FUNDAMENTAL ASPECTS OF BIOCHEMISTRY THAT RELATE DIRECTLY TO PHARMACEUTICAL DEVELOPMENTS ARE DISCUSSED AND INCLUDE BASIC ORGANIC CHEMISTRY, BLOOD AND BUFFERS, PROTEIN BASED ENZYMES, COMPLEX CARBOHYDRATES, NUCLEIC ACIDS, AND FATS. THOSE TOPICS WILL THEN BE INTEGRATED INTO A THOROUGH UNDERSTANDING OF BIOPROCESSING IN PHARMACEUTICAL INDUSTRIES. THIS COURSE IS FOR PROFESSIONAL SCIENCE MASTER'S STUDENTS WITH LIMITED KNOWLEDGE OF BIOLOGY.

**GOALS:**

This course will review general principles of the function of cells and the biochemistry that allows them to operate. It will give students a solid foundation for understanding the molecular mechanisms that underlie basic metabolic pathways. That knowledge will be used to understand how enzymatic reactions control cellular and systemic functions in the human body. Finally, students will be learn how pathogenic organisms disrupt human health and how modern pharmaceutical manufacturing techniques are used to combat invading microorganisms.

**TEXTBOOKS:**

THE MOLECULAR BASIS OF LIFE, SIXTH EDITION, TRUDY MCKEE AND JAMES R. MCKEE, JULY 2015

ISBN: 9780190209896

ANALYTICAL CONSIDERATIONS FOR CELLULAR THERAPY MANUFACTURING, CHRIS WIWI

CELL CULTURE BASICS HANDBOOK, GIBCO

**BIOLOGY 605: Principles of Bioprocessing**

**COURSE OUTLINE**

WEEK	DATES	TOPICS
Week 1	Sep 7	Labor Day- No Class
Week 2	Sep 8 Monday Schedule	History of Bioprocessing and the cell theory
Week 3	Sep 14	Cell Cycle, Mitosis, and Meiosis
Week 4	Sep 21	Energy: Enzyme-substrate kinetics and basic chemistry
Week 5	Sep 28	Amino Acids, peptides and proteins
Week 6	Oct 5	Carbohydrates and their metabolism
Week 7	Oct 12	Exam 1
Week 8	Oct 19	Lipids and membranes /Second messenger signaling pathways: Receptors and Ligands
Week 9	Oct 26	Microbiology basics: Bacterial and viral replication/ Viral transformation and other viral biotechnologies
Week 10	Nov 2	Vaccine Development
Week 11	Nov 9	Exam 2
Week 12	Nov 16	Sterile lab environment/
Week 13	Nov 23	Good Manufacturing Processes and Drug Development
Week 14	Nov 30	Cell Culture Basics/ FDA regulations
Week 15	Dec 7	Exam 3

**BIOLOGY 605: Principles of Bioprocessing**

**LEARNING OBJECTIVES/GOALS:** Upon successful completion of this course, students will be able to:

1. DESCRIBE IN A BROAD VIEW WHAT BIOPROCESSING IS.
2. DEFINE KEY ELEMENTS IN CELL CYCLE REGULATION.
3. IDENTIFY SPECIFIC ASPECTS OF BIOCHEMISTRY AS THEY RELATE TO CELL SURVIVAL AND GROWTH.
4. DEMONSTRATE KNOWLEDGE OF HOW BIOTECHNOLOGY IS USED TO MANIPULATE ORGANISMS FOR THE PRODUCTION OF PHARMACEUTICALS.
5. DESCRIBE TECHNOLOGIES THAT RELATE TO THE DEVELOPMENT OF CELL BASED THERAPIES.
6. DESCRIBE IN DETAIL A WORKING LABORATORY SETUP FOR THE DEVELOPMENT OF PHARMACEUTICALS.
7. DEFINE KEY ASPECTS OF MICROBIAL LIFE CYCLES.
8. IDENTIFY SPECIFIC TARGETS OF MICROBIAL LIFE CYCLES FOR MAINTAINING STERILE ENVIRONMENTS IN LABORATORIES.
9. CITE FDA REGULATIONS PERTAINING TO THE DEVELOPMENT OF PHARMACEUTICALS.

**You must have a computer of some kind with both a working webcam and microphone. The class will be held via Webex and participation and attendance are required portions of the class. Your webcam must be turned on and your face must be visible. You will have your microphone muted unless you are speaking. Speaking is not only encouraged but necessary during this class but feedback will result if everyone leaves their mics on at all times. So, please self monitor and be diligent about turning your mic on and off at appropriate times.**

EXAMINATIONS:

- Your final letter grade is based on lecture exams. The exams will each be worth 30% of your grade. The remaining 10% of your grade is based on attendance and class participation.
- You must have a laptop or iPad with a working webcam in order to take the online exams. The software used to monitor the exams does not work with Chromebooks or Android Tablets. Therefore, you MUST have a computer that has a working webcam and runs on either Apple's IOS operating system or a PC that runs Windows. If you do not you must drop the class because you cannot take the exams.**
- Exams will require the student to download the Lockdown Browser and Respondus Monitoring Software. Instructions for downloading and installing these are found in the Canvas page for the course.**
- "Exams will be proctored using both Respondus LockDown Browser+Monitor and Webex. Students will be required to join a Webex meeting from their phone with their cameras on, and to access the exam through LockDown Browser on a Mac or Windows PC with webcam. Students must follow all instructions related to environment checks and camera positioning."**
- Extra credit is not an option.**

**ATTENDANCE POLICY:**

Attendance is mandatory. Participation in the class is also mandatory. You must attend class with your webcam on and your microphone muted unless you wish to ask a question. Microphones should be muted to insure that feedback will not occur when one voice travels through multiple microphones at once.

This course will strictly adhere to the [NJIT Honor Code](#)!! Both the lecture and the lab will have zero tolerance for violations to the NJIT's [University Code on Academic Integrity](#)!!

---