

COURSE DESCRIPTION:

This course covers basic biochemistry and molecular biology. The nature of the major macromolecules will be discussed and their role in the regulation of carbohydrate, lipid and amino acid metabolism will be illustrated. The synthesis of proteins and nucleic acids will be reviewed, and the experimental techniques used in molecular biology will be considered. A review of the regulation of gene expression and intermediary metabolism will serve as an introduction to a more extensive consideration of the material to be discussed in the cell biology course in the following semester.

COURSE OBJECTIVES:

Throughout the course an effort will be made to indicate the relevance of biochemistry to clinical medicine.

FACULTY AND STAFF:

| Instructors | Department | Scheduled Office Hours | Office | Phone | E-Mail Address |
|---------------------------------|---|------------------------|----------------------|--------------|--|
| Michael A. Lea, Ph.D. | Microbiology, Biochemistry & Molecular Genetics | 3 pm Friday | E671, MSB | 973-972-5345 | lea@njms.rutgers.edu |
| Melissa B. Rogers, Ph.D. | Microbiology, Biochemistry & Molecular Genetics | 4 pm Monday | Cancer Center, F1216 | 973-972-2984 | rogersmb@njms.rutgers.edu |
| Technical/IST Assistance | | | | | |
| Christopher Houston | | | | | christopher.houston@rutgers.edu |
| Teaching Assistants | | | | | |
| Tiarrah Tolliver | | 2 pm Wednesday by Zoom | | | trt43@gsbs.rutgers.edu |
| Jessica Lu | | 4 pm Tuesday by Zoom | | | jl2706@gsbs.rutgers.edu |
| Amanda Huang | | 4 pm Friday by Zoom | | | xh241@gsbs.rutgers.edu |

COURSE FORMAT:

Lectures will be delivered between 6-9pm in person and by Zoom. Quizzes will be administered at the beginning of class by ExamSoft. Late arrivals will require an acceptable excuse (see SGS Missed Exam Policy below).

Sept. 7 Introduction - Functional Groups in Biological Molecules, Amino Acids (MBR)

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- Sept. 14 **Quiz 1, Protein Structure and Function; Enzymes: Kinetics and Regulation (MAL)**
- Sept. 21 **Quiz 2, Carbohydrates and Nucleotide Structure, Glycolysis and Gluconeogenesis (MBR)**
- Sept. 28 **Quiz 3, Pentose Phosphate Pathway, Glycogen and Glycosaminoglycans (MAL)**
- Oct. 5 **Quiz 4, Bioenergetics and the Tricarboxylic Acid Cycle; Electron Transport and Oxidative Phosphorylation (MBR)**
- Oct. 12 **Quiz 5, Lipid metabolism, Review (MAL)**
- Oct. 19 **Examination 1**
- Oct 26 **Amino Acid Metabolism, Protein Turnover and the Urea Cycle (MAL)**
- Nov 2 **Quiz 6, Porphyrins and Hemoglobin, Plasma proteins, Blood clotting, Nucleotide metabolism (MAL)**
- Nov. 9 **Quiz 7, DNA and RNA Synthesis and Nucleic Acid Techniques (MBR)**
- Nov. 16 **Quiz 8, Protein Synthesis and Techniques (MBR)**
- Nov. 23 **Quiz 9, Integration of Intermediary Metabolism and Review (MAL)**
- Nov. 30 **Quiz 10, Regulation of Gene Expression and Review (MBR)**
- Dec. 7 **Examination 2**
- Dec. 14 **Comprehensive Final Examination**

COURSE TEXTBOOKS:

Lippincott Illustrated Reviews: Biochemistry, 8th edition, 2022, by Abali, Cline, Franklin, Viselli, published by Wolters Kluwer, Philadelphia.

An eBook is available through the library: <https://meded-lwwhealthlibrary-com.proxy.libraries.rutgers.edu/book.aspx?bookid=3073>

Wolters Kluwer books receive a 30% discount at checkout from www.LWW.com w/ Promo Code: **WZP45MFT**.

Note, earlier editions should also suffice for FundsA and are available via the library

Other useful resources:

Molecular Biology of the Cell, 6th ed. (2015), Alberts B, *et al.* (Smith Library, Permanent Reserve QH581.2 M718 2015)

Molecular Cell Biology, 8th edition (2016), Lodish H, et al. (Smith Library, Permanent Reserve QH581.2 M718c 2016)

<http://themedicalbiochemistrypage.org>

For those desiring additional practice questions, we have reviewed a demo of “Lippincott® Firecracker for Firecracker Classroom: Biochemistry”, which is available from https://med.firecracker.me/purchase/rep_Rubin?product=Firecracker+Classroom%3A+Biochemistry. Although the 3,000 flashcard-style questions and 696 exam-style questions are not specific to the FundsA lectures, they are a comprehensive guide to general content. The questions are challenging and include professional school type questions with case studies.

EVALUATION METHODS & COURSE GRADING

Assessment/Evaluation:

The quizzes (10 total) are derived from each previous week’s material (5 questions each). Scores from 10 quizzes worth 1% each, 10% total.

Exam 1 and 2 will each evaluate material cumulative to date of exam (12 Qs/ each week’s topic, 72 questions total).

The Final Exam will evaluate material cumulative through the course (6 Qs/ each week’s topic, 72 questions total).

Estimation of Weighted Course Average

| Exam/Quizzes | Weight (%) |
|--------------|---------------------|
| Quizzes | 1% each (10% total) |
| Exam 1 | 30% |
| Exam 2 | 30% |
| Final Exam | 30% |
| Total | 100% |

Makeup Policy:

If a quiz is missed AND a student has a verifiable excuse meeting the SGS Missed Exam Policy (below) and accepted by Drs. Lea or Rogers, all remaining quizzes will be prorated. If more than 3 quizzes must be excused, then the faculty and student will arrange for Makeup quizzes, within 3 days of the evaluation.

If an exam is missed AND a student has a verifiable excuse meeting the SGS Missed Exam Policy (below) and accepted by Drs. Lea or Rogers, the remaining two exams will each be worth 45%. If more than one exam must be excused, then the faculty and student will arrange for a Makeup exam, within 3 days of the evaluation. In situations involving extensive delays, the student may be advised to discuss an incomplete with their advisor.

Course Grading:

A = 90-100, B+ = 80-89, B = 70-79, C+ = 60-69, C = 50-59, F = 49 and below.

Scores of ##.5 are rounded up.

A curve will only be applied under extraordinary conditions.

An anonymous course evaluation will be released after the final exam. Final grades will be released after 50% of the class has submitted an evaluation.

ABSENCE FROM COURSE QUIZZES AND EXAMS:

SGS has issued a **MISSED EXAM POLICY** for students enrolled in their programs.

Below are the valid excuses for missing a quiz or exam in this course (verbatim from the SGS Exam Policy):

- 1) Significant illness, with official note by doctor, which must include a valid reason for missing the exam. The doctor's note cannot result from a remote (online) diagnosis. NOTE: Illness prior to the exam ("didn't have time to study") does not constitute a valid excuse, although exceptions can be given by the SGS Associate Dean of Student Affairs if the prior illness has been severe or lengthy.
- 2) Death in the immediate family (parents, siblings, children, grandparents, aunts/uncles, niece or nephew, sister-in-law or brother-in-law, parents-in-law, first-cousins). Verification, with dates, is required, but this can be a newspaper announcement, event (e.g. wake) announcement, etc.
- 3) Medical/dental school interview, in which the interview or unavoidable travel overlaps with the exam. Copy of the invitation letter.
- 4) Presentation at a meeting. Proof of attendance required.
- 5) More than two final exams on the same day. (NOTE: An exam should not be rescheduled for an individual with two exams on the same day). If a student has more than two exams on the same day, they will need to contact the SGS Associate Dean of Student Affairs, who will contact the course directors about allowing the student to take one of the exams on a different day. The vast majority of schools across the country, including Rutgers New Brunswick, allow up to two final exam in the same day.
- 6) Permission of SGS Associate Dean of Students Affairs, with consultation of course-director. This will be rare, but is meant to account for valid, but unforeseen circumstances.

Each of these reasons will require some form of documentation to be submitted to verify the absence. For the full policy, please follow this link:

http://njms.rutgers.edu/sqs/current_students/docs/new/ExamPolicy.pdf

*In the event of insurmountable technical problems at the time of a quiz or exam, **FundsA** students are advised to retain proof of interactions with Rutgers or other technical help, e.g. an ExamSoft case number and/or screenshots verifying technical assistance, an electrical company notice indicating power outage, etc.*

SOFTWARE EXPECTED TO BE USED:

Canvas, Zoom conferencing, and Recording software chosen by Rutgers SGS, Turning Point Polling, ExamSoft for Quizzes, ExamSoft and potentially ExamMonitor for Exams.

EDUCATION PORTAL (<https://ep.njms.rutgers.edu>):

The **CANVAS** course website provides the schedule, documents, and notice of any changes to the Funds A Course. CANVAS can be accessed using the Educational Portal website at <https://ep.njms.rutgers.edu> or directly at <https://canvas.rutgers.edu/>.

2021 or archived 2020 **podcasts** of FundsA lectures can be accessed on the Digital Media Portal at <https://ep.njms.rutgers.edu>.

WIRELESS ACCESS FOR ELECTRONIC EXAMS (ON CAMPUS EXAMS)

RU Health Sciences is the primary wireless network for SGS however you can use either RU Health Sciences or RU Wireless Secure for electronic exams. Please make sure you can connect to both prior to an exam. See <https://ruwireless.rutgers.edu/ruwireless-secure> for more information. **DO NOT USE RU Wireless.**

Activation of Turning Technologies License for the Turning Point Audience Response System (ARS)

To Create an Account and Activate License:

1. Visit account.turningtechnologies.com.
2. Click Create Account.
3. Enter your email address and click Next. It is strongly recommended that you use your school email address.
4. Check your email and click the link to verify your Turning Account.
5. After verifying your email, enter all required fields as noted by the asterisks on the Profile page. Enter your license code in the License field and click Validate.
6. Click Create Account.

NOTE: If you do not have access to your Turning Account license code during account creation, you can redeem a license at any time by selecting Licenses from the left menu.

Any questions can be directed to our Technical Support Team at support@turningtechnologies.com or 866.746.3015.

EXAMSOFT SYSTEM REQUIREMENTS:

Note: These requirements will be updated by the SGS Office of Student Affairs and Admissions. The requirements below are from the 2019-2020 Academic year:

EXAMSOFT SYSTEM REQUIREMENTS:

The following laptop requirements are necessary for the School of Graduate Studies

| REQUIREMENTS | |
|--|---|
| Windows | Mac OS |
| <ul style="list-style-type: none"> • Operating System: 32-bit and 64-bit Versions of Windows 10. Alternate versions of Windows 10 RT and 10 S are NOT supported at this time. • CPU Processor: 2.0 ghz Intel i3 processor or equivalent • RAM = 4 GB or higher • HD (needs at least 1 GB of free space) • 13' screen or larger (Laptops) • Minimum screen resolution of 1024x768 is required with a 32 bit color setting • Virtual machines & applications are not allowed • Surface Pro is allowed (non-pro Surface devices are not allowed) • Tablets are not allowed; nor Chromebooks, netbooks, etc. • For on-site support, a working USB port is required (newer devices may require an adaptor) | <ul style="list-style-type: none"> • MacOS Catalina (version 10.15) is only compatible with Examplify version 2.0.6 or higher (Released on 10/14/19 or later)Any server version of Mac OS is NOT supported • 1GHz Intel processor or higher • RAM = 4 GB or higher • HD (needs at least 1 GB of free space) • 13' screen or larger (Laptops) • Minimum screen resolution of 1024x768 is required with a 32 bit color setting • Virtual machines & applications are not allowed • iPads/tablets are not allowed • For on-site support, a working USB port is required (newer devices may require an adaptor) |
| <ul style="list-style-type: none"> • Microsoft Edge, Internet Explorer • Chrome • Firefox • Do not use beta versions. Other browsers are not supported. | <ul style="list-style-type: none"> • Safari • Chrome • Firefox • Do not use beta versions. Other browsers are not supported. |
| <p>Browser Settings</p> <ul style="list-style-type: none"> - JavaScript Enabled - Cookies Enabled - CSS Enabled - Disable pop-up blockers | <p>Browser Settings</p> <ul style="list-style-type: none"> - JavaScript Enabled - Cookies Enabled - CSS Enabled - Disable pop-up blockers |
| <p>Must have Administrator level account permissions.</p> | |
| <p>Disable Toolbars, Adware or Spyware programs. They may adversely affect the computer's performance and cause delays in loading testing questions.</p> | |
| <p>If you are using McAfee, you need to turn off Real-Time Scanning.</p> | |
| <p>Turn off Windows updates or virus scanner updates to avoid interruptions during testing.</p> | |
| <p>****The following requirements apply for exams with ExamID or ExamMonitor enabled</p> <ul style="list-style-type: none"> • Examplify version 2.3.2 or greater • Hard Drive: 2GB or higher available space | |

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- RAM: 8GB or higher recommended; 4GB required
- Webcam
- Microphone (no headphones!)
- Internet: 2Mbps upload speed

EXAMSOFT EXAMPLIFY LINKS:

Mac : <https://examsoft.force.com/emcommunity/s/article/Exemplify-Minimum-System-Requirements-for-Mac-OS-X>

Windows: <https://examsoft.force.com/emcommunity/s/article/Exemplify-Minimum-System-Requirements-for-Windows>

Effective Study Habits

- 1. Pre lecture preparation.**
 - a. Prepare** index cards with book or Googled definitions of every keyword.
 - b. Deduce** the context and purpose of the lecture from the introductory and summary slides.
 - c. Formally prepare** (*i.e.*, write down) questions that you expect to be answered in the lecture or text. *E.g.*, for any lecture on a pathway: “*What are the substrates and products?*” “*What are the rate-limiting steps?*” “*What cellular or physiological need does this process fulfill?*”
- 2. Post lecture review.**
 - a.** Review your **notes within 24 hours** or lose 80% of the content.
 - b.** Review the **learning objectives** and identify
 - i.** the slides that relate to each objective.
 - ii.** the pages of the textbook that relate to each objective.
 - c. Compare notes** after class with a group of students.
 - d. Test yourself** online immediately. *Study as if the exam is tomorrow.*
- 3. Study using active learning methods.**
 - a. Replace** “reading” or “going over” with activities that activate multiple parts of your brain:
 - b. Identify** and **paraphrase** the most important take-home messages for each slide or paragraph. **Write** these down in your own words. **Translate** into a foreign language. **Explain** it to your grandmother – if you can’t, then you don’t really understand it.
 - c. Compare** and **contrast.** Identify similarities and differences between processes or structures. *E.g.*, glycolysis vs. gluconeogenesis, purines vs. pyrimidines; replication vs. transcription; DNA vs. RNA, carbohydrate vs. lipid vs. protein metabolism *etc.*
- 4. Use your learning strengths.**
 - a. Visual** learners should use pictures, diagrams, flow charts *etc.*
 - b. Auditory** learners should listen to recorded lectures in the car.
 - c. Verbalizers** should work with a study partner or “teach” the material to a friend or family member.
- 5. Know the core concepts and essential vocabulary for each topic.** If the lecturer repeats the word and the text books have underlined or **bold-faced** the word, you must understand that word.
- 6. For those with some background, appreciate the difference between “familiarity” and “mastery”.** If you think you already “know” a topic, then test yourself immediately using the questions posted on the web site and in the text books. Unless you get every question *perfectly* right on the night of the lecture, then study as if you never saw that topic before.
- 7. Schedule study time.** Any new concept requires at least 3 *intense* study sessions. An ideal pattern is right after class, the day after, and a day or so before the exam.
- 8. Stay healthy.** Graduate/medical/dental school is stressful and your body must meet the challenge. Get enough good food, exercise, and sleep. Replace TV or video games *etc.*, with exercise and sleep. Identify and use every coping method you ever learned.

CODE OF PROFESSIONAL CONDUCT (COURSE EXAMINATIONS):

All students have a fundamental responsibility for maintaining academic integrity and intellectual honesty in their academic and professional endeavors. They are expected to observe generally accepted principles of scholarly work, to submit their own rather than another's work, to refrain from falsifying data, to acknowledge the published work of others in an appropriate manner, and to refrain from receiving or giving aid during examinations or other work requiring independent effort. When submitting written material, students take full responsibility for the originality of all work not otherwise identified by appropriate acknowledgments and imply that both the ideas and words used are their own. All students are expected to respect the property of faculty and other students, and not use research equipment or laboratory supplies of others without permission.

Specific examples of appropriate behavior in examinations exams are given below:

Examinations: The purpose of an examination is to assess a student's knowledge of a topic defined within a course or courses. **Unless given explicit written instructions to the contrary, a student must work without assistance on an examination.**

- **Classroom examination:** Each student will provide answers to questions as directed. Unless otherwise stated, no material (books, calculators, computers, communication devices) of any kind can be used during an examination.
- **Take-home examination:** Each student will provide answers as directed. Unless otherwise stated, research and writing must be done individually without assistance or exchange of information with others. The ability to use source material in the research of answers will be defined for each examination. But, unless stated otherwise, all source material should be cited appropriately as outlined below.

NOTE: THESE POLICIES ALSO HOLD TRUE FOR ALL EXAMS ADMINISTERED REMOTELY.

To view the full policy for the Code of Professional Conduct in the School of Graduate studies regarding examinations, research and oral presentations follow this link:

http://njms.rutgers.edu/sgs/current_students/ac_integ.php

ACADEMIC WARNING POLICY:

http://njms.rutgers.edu/sgs/documents/policys/SGS_Academic_Warning_Policy.pdf

Each program shall clearly inform students of the criteria for satisfactory academic performance. Academic standing will be reviewed each semester by the Program's Academic Standing Committee. Students who receive less than an average grade of "B" in the designated Core course(s) or have a GPA less than 3.0 will receive an academic warning notice. Students performing below satisfactory levels of proficiency as outlined by the program may also receive a written warning notice. The written warning states the problem(s), outlines those measures needed for improvement and sets a deadline for compliance. Letters informing students of an

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academic warning will be sent within 30 calendar days of the end of the semester. A request will be made to students receiving academic warning letters to meet with the Program Director and/or the Academic Standing Committee.

COURSE ADD/DROP POLICY:

Policy for the Addition of a Course:

Students may add courses with the approval of the instructor (when required) and the program director. A student wishing to add a course after the general registration period has closed, must complete the "Add/Drop/Withdraw" form and have appropriate approval of the course instructor (when required) and program director prior to the start of the course. Registration will not be permitted beyond the first week of a course. Credit will not be given for courses in which the student was not registered.

Add Course Form Link:

<https://na2.docusign.net/Member/PowerFormSigning.aspx?PowerFormId=96fcae95-bc67-45fb-8da3-11300ded2e99>

Policy for Dropping a Course:

Students may drop courses with approval of the instructor (when required) and the program director. Students submitting a completed "Add/Drop/withdraw" form to the SGS Registrar's office within 10 academic days of the start of the course will receive a full tuition refund and the course will not appear on their official transcript. The drop period of 1-10 *academic days, is distinguishable from the withdrawal period in that the drop period is without penalty. A completed and approved Add/Drop/Withdraw" form(s) must be received by the Registrar's office within the time periods set forth above in order for a course(s) to be "dropped".

Drop Course Form Link:

<https://na2.docusign.net/Member/PowerFormSigning.aspx?PowerFormId=c45635ca-6a1e-4936-b436-337b211b8433>

***An academic day is defined as a day that the SGS campus at which the student is enrolled is open for business.**

REASONABLE ACCOMMODATIONS AT RUTGERS SCHOOL OF GRADUATE STUDIES:

Rutgers School of Graduate Studies is committed to providing equitable access to learning opportunities to students with documented disabilities (e.g. mental health, attentional, learning, chronic health, sensory, or physical). To ensure access to this please contact Student Affairs, to engage in a confidential conversation about the process for requesting reasonable accommodations in the classroom setting. Students are encouraged to register with the Office of Student Affairs as soon as they begin their program. Accommodations are not provided retroactively. Rutgers School of Graduate Studies encourages students to access all resources available through the School for consistent support and access to their program.

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More information can be found online at

http://njms.rutgers.edu/education/student_affairs/student_support/disability_services.cfm .

Rutgers University welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must complete the ODS registration form: <https://webapps.rutgers.edu/student-ods/forms/registration> and contact the RBHS Office of Disability Services at 973-972-5396 or cindy.poorepariseau@rutgers.edu to make an appointment for an intake interview. You will also be asked to provide documentation of your disability:

<https://ods.rutgers.edu/students/documentation-guidelines> .

If the documentation supports your request for reasonable accommodations, the Office of Disability Services will provide you with a Letter of Accommodations. This Letter will be used to notify appropriate school personnel about the accommodations you are qualified to receive. To begin this process, please complete the Registration form on the ODS web site at:

<https://webapps.rutgers.edu/student-ods/forms/registration> .

TEACHER-LEARNER POLICY RUTGERS SCHOOL OF GRADUATE STUDIES:

The Rutgers SGS Newark Health Science Campus strongly believes that teaching and learning should take place in a climate of mutual respect where students and faculty are equally responsible for maintaining a professional and collegial environment. An environment where students are evaluated based upon accomplishment, professionalism and academic performance. We are committed to maintaining a positive learning environment and the highest standards of behavior in the teacher-student relationship.

To view the full Teacher-Learner policy for the School of Graduate studies, please follow this link: https://njms.rutgers.edu/sgs/current_students/docs/Teacher%20Learner%20Policy.pdf