

Fundamentals of Biomedical Sciences A: Biochemistry and Molecular Biology (Course GSND N500A).

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 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: To prepare a student for pre-professional exams such as the MCAT and DAT and for further studies of medical biochemistry. Where possible the relevance of biochemistry to clinical medicine will be indicated.

FACULTY AND STAFF:

Instructor	Department	Scheduled Office Hours*	Office	Phone	E-Mail Address
Melissa B. Rogers, Ph.D.	Microbiology, Biochemistry & Molecular Genetics	4 pm Mon	Cancer Center, F1216	973-972-2984	rogersmb@njms.rutgers.edu
<i>*Access to the F level of the Cancer Center at 205 South Orange Ave. is restricted. If you wish to visit Dr. Rogers in person, email Dr. Rogers and Yesenia Sanchez (ys598@njms.rutgers.edu) at least 3 working days in advance so that your ID can be coded for access.</i>					
Technical/IST Assistance					
Edwin Deus		ed721@njms.rutgers.edu			
Teaching Assistants (office hour to be determined)					
Georgia Kambouras				gk572@gsbs.rutgers.edu	
Ruwenne Moodley				rm1815@gsbs.rutgers.edu	
Ishita Patel				ijp24@gsbs.rutgers.edu	

Additional tutoring is available via:

Rutgers SGS Pre-Medical Society

http://njms.rutgers.edu/sgs/student_organizations/pre_medical.php

Pre-Dental Society

http://njms.rutgers.edu/sgs/student_organizations/pre_dental.php

COURSE FORMAT:

Lectures will be delivered between **4 - 5:30 pm on Wednesday and Friday in MSB B552** 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). Quiz 1 will be on Friday 9/6. Quizzes 2-10 will be on the following Wednesdays. Quiz material will be on the previous week's 2 lectures and required reading assignments.

Date Wed./Fri.	Content	Assessments	Required Readings	Supplemental Readings
Aug. 28, 30	Week 1 Chemistry Basics - Functional Groups in Biological Molecules, Amino Acids	none	Funds A Syllabus	Lippincott Chap. 1, Alberts et al. Chap. 1-3
Sept. 4, *6	Week 2 Protein Structure and Function; Enzyme Kinetics and Regulation	*Quiz 1 (5 questions total with 1 Q from syllabus)	Abali <i>et al.</i> Case 1.4, pp. 20-26	Lippincott Chap. 2-5, Alberts et al. Chap. 3
Sept. 11*, 13	Week 3 Carbohydrates and Nucleotide Structure, Cytosolic reactions: Glycolysis and Gluconeogenesis	*Quiz 2 (5 Qs total with 1 Q from previous week's case going forward)	Abali <i>et al.</i> Case 5.2, pp. 150-156	Lippincott Chap. 7, 8, 10, Alberts et al. Chap. 2
Sept. 18*, 20	Week 4 More Cytosolic reactions: Glycogen, other sugars (fructose, lactose), Pentose Phosphate Pathway, and Amino acid sugar molecules (glycosaminoglycans, proteoglycans, and glycoproteins)	*Quiz 3	Abali <i>et al.</i> Case 1.3, pp. 14-20, Case 8.3, pp. 264-275	Lippincott Chap. 11-14
Sept. 25*, 27	Week 5 Mitochondrial reactions: Bioenergetics and the Tricarboxylic Acid Cycle; Electron Transport and Oxidative Phosphorylation	*Quiz 4	Abali <i>et al.</i> Case 5.3, pp. 156-162	Lippincott Chap. 6, 9; Alberts et al. Chap. 2, 14
Oct. 2*, 4	Week 6 Lipid metabolism and Exam 1 Review	*Quiz 5	Abali <i>et al.</i> Case 10.3, pp 343-355	Lippincott Chap. 15-18
Oct 9	Week 1 – 6 Material	Exam 1 (60 questions)		
Oct 11	No Friday class			
16, 18,	Week 7 The Many Fates of Nitrogen: Nitrogen disposal (Urea Cycle), Amino Acid Metabolism	none	Abali <i>et al.</i> Case 9.4, pp 308-319	Lippincott Chap. 19-20
Oct 23*, 25	Week 8 More Nitrogen Fates: Special Products: Porphyrins, Heme, and more; Nucleotide metabolism, Plasma proteins & Blood clotting	*Quiz 6	Abali <i>et al.</i> Case 9.5, pp 319-324	Lippincott Chap. 21, 22, 35

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Oct 30*, Nov. 1	Week 9 DNA and RNA Synthesis and Nucleic Acid Techniques	*Quiz 7	Abali <i>et al.</i> Case 8.2, pp. 260-264	Lippincott Chap. 30, 31, 34, Alberts et al. Chap. 4-6, 8
Nov. 6*, 8	Week 10 Protein Synthesis and Techniques	*Quiz 8	Abali <i>et al.</i> Case 4.4, pp 125-129	Lippincott Chap. 32, Alberts et al. Chap. 6, 8
Nov. 13*, 15	Week 11 Tying it together: Regulation of Gene Expression and Review	*Quiz 9	Abali <i>et al.</i> Case 4.5, pp 129-136	Lippincott Chap. 33, Alberts et al. Chap. 7, 8
Nov. 20*, 22	Week 12 Tying it together: Hormonal Integration of Metabolism and Review	*Quiz 10	Abali <i>et al.</i> Case 9.1; pp, 290-298	Lippincott Chap. 23-25, Alberts et al. Chap. 15
Nov. 27, 28	No Classes, Thanksgiving			
Dec. 4	Week 7 – 12 Material	Exam 2 (60 questions)		
Dec. 11	Week 1 – 12 Material	Optional Comprehensive Final Exam (60 questions)		

COURSE TEXTBOOKS:

Required:

Students will be examined only on material presented in class and in assigned readings in:
Biochemistry Behind the Symptoms Emine E. Abali, Roy Carman, Douglas B. Spicer; ISBN: 978-1-9751-9147-4

Students can get 30% off and free shipping (print) from
<https://shop.lww.com/p/9781975191474?promocode=WZT49QFT>
(skip find your school prompt) then add to cart, which will take you to the product page for a 30% discount and free shipping on this product and any other products (including digital) purchased. The discount will be applied at checkout.

An eBook is available through the library at <https://bit.ly/3CJcfd9>

Supplemental texts:

Many slides were designed from these 2 texts. Alternative explanations and supplemental reading may benefit and interest students.

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>

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

Note, earlier editions of both Lippincott and Alberts *et al.* should suffice for FundsA and are available used or in the library

Other useful resources:

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

<http://themedicalbiochemistrypage.org>

EVALUATION METHODS & COURSE GRADING

Assessment/Evaluation:

The quizzes (10 total) are derived from each previous week's lecture and assigned reading material (5 multiple choice questions per quiz).

Scores from 10 quizzes worth 1% each, 10% total.

Exam 1 and 2 will each evaluate material cumulative to date of exam (10 multiple choice Qs/ each week's topics, 60 questions total).

The Final Exam will evaluate material cumulative through the course (5 multiple choice Qs/ each week's topics, 60 questions total).

The lowest score from the 3 exams will not count towards the final grade.

Estimation of Weighted Course Average

Exam/Quizzes	Weight (%)
Quizzes on lecture and reading material	1% each (10% total)
Exam 1	45%
Exam 2	45%
Final Exam	45%
Total with lowest exam score dropped	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 Dr. Rogers, all remaining quizzes will be prorated. Students with the accommodation "Consideration with regard to absences & missed exams/quizzes within the academic standards of the course" approved by the Office of Disability Services will be excused with no further documentation.

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 one exam is missed with or without excuse, that exam will be dropped.

If more than one exam must be excused, then the student will arrange for a Makeup exam with Dr. Rogers, within 3 days of the evaluation. In situations involving extensive delays, the student will be advised to discuss an incomplete with their advisor and Dr. Rogers.

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.

Final grade scores will only be curved in extraordinary circumstances (e.g., a pandemic).

Pending testing of technology:

Extra Credit Opportunity: Point Solutions polling questions are interspersed throughout all lectures. These provide important pauses to consolidate the material just presented. Extra credit will be awarded based on the overall score of these questions starting on Aug. 30. If a student chooses the correct option on 70% of all questions posed during the semester, then 1% extra credit will be awarded to that student's final score. Some questions, e.g., survey questions, will not be included.

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 exams 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 see:

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

Students with the accommodation "*Consideration with regard to absences & missed exams/quizzes within the academic standards of the course*" approved by the Office of Disability Services will be excused with no further documentation.

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, car repair receipt etc.

Effective Study Habits

1. **BEFORE 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. **AFTER 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 textbooks 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 textbooks. 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 games *etc.*, with exercise and sleep. Identify and use every coping method you ever learned.

SOFTWARE EXPECTED TO BE USED:

Canvas, Zoom conferencing, Duo, Point Solutions (formerly Turning Technologies) Polling, ExamSoft for Quizzes, ExamSoft and ExamMonitor for Exams.

Very important: use your *gsbs.rutgers.edu* email address (NEVER Scarletmail, gmail, or other accounts) for ExamSoft and Point Solutions.

The **EDUCATION PORTAL** (<https://ep.njms.rutgers.edu>) is a single sign-on site for CANVAS, Education Management System, Digital Media Portal, Virtual Microscopy, SOCRATES, etc.

CANVAS: To access all course information log onto CANVAS at:

<https://canvas.rutgers.edu/>

PODCAST ACCESS: <https://njms-rutgers.yuja.com/Login?accesstype=YuJa%20Credentials>

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.**

Minimum requirements for ExamSoft and Examplify are here:

<https://examsoft.com/resources/examplify-minimum-system-requirements/#windows>

<https://examsoft.com/resources/examplify-minimum-system-requirements/#mac>

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

To Create an Account and Activate License:

1. Visit account.turningtechnologies.com or use registration link from Canvas.
2. Click Create Account.
3. Enter your *gsbs.rutgers.edu* email address (NEVER Scarletmail, gmail, or other accounts) and click Next.
4. Check your email and click the link to verify your 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 the Technical Support Team at 1-877-ECHO360 x2 or support@echo360.com.

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/sqs/current_students/ac_integ.php

ACADEMIC WARNING POLICY:

http://njms.rutgers.edu/sqs/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 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.

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