



SAINT LOUIS UNIVERSITY  
MADRID

**BIOL-3020: Biochemistry and Molecular Biology**  
Fall 2017

**Class Days and Time:** MW, 4:00-5:15 PM

**Classroom:** PRH-13

**Prerequisite(s):** BIOL-1060, CHEM-1120/164

**Credit(s):** 3

**Instructor:** Francisco Amaro, Ph.D.

**Instructor's Email:** [francisco.amaro@slu.edu](mailto:francisco.amaro@slu.edu)

**Instructor's Campus Phone:** 91 554 58 58, ext. 232

**Office:** PAH-206

**Office Hours:** MW, 5:15-6:30 PM, or by appointment

**Course Description:**

BIOL-3020 is designed as the first in-depth course in Biochemistry and Molecular Biology for undergraduate students beyond General Biology (BIOL-1040/1060). The first part of the course will include studies in cellular biochemistry, which covers cellular organization and function at the molecular level. The structural building blocks of cells (lipids, nucleic acids, amino acids, and carbohydrates) and their functional integration into macromolecules and organelle compartments with particular emphasis on protein structure and function will be focused upon in this course. We will also focus on how cells obtain energy from nutrients and how that is regulated.

On the second part of the course basic genetic mechanisms will be studied in detail: processes of information flow from genomes to gene expression and protein biosynthesis, and regulation of gene expression. Introduction to molecular biology techniques that enable the study of DNA, RNA and proteins in modern biomedical research will be covered, as well as applications for the manipulation of genes and cells.

**Course Goals and Student Learning Outcomes:** At the end of the course, students will:

- Acquire specialized knowledge and will be able to discuss of how proteins carry out functions in the cell, how the cell obtains energy, and how cells store and use the genetic information necessary to maintain a living organism.
- Gain an understanding of the basic techniques utilized in molecular biology research.
- Be able to apply reasoning and critical thinking skills to problems in cellular biochemistry and molecular biology.
- Be able to interpret the outcome of experiments that involve the use of recombinant DNA technology.
- Understand and discuss how molecular biology impacts and benefits our society.

Saint Louis University - Madrid Campus is committed to excellent and innovative educational practices. In order to maintain quality academic offerings and to conform to relevant accreditation requirements, the Campus regularly assesses its teaching, services, and programs for evidence of student learning outcomes achievement. For this purpose anonymized representative examples of student work from all courses and programs is kept on file, such as assignments, papers, exams, portfolios, and results from student surveys, focus groups, and reflective exercises. *Thus, copies of student work for this course, including written assignments, in-class exercises, and exams may be kept on file for institutional research, assessment and accreditation purposes.* If students prefer that Saint Louis University - Madrid Campus does not keep their work on file, they need to communicate their decision in writing to the professor.

### Required Texts and Materials:

- **Course textbook: (highly recommended).** *Essential Cell Biology*. Alberts *et al.*, 2013. Garland Science. 4<sup>th</sup> Edition (**available at the SLU-Madrid Library**).
- **Other recommended books:**
  - *Molecular Cell Biology*, by Lodish *et al.*, 2013. Freeman-Macmillan. 7<sup>th</sup> Edition (**available at the SLU-Madrid Library**).
  - *Molecular Biology of the Cell*. Alberts *et al.*, 2013 (\*). Garland Science. 5<sup>th</sup> Edition.
  - *Cell and Molecular Biology*. Karp. 2013 (\*). Willey. 7<sup>th</sup> Edition.
  - *The Cell: A Molecular Approach*. Cooper & Hausman. 2013 (\*). ASM Press. 6<sup>th</sup> Edition

(\* ) Older editions are available at the SLU-Madrid Library

Older editions of these textbooks are available FREE online from NCBI website:

<http://www.ncbi.nlm.nih.gov/books>

For example, Lodish *et al.* (2000). *Molecular Cell Biology*. 4<sup>th</sup> Edition can be accessed via:

<http://www.ncbi.nlm.nih.gov/books/NBK21475/?term=LODISH%20CELL%20BIOLOGY>

### Attendance Policy:

Students are expected to attend all classes unless a reasonable excuse is given. Most students in the past have found the lectures to be helpful. If you absolutely must miss a class, it is your responsibility to get all information and material covered from your fellow students.

### Course Requirements and Grading Rationale/System:

### EVALUATION OUTCOME

The **FINAL GRADE** for the class is calculated as follows:

- Midterm 1: 23% of your final grade
- Midterm 2: 23% of your final grade
- Final Exam: 24% of your final grade
- Homework & quizzes: 20% of your final grade
- Final Project: 10% of your final grade

There could be quizzes (dates will be indicated by your instructor in advance).

### GRADING SCALE:

A:	93-100%
A-:	90-92.9%
B+:	87-89.9%
B:	83-86.9%
B-:	80-82.9%
C+:	77-79.9%
C:	73-76.9%
C-:	70-73.9%
D:	60-69.9%
F:	00-59.9%

## EXAMS

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**There will be a total of 3 EXAMS:**

- Midterm 1: October 9 (4:00 - 5:15 PM). Room: PRH-13
- Midterm 2: November 8 (4:00 - 5:15 PM). Room: PRH-13
- Final Exam: December 18 (3:30 - 6:30 PM). Room: PRH-13

All exams will comprise two parts: multiple-choice questions and essay/short answer questions.

Exam questions may come from material covered in lecture, class discussions, assigned textbook readings and from any supplementary reading material provided.

**The exams are NOT cumulative.** However, there is also a comprehensive final exam that examines ALL of the course material. This exam is mandatory ONLY for students who failed or missed either midterm exam.

**Make up exams are not given.** Students who legitimately miss an exam, due to a doctor or family emergency must provide written documentation of the circumstances. A letter from the university counselor is accepted. Exams that are missed illegitimately result in a score of F. Grades for these students will be based on the remaining exams. Missing more than one exam results in an F.

All lecture slides will be posted on Blackboard, as well as announcements, supplementary material and readings. **SLU-Blackboard should be checked at a regular basis.**

We will cover most of the assigned material during lecture; however, you will be required to have general knowledge of the assigned reading material, even if not specifically covered during the lectures.

## HOMEWORK AND FINAL PROJECT

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Regular homework assignments will be given. Questions and case studies outside of class are expected to be a measurement tool for you to chart your progress in this course and to identify your deficiencies. Homework will count towards your final grade. **Late homework will not be accepted and will result in a grade of zero for that assignment.** If you are going to miss school on the day the homework is due, please turn your homework in early or email it to me ([francisco.amaro@slu.edu](mailto:francisco.amaro@slu.edu)).

**FINAL PROJECT (STUDENT PRESENTATIONS)-** All students are invited to prepare an **oral presentation** (format: power point presentation). Topics will be provided by your instructor in class. This project will count for 10% of your final grade. An abstract describing your presentation must be submitted via SLU BlackBoard before December 1<sup>st</sup>. Template and guidelines will be provided by your instructor. A copy of your slides/presentation (.pdf file) must be emailed to your instructor after your presentation.

## COURSE OUTLINE

WEEK	DATE	UNIT	MAIN TOPICS	TEXTBOOK - CHAPTER -
1	Sep-04	UNIT 1. THE CELL: INTRODUCTION	Course Overview. Introduction to the Cell.	1
	Sep-06	UNIT 2. THE STRUCTURE AND FUNCTION OF BIOLOGICAL MOLECULES	Covalent bonds. Noncovalent bonds. Water. Biological macromolecules: carbohydrates, lipids, nucleic acids and proteins	2
2	Sep-11	UNIT 3. PROTEINS: STRUCTURE AND FUNCTION	Protein structure, protein folding, chaperones How proteins work. Enzymes. Regulation of protein function. How proteins are studied: techniques	4
	Sep-13			
3	Sep-18			
	Sep-20			
4	Sep-25	UNIT 4. PRINCIPLES OF METABOLISM	How cells obtain energy from food. Cellular respiration and fermentation. Electron transport and synthesis of ATP.	13
	Sep-27			
5	Oct-02	UNIT 5. CHROMOSOMES, GENES AND GENOMES	Bacterial and eukaryotic genomes. Structure of chromosomes.	5
	Oct-04			
6	Oct-9	<b>MIDTERM 1</b>	<b>4:00 – 5:15 PM. Room: PRH-13</b>	
	Oct-11	UNIT 6. DNA REPLICATION	DNA replication in bacteria and eukaryotes. Telomeres and Telomerase.	6
7	Oct-16	UNIT 7. DNA REPAIR AND RECOMBINATION	DNA Repair Mechanisms. DNA damage. Mutations. DNA Recombination. Mobile genetic elements and viruses.	6
	Oct-18			
8	Oct-23			
	Oct-25			
9	Oct-31	UNIT 8. FROM DNA TO PROTEINS	How cells read the genome. Transcription in bacteria.	7
	Nov-01	NO CLASSES	NO CLASSES (UNIVERSITY CLOSED)	
10	Nov-06	UNIT 8. FROM DNA TO PROTEINS	How cells read the genome. Transcription in bacteria.	7
	Nov-08	<b>MIDTERM 2</b>	<b>4:00 – 5:15 PM. Room: PRH-13</b>	
11	Nov-13	UNIT 8. FROM DNA TO PROTEINS	Transcription in eukaryotic cells. Genetic code. Translation in bacteria and eukaryotes. Nonsense- mediated mRNA decay.	4
	Nov-15			
12	Nov-20	UNIT 9. CONTROL OF GENE EXPRESSION	Regulation of gene expression in bacteria and eukaryotes.	7 & 8
	Nov-22			
13	Nov-27	UNIT 10. TECHNIQUES IN MOLECULAR BIOLOGY	Recombinant DNA technology. DNA cloning. Deciphering and exploiting genetic information. Applications of Molecular Biology	5
	Nov-29			
14	Dec-04			
	Dec-06			
15	Dec-11	UNIT 10. TECHNIQUES IN MOLECULAR BIOLOGY	Deciphering and exploiting genetic information. Applications of Molecular Biology	
	Dec-14	Student presentations	4:00 – 5:15 PM. Room: PRH-13	
	Dec-18	<b>FINAL EXAM</b>	<b>3:30-6:30 PM. Room: PRH-13</b>	

**E-mail:** Campus and course announcements will often be handled by e-mail. Students should check their "@slu.edu" e-mail regularly.

**University Statement on Academic Integrity:** Academic integrity is honest, truthful and responsible conduct in all academic endeavors. The mission of Saint Louis University is "the pursuit of truth for the greater glory of God and for the service of humanity." Accordingly, all acts of falsehood demean and compromise the corporate endeavors of teaching, research, health care and community service via which SLU embodies its mission. The University strives to prepare students for lives of personal and professional integrity, and therefore regards all breaches of academic integrity as matters of serious concern.

The governing University-level Academic Integrity Policy can be accessed on the Provost's Office [website](#). Additionally, SLU-Madrid has posted its academic integrity policy online: <http://www.slu.edu/madrid/academics>. As a member of the University community, you are expected to know and abide by these policies, which detail definitions of violations, processes for reporting violations, sanctions and appeals.

The professor will review these matters during the first weeks of the term. Please direct questions about any facet of academic integrity to your faculty, the chair of the department of your academic program or the Academic Dean of the Madrid Campus.

**University Title IX Statement:** Saint Louis University and its faculty are committed to supporting our students and seeking an environment that is free of bias, discrimination, and harassment. If you have encountered any form of sexual misconduct (e.g. sexual assault, sexual harassment, stalking, domestic or dating violence), we encourage you to report this to the University. If you speak with a faculty member about an incident of misconduct, that faculty member must notify SLU's Title IX deputy coordinator, Marta Maruri, whose office is located on the ground floor of Padre Rubio Hall, Avenida del Valle, 28 ([mmaruri@slu.edu](mailto:mmaruri@slu.edu); 915-54-5858, ext. 213) and share the basic fact of your experience with her. The Title IX deputy coordinator will then be available to assist you in understanding all of your options and in connecting you with all possible resources on and off campus.

If you wish to speak with a confidential source, you may contact the counselors at the SLU-Madrid's Counseling Services on the third floor of San Ignacio Hall ([counselingcenter-madrid@slu.edu](mailto:counselingcenter-madrid@slu.edu); 915-54-5858, ext. 230) or Sinews Multiplettherapy Institute, the off-campus provider of counseling services for SLU-Madrid ([www.sinews.es](http://www.sinews.es); 917-00-1979). To view SLU-Madrid's sexual misconduct policy and for resources, please visit the following web address: <http://www.slu.edu/Documents/Madrid/campus-life/SLUMadridSexualMisconductPolicy.pdf>.

**Students with Special Needs:** In recognition that people learn in a variety of ways and that learning is influenced by multiple factors (e.g., prior experience, study skills, learning disability), resources to support student success are available on campus. Students who think they might benefit from these resources can find out more about:

- Course-level support (e.g., faculty member, departmental resources, etc.) by asking your course instructor.
- University-level support (e.g., tutoring/writing services, Disability Services) by visiting the Academic Dean's Office (San Ignacio Hall) or by going to <https://www.slu.edu/madrid/academics/student-resources>.

Students with a documented disability who wish to request academic accommodations must contact Disability Services to discuss accommodation requests and eligibility requirements. Once successfully registered, the student also must notify the course instructor that they wish to access accommodations in the course. Please contact Disability Services at [disabilityservices-madrid@slu.edu](mailto:disabilityservices-madrid@slu.edu) or +915 54 58 58, ext. 230 for an appointment. Confidentiality will be observed in all inquiries. Once approved, information about the student's eligibility for academic accommodations will be shared with course instructors via email from Disability Services. For more information about academic accommodations, see "Student Resources" on the SLU-Madrid webpage.

Note: Students who do not have a documented disability but who think they may have one are encouraged to contact Disability Services.

**(IF APPLICABLE): Mandatory Trips/Activities:** Students enrolled in this class must participate and make payment for all mandatory trips/activities. The prices posted on the web are approximate; and the final price will be based on the number of students enrolled on the last day of the Add/Drop period. All students, including those who

withdraw from the class after this date, are required to pay these fees, which are non-refundable, unless the trip is cancelled due to low enrollment. Please review SLU-Madrid's trip policies, available on-line.

**Fall 2017 Course Schedule:**

Monday, September 4	Fall 2017 first day of classes
Sunday, September 17	Last Day to Drop a Class Without a Grade of W and /or Add a Class, choose Audit (AU) or Satisfactory/Unsatisfactory (S/U) Options
Thursday, October 12	Fall Break
Friday, October 13	
Saturday, October 14	
Sunday, October 15	
Thursday, October 19	
Monday, October 30	Midterm Grades Due.
Monday, October 30	Last Day to Drop a Class and Receive the Grade of W.
Wednesday, November 1	University Closed
Thursday, November 2	Spring Registration Opens!
Thursday, November 9	University Closed
Wednesday, December 6	University Closed
Friday, December 8	University Closed
Thursday, December 14	Final Exam – Day 1
Friday, December 15	Final Exam – Day 2
Monday, December 18	Final Exam – Day 3 Midyear Commencement!
Tuesday, December 19	Final Exam – Day 4
Wednesday, December 20	Final Exam – Day 5
Saturday, December 23	Grades Due to Registrar

FALL 2017 FINAL EXAM SCHEDULE

	14 Dec (Th)	15 Dec (Fr)	18 Dec (Mn)	19 Dec (Tu)	20 Dec (Wd)
<b>08:30-11:30</b>	Mn classes that meet at 9:00 & 9:30	Mn classes that meet at 10:00	Mn classes that meet at 11:00 & 11:30	Tu classes that meet at 9:30 & 10:00	Tu classes that meet at 8:00
<b>12:00-15:00</b>	Tu classes that meet at 11:00	Mn classes that meet at 13:00	Tu classes that meet at 14:30	Mn classes that meet at 12:00	Tu classes that meet at 12:30
<b>15:30-18:30</b>	Mn classes that meet at 14:30	Tu classes that meet at 17:00 & 17:30	Mn classes that meet at 16:00	Tu classes that meet at 15:30 & 16:00	Mn classes that meet at 17:30
<b>19:00-22:00</b>	---	---	Mn classes that meet at 19:00	Tu classes that meet at 19:00	---