

Palm Beach State College
Course Syllabus – Hybrid/Web Content

General Class and Course Information

Course number: BSC 2420 Class Reference Number: 152883 Term: Spring 2012

Course title: Biotechnology I. Credit/Contact hours: 3

Course Description: This hybrid course provide an specific approach to the main topics of biotechnology, emphasis in the area of Nucleic acids, Genomics, Recombinant DNA Technology and Genetic Engineering. The course covers a comparative analysis of genes, genomes, and chromosomes. It also includes a comparison of transcription, and translation including detail information about messenger, ribosomal, and transfer RNA, and the most relevant posttranslational events in protein synthesis. Another areas described in detail are, DNA replication, damage and repair, and recombination both in Prokaryotes and Eukaryotes. There is a strong component on recombinant DNA technology and genetic engineering with some concentration into biomedical biotechnology, including pharmacogenomics, DNA profiling, the human genome, regenerative medicine, gene therapy, cloning, and stem cell applications and implications.

Course Learning Outcomes: As a result of taking this course, the student will be able to

Recognize the impact of the historical events in molecular biology, recombinant DNA technology, and genetic engineering, over modern molecular biotechnology, and briefly describe the molecular nature of genes and gene function.

Discuss the basics of DNA and RNA structure, genes and chromosomes, and the basic principles of genetics applied to recombinant DNA technology and genetic engineering.

Explain the concept of transcription in prokaryotes and interpret the regulatory mechanisms of gene expression by operons and the DNA-Protein interactions in Prokaryotes.

Report the main differences of transcription in eukaryotes versus prokaryotes, including the polymerases and their promoters, as well as the transcription factors and activators in Eukaryotes.

Review the main posttranscriptional events, like capping, polyadenylation, and other RNA processing mechanisms in the context of their relevance in biotechnology.

Interpret the fundamental mechanisms of translation, including initiation, elongation and termination, and describe the nature , structure, and main function of ribosomes and the differences of them in prokaryotes versus eukaryotes.

Discuss the basic mechanisms of DNA replication and enzymology behind them.

Explain the concept of DNA recombination, and repair, as well as differentiate between homologous and meiotic recombination.

Express the concept of transposition, including bacterial and eukaryotic transposons, and retrotransposons.

Discuss the principal molecular tools used in recombinant DNA technology including the use of restriction endonucleases, plasmids, cloning vectors, gene libraries, genetic transformation, as well as chemical synthesis of DNA, amplification, and sequencing.

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Give examples of major applications of modern molecular biotechnology, like DNA profiling, the use of nucleic acids as therapeutic agents, interfering RNAs, cell, tissue, and organ engineering, stem cells, cloning, pharmacogenomics, nanobiotechnology, gene therapy, and regenerative medicine, and the impact of the human genome and proteome research.

Full Course Outline: Click on the following link: Cut and paste in web link to course outline available at <http://www.palmbeachstate.edu/x4247.xml>

Class Schedule

This is a hybrid course, which means that some activities will be conducted through the blackboard on line system, and other ones will be produced in regular weekly meetings of one hour and fifteen minutes each, on Wednesdays, at 5:00 pm. in Room SC 211 of the new bioscience complex building of the Palm Beach Gardens campus at the Palm Beach State College.

During the regular meetings we will have discussions, questions and answers, 4 official exams, and one specific presentation from each one of the participants in front of the entire class, using audiovisual aids, like power point presentations etc.

The on line component which could be accessed through the on line blackboard system in the section of the left menu of the course content, called Learning Modules, is in the form of 16 units, each one with one specific lecture, and it will include 16 short written research assignments, to be submitted on line through the blackboard system at specific deadlines, which will appear in this syllabus and in the blackboard program, in the Learning Modules of the on line course content. Also, 16 discussions to be submitted as the previous on line assignments. There is also an special assignment which consists, of a written presentation of a professional “resume” from each one of the participants. The course is divided in 16 units, each one with one lecture on specific topics described in this syllabus, in the Learning Modules of the blackboard system, and in the orientation section.

Textbook(s) Information:

Required:

Weaver R.F., 2012, Molecular Biology, 5th edition. McGraw-Hill Higher Education. Boston, MA, 10 0 07-352532-4 or ISBN-13-978-0-07-352532-7.

Glick B.R., C.L. Patten, and Pasternak J.J. , 2009, Molecular Biotechnology: Principles and Applications of Recombinant DNA, 4th edition. Washington D.C., ASM Press. ISBN: 10:1-55581-498-0.

Thieman W.J. and Palladino M.A., 2009. Introduction to Biotechnology, 2nd edition, San Francisco CA, Pearson/Benjamin Cummings. ISBN: 978-0-321-49145-9

Recommended:

Clark D.P, and Pazdernik N.J. 2012. Biotechnology. Elsevier, Academic Cell, (Academic Press), Maryland Heights, MO 63043, USA. ISBN: 978-0-12-385063-8.

Clark D.P. and Pazdernik N.J. 2009. Biotechnology. Applying the Genetic Revolution. Elsevier Academic Press. Burlington, MA. ISBN: 978-0-12-175552-2.

Glazer A.N. and Nikaido H. 2007. Microbial Biotechnology. Fundamentals of Applied Microbiology. Cambridge University Press. Cambridge, NY. Second Edition. ISBN: 978-0-521-84210-5.

Kreuger H. and Massey A., 2007, Molecular Biology and Biotechnology: A Guide for Students, 3rd edition, Washington D.C., ASM Press. ISBN: 978-1-55581-472-4.

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Ratledge C. and Kristiansen B., 2001, Basic Biotechnology, 2nd edition, Cambridge UK, Cambridge University Press. ISBN: 0-521- 77917-0 or 0-521- 77074-2

Lewin B. 2011, Genes X, 10th edition of the series but 1st edition of this one, Sudbury MA, Jones & Bartlett Publishers. ISBN-978-0-7637-6632-0.

Bains W. 2004, Biotechnology from A to Z., 3rd edition, New York NY., Oxford University Press. ISBN: 0198524986.

Web Content Information: Course Core Outline

Unit 1. Introduction to Molecular Biotechnology and Molecular Biology.

- A. Brief History.
- B. The Molecular Biotechnology Revolution.
- C. The impact of Recombinant DNA Technology and genetic Engineering in modern Biotechnology.
- D. Biological Systems in Molecular Biotechnology. Prokaryotes and Eukaryotes.

Unit 2. Genomics.

- A. Genomics. DNA, RNA, Genes and chromosomes. Basic genetics.
- B. Genetic engineering and recombinant DNA technology.
- C. The Molecular methods in modern Biotechnology.

Unit 3. Molecular Biology and Biotechnology. Transcription.

- A. Transcription in Prokaryotes.
- B. Transcription in Eukaryotes.

Unit 4. Postranscriptional events and their Relevance in Biotechnology.

- A. mRNA processing I. Splicing.
- B. mRNA processing II: Capping and Polyadenylation.
- C. Other RNA processing Events.

Unit 5. Translation. From Genes to Proteins.

- A. Translation I: Initiation.
- B. Translation II: Elongation and Termination.
- C. Ribosomes and tRNA.

Unit 6. DNA Replication.

- A. DNA Replication I: Basic mechanisms and Enzymology.
- B. DNA Replication II: Detailed mechanisms.

Unit 7. DNA Recombination and Repair.

- A. Homologous recombination.

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B. Meiotic Recombination.

C. Transposition.

D. Bacterial Transposons.

E. Eukaryotic transposons.

F. Retrotransposons.

G. Telomers.

Unit 8 and Unit 9. Recombinant DNA Technology and Genetic Engineering. Part I and Part II.

A. The basic tools.

B. Cloning.

C. DNA synthesis, sequencing, and amplification.

Unit 10. Major Application of Modern Molecular Biotechnology.

A. Genetic disorders. Causes.

B. Gene therapy.

C. Viral vectors for gene therapy. Non-viral vectors.

D. Molecular diagnosis.

Unit 11. DNA profiling. Nucleic acids as therapeutic agents.

A. DNA Profiling.

B. Nucleic acids as Therapeutic agents.

C. Interfering RNAs.

D. Ribozymes.

E. Chromosomal location and gene copy number.

Unit 12. Interfering RNAs in Cell, tissue, and organ engineering.

Unit 13. Pharmacogenomics and Nanobiotechnology.

A. Pharmacogenomics.

B. Nanobiotechnology.

Unit 14. Stem cells and Regenerative Medicine.

Unit 15. The Impact of the Human Genome and the Human Proteom Research.

Unit 16. Genetic engineering of plants.

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Professor's Contact Information

Professor's Name: Dr. Silvio Arango-Jaramillo
Office Location: SC 252
Telephone: 561 207 5072
Email address: arangos@palmbeachstate.edu
Home Page: <http://www.palmbeachstate.edu/x461.xml?id=Arangos>
Office Hours: 11:0 to 12:00 am. On M-T-W.
 2:00 to 4:00 pm on M.
 3:00 to 5:00 pm on T.
 2:00 to 5:00 pm on W.

Class Requirements

Assignments :Dates and Deadlines for Assignments in the classroom:

Selecting the topic of your presentation before the entire class: Wednesday, February 22.
Resume: Wednesday, April 4.
Presentations: Wednesday, April 4, 11, 18, and 25.

On Line Assignments and Discussions:
The Deadlines are:

Units 1 and 2: Wednesday, February 8.
Units 3 and 4: Wednesday, February 15.
Unit 5: Wednesday, February 22.
Unit 6: Wednesday, February 29.
Unit 7: Wednesday, March 14.
Unit 8 and 9 : Wednesday, March 21.
Unit 10: Wednesday, March 28.
Unit 11: Wednesday, April 4.
Unit 12: Wednesday, April 11.
Unit 13: Wednesday, April 18 .
Unit 14: Wednesday, April 25.
Unit 15 and 16: Wednesday, May 2.

The details for this presentation assignment can be found on the Blackboard site for this course.

Late Assignment Policy: All required assignments are expected to be completed on time. If, due to an emergency, a student cannot meet the due date, s/he is to request and get the approval of an extension from the Professor.

Grading Scale and Policy: There is a summary of the grading system for each one of the components, based on a total of 100 points for the total grade of the course:
For the regular activities with personal presence in the classroom once a week:
4 exams with 10 points each, for a total of 40 points.

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One presentation by each one of the participants in front of the entire class: 10 points.

Participation and attendance to these meeting in the classroom: 5 points.

An special assignment, a professional resume: 5 points

For the on line activities through the blackboard system:

16 Written research assignments: Total of 30 points.

16 Written discussions: Total of 10 points.

Tests, Quizzes, and Final Examination Schedule:

The first quiz will be held on Wednesday, February 15.

The second quiz will be on Wednesday, March 21.

The third quiz will take place Wednesday, April 18.

The Final Exam will be on Wednesday, May 2.

Make-up Exam Policy: Make up tests are only given in emergency situations. These exams may be in a different format than the original class exam. The student is responsible for the fee to take the proctored test in the Test Center. Special arrangements for make-up exams should be discussed with and approved by the professor.

Distance Learning Class Information

This course is taken in part via the Internet (hybrid classes), or includes a web component. Before you decide to take the course under these conditions, it is recommended that you:

- take the following assessments to determine if distance learning is best for you:
 1. [Should I take a distance learning class?](#)
 2. [Do I have enough time to take a distance learning class?](#)
 3. [Do I have the technical skills and knowledge to learn online?](#)
- read the [Distance Learning Frequently Answered Questions](#) page which include instructions for logging onto Blackboard, computer requirements, and basic computer skills students must have prior to enrolling a distance learning class.
- read the syllabus description below carefully.
- contact the professor by e-mail or by phone if you have any questions.

Computer Requirements

If you choose to take this course, you must have access to a computer that meets the [basic computer requirements](#) - <http://www.palmbeachstate.edu/x10620.xml>

No additional specific computer requirements.

SLC Computer Lab

If students do not have access to a computer at home, the SLC Computer Lab at a Palm Beach State campus can be used to complete course assignments. Visit the SLC Computer Lab web page at <https://www.palmbeachstate.edu/x13669.xml> for location and hours.

IT IS RECOMMENDED THAT THE STUDENT TAKING THIS COURSE AS A *HYBRID* COURSE NOT BE A NOVICE COMPUTER USER. THE STUDENT SHOULD KNOW HOW TO USE A MOUSE, NAVIGATE THE INTERNET, AND SEND/RECEIVE E-MAIL WITH ATTACHMENTS. VISIT THE FOLLOWING WEB PAGE FOR MORE INFORMATION REGARDING MINIMUM COMPUTER SKILLS STUDENTS MUST HAVE PRIOR TO ENROLLING IN A HYBRID COURSE - <http://www.palmbeachstate.edu/x10620.xml>.

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This course has an Internet web site located at: <https://palmbeachstate.blackboard.com>

The course web site will be available three days prior to the start of the semester. Your password will not work until that time. It is the student's responsibility to have accessed this site no later than Wednesday, January 11. The web site has a security system which requires a *Sign on* and a *Password*. Only registered students will be able to access the course.

To login to the course web site:

Go to <https://palmbeachstate.blackboard.com> **User Name:** Use your Palm Beach State Student ID Number (no hyphens). Your Palm Beach State Student ID Number can be found on the back of your student ID card. If you do not have a student ID card, you can obtain one in the bookstore at Lake Worth campus. For obtaining a student ID card on other campuses, check with the campus directly. **Password:** The student's Blackboard password will be the student's Palm Beach State Pin Number.

What do I do if I forget my password or need assistance with Blackboard?

E-mail the Blackboard administrator at adminwebct@palmbeachstate.edu. You can also contact the Palm Beach State Student Helpdesk by sending an e-mail to studenthelpdesk@palmbeachstate.edu or contacting them by phone at (561) 868-4000. Be sure you have the following information available:

- your full name
- your Palm Beach State Student ID number
- course with the reference number
- details of the assistance needed and any error messages
- The Student Help Desk Hours of Operation are posted on the following web page:
<http://www.palmbeachstate.edu/x6363.xml>.

On hours and days that the Help Desk is closed, the student may leave a voice message or an e-mail and the issue will be addressed the next business day.

Class Policies and Methodology

Attendance: Professors are required to take attendance. Professors are required to take attendance. Participation and attendance to at least 80 % of the weekly discussions about the topics posted on line, and approval of the midterm and final exams.

Electronic Device Use: No special limitations.

Email Policy: The e mail of the Blackboard system will be the regular one to use. As an alternative, for emergency, you may also send an e mail through the official Palm Beach State College system, meaning the:
.....@my.palmbeachstate.edu.

Equipment and Supplies: No special equipment or supplies.

Professor's Expectations: The student should participate in at least 80 % of the weekly discussions on campus about the topics posted on line, and take the exams at the time scheduled.

Methods of Instruction: n line lectures, and weekly discussion meetings on campus.

Unique Requirements of the Class: No other than the ones mentioned above.

College Policies and Web Information

Academic Dishonesty

Academic dishonesty includes the following actions, as well as other similar conduct aimed at making false representation with respect to the student's academic performance:

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(1) Cheating on an exam, (2) Collaborating with others on work to be presented, if contrary to the stated rules of the course, (3) Submitting, if contrary to the rules of the course, work previously submitted in another course, (4) Knowingly and intentionally assisting another student in any of the above actions, including assistance in an arrangement whereby work, classroom performance, examination, or other activity is submitted or performed by a person other than the student under whose name the work is submitted or performed, (5) Plagiarism.

Please refer to the **Palm Beach Community College Student Handbook**

(www.palmbeachstate.edu/Documents/Marketing/studenthandbook.pdf) for further information.

Classroom Etiquette and Student Behavior Guidelines

Students will demonstrate respect for professors and fellow students. Behavior that is disruptive to a positive learning environment reported by the professor will result in a warning on the first instance; the second instance might result in expulsion from the course or campus.

Computer Competency Component

Each student will, to the satisfaction of the professor, demonstrate a fundamental understanding of basic computer operations through various professor-determined exercises and/or assignments.

Disability Support Services

Students with disabilities are advised, in compliance with federal and state laws, that accommodations and services are available through the office of Disability Support Services (DSS). It is the student's responsibility to contact Disabled Student Services Advisors and to submit appropriate documentation prior to receiving services. Please see the website at www.palmbeachstate.edu/disabilities.xml.

Eating, Drinking and Smoking

Eating and drinking are confined to areas designated on the campus. Smoking is not permitted in any College building and only in areas designated at each campus.

Student Responsibility Policy

When a student attends the College, s/he becomes subject to its jurisdiction. Students are expected to conduct themselves in a responsible manner, in all areas of campus life. By enrolling, they pledge to obey the rules and regulations of the College and are responsible for observing all College policies and procedures as published in the student handbook, the College catalog and other College publications. The student will be responsible for preparing for class, participating in class, and completing assignments on time.

Palm Beach State Websites of Interest

Please see this web page (www.palmbeachstate.edu/x340.xml) for a list of web addresses for students.

Withdrawal Policy for Individual Courses

The last day to withdraw from a College course with a "W" grade in this course is Tuesday, March 27. It is the responsibility of the student to use the PantherWeb system or visit a campus Registrar's office to withdraw. An official withdrawal entitles the student to a grade of "W" in the class.

Department Contact Information

Department Contact Name: Dr. Silvio Arango-Jaramillo

Office Location: SC 252

Telephone: 561 207 5072

Fax Number: 561 207 5005

Email address: arangos@palmbeachstate.edu

Getting Started with a Web Class

1. Make sure you have all the computer system requirements as listed in the Computer Requirements section of this syllabus.
2. E-Mail the professor to: arangos@palmbeachstate.edu, with your name and phone number. The professor will communicate with you through Blackboard or your Palm beach State-issued email address.
3. Obtain course materials. The textbook(s) can be purchased at the Palm Beach State campus bookstore or online at <http://www.efollett.com>.
4. Log onto the course web site at :<https://palmbeachstate.blackboard.com> Use your [Pantherweb](#) logon information.

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5. Once inside the course website, read the "Mandatory Online Orientation" and complete the *Orientation Quiz*.
6. Explore the different parts of the web page. Be sure to print the **syllabus, course calendar, and assignment sheet** so that you know what is expected of you during the semester.
7. Read the instructor's *Welcome* message on the discussion board and post a reply to it introducing yourself to the class.
8. Begin completing your assignments as listed on the course calendar.

Have fun!

February 2010