

Palm Beach State College
Course Syllabus – Hybrid/Web Content

General Class and Course Information

Course number: **BSC 2427**

Class Reference Number: **152890**

Term: **Spring 2012**

Course title: **Biotechnology II Lecture (Online Hybrid Course)**

Credit/Contact hours: **3 credit hours; 1 contact hour/week**

Course Description:

This lecture course provides a relatively deep exploration of the basic foundations of modern biotechnology, with emphasis in molecular and cell biology as required disciplines for the study development, and applications of genetic engineering, recombinant DNA technology, which includes hands on laboratory exercises in the main general techniques. It also includes molecular considerations of some of the latest advances in oncology and cancer prevention, pharmacogenomics, as well as stem cell technology. The final part of the course focuses on basic concepts of immunobiology and medical immunology, which are also relevant to biomedical biotechnology, particularly in the areas of applications of monoclonal antibodies, anti allergic medications, recombinant DNA vaccines, transplants, immunomodulation and gene therapy.

Co-requisites: 2427L, CHM 1046A and CHM 1046AL

Pre-requisites: BSC 2421, CHM 1045A and CHM 1045AL.

Course Learning Outcomes:

Course Core Objectives

Upon completion of this laboratory course a student should be able to understand/discuss:

Proteomics:

- ❖ The student will describe the main concept of proteomics.
- ❖ The student will review the process of protein synthesis from the initiation of translation, to termination and gene expression.
- ❖ The student will identify the steps of initiation, elongation, and termination in the context of protein synthesis.
- ❖ The student will report the roles and structure of tRNA.
- ❖ The student will discuss the different posttranslational modifications of proteins.

Introduction to Molecular Cell Biology:

- ❖ The student will interpret the main differences between prokaryotic and eukaryotic cells.
- ❖ The student will express the main aspects of the molecular organization of cells.
- ❖ The student will differentiate between the main cellular organelles.
- ❖ The student will describe the molecular structure and main functions of the cell or plasma membrane.
- ❖ The student will discuss the main roles of cell membrane receptors.
- ❖ The student will give examples of cell signaling.
- ❖ The student will describe at least two of the main second messengers.
- ❖ The student will explain the concept and importance of cellular apoptosis.
- ❖ The student will discuss the principal aspects of the transportation of small molecules in the cellular context.

Gene expression in prokaryotes.

- ❖ The student will discuss the concept of gene expression from strong and regulatable promoters.
- ❖ The student will explain some ways of increasing protein production from the molecular point of view.
- ❖ The student will describe large scale systems of protein production in the molecular biotechnology context.
- ❖ The student will review the characteristics of fusion proteins and why they are so important in proteomics.

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Protein expression in eukaryotes.

- ❖ The student will discuss the general approaches for protein production in eukaryotic cells.
- ❖ The student will describe the yeast, baculovirus in insect cells, and mammalian cells expression systems.

Routes of proteins in the cell. Cytosolic, secretory or endogenous pathway versus endocytic or exogenous pathway.

- ❖ The student will identify and explain the routes of proteins in the cell.
- ❖ The student will differentiate between the cytosolic, secretory or endogenous pathway, versus the endocytic or exogenous pathway.

Protein folding. The implications of lack of folding and mis-folding.

- ❖ The student will review and explain the mechanisms of protein folding and its importance and impact in biotechnology.

Introduction to Immunobiology:

- ❖ The student will express the concept of immunobiology and its relation with biotechnology.
- ❖ The student will describe the cell and organs more directly implicated in the immune system.
- ❖ The student will recognize the structure and function of antibodies and the difference between polyclonal and monoclonal antibodies, and their implications.
- ❖ The student will explain the basic principle of cell mediated immunity and its mediators.
- ❖ The student will discriminate between cytokines and chemokines, and discuss the applications of interferon.
- ❖ The student will discuss the major histocompatibility complex and its implications in the context of biotechnology.
- ❖ The student will review antigen process and presentation.

Cell and tissue culture in biotechnology:

- ❖ The student will discuss the importance of mammalian cell culture in biotechnology.
- ❖ The student will identify the main factors affecting the growth of cells in tissue culture.

Mutagenesis and protein engineering.

- ❖ The student will explain the concept of protein mutagenesis and protein engineering.
- ❖ The student will review the large scale production methods of proteins from recombinant microorganisms.

Protein separation, analysis. Protein interactions.

- ❖ The student will discuss some of the different fermentation processes and the use of bioreactors.
- ❖ The student will describe some methods of protein separation and analysis.
- ❖ The student will cite examples of protein interactions.

Oncogenes and cancer:

- ❖ The student will describe the connection between oncogenes and neoplasias.
- ❖ The student will explain the role of some tumor viruses in the development of neoplasias.
- ❖ The student will interpret the role of tumor suppressor genes.
- ❖ The student will explain the concept and applications of biotechnology in cancer prevention and therapy.

Regenerative medicine, pharmacogenomics, and stem cell research in biotechnology:

- ❖ The student will discuss the concept of regenerative medicine and its implications.
- ❖ The student will review the concept of pharmacogenomics and its implications.
- ❖ The student will describe the main differences of the use of adult versus embryonic stem cells in biomedical applications.
- ❖ The student will report on the main implications and applications of stem cell research and technology.
- ❖ The student will recognize the role of biotechnology in the production of polyclonal antibodies for medical applications.
- ❖ The student will describe the process of production of monoclonal antibodies.

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- ❖ The student will define the biotechnological process for the production of interferon, and other cytokines and chemokines.
- ❖ The student will review other applications of biotechnology in medicine, in the context of transplants, and histocompatibility testing.
- ❖ The student will identify some biotechnological methods applied to immunomodulatory therapy.
- ❖ The student will discuss gene therapy from the point of view of biotechnology.
- ❖ The student will explain the role of biotechnology in the production of recombinant vaccines.

Course Core Outline

I. Proteomics.

- A. Brief review of protein synthesis. Translation. Initiation. Elongation, and Termination.
- B. Ribosomes and tRNA.
- C. Posttranslational modifications.

II. Introduction to molecular cell biology.

- A. Prokaryotic versus eukaryotic cells.
- B. Molecular organization.
- C. Cell organelles.
- D. Cell or Plasma membranes.
- E. Cell signaling and transduction.
- F. Apoptosis.

III. Cell and Tissue culture in Biotechnology.

- A. Mammalian cell culture
- B. Stem Cells
- C. Plant cell culture

IV. Gene expression in Prokaryotes.

- A. Strong and regulatable promoters.
- B. Increasing protein production.
- C. Large scale systems.
- D. Fusion proteins.

V. Protein expression in Eukaryotes.

- A. Yeast, baculovirus in insect cells, and mammalian cells expression systems.

VI. Routes of proteins inside and outside the cells.

VII. Protein folding. The implications of lack of folding and mis-folding.

VIII. Protein separation, analysis. Protein interactions

- A. Fusion Proteins
- B. DNA Binding Assays
- C. Protein-Protein Interactions

IX. Mutagenesis and protein engineering

- A. Large scale production of proteins from recombinant microorganisms.
- B. Fermentation process.
- C. Bioreactors.

X. Introduction to immunobiology.

- A. Cells, organs, and the immune system.
- B. Antibodies. Monoclonal antibodies.
- C. Cell mediated immunity.
- D. Cytokines and chemokines. Interferons.
- E. The Major Histocompatibility Complex.
- F. Antigen process and presentation.

XI. Oncogenes and cancer.

- A. Tumor viruses.
- B. Tumor suppressor genes.
- C. Applications of biotechnology to cancer prevention and treatment.

XII. Regenerative Medicine

- A. Pharmacogenomics and Stem Cells in Biotechnology.
- B. Other applications in transplantations, immunomodulation, gene therapy, and vaccinology.

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Full Course Outline: Click on the following link:

http://www.palmbeachstate.edu/asp/IE_ShowOutline.asp?show=Y&CourseID=BSC2427

Class Schedule: Class *will meet on Mondays from 5:15 pm – 6:15 pm in SC214.*

Lab will meet twice a week for 6hrs each time and students are required to attend every session. Students are required to take all quizzes/exams related to the course and participate in all assignments. Students are required to come to class prepared for the lab experiment that will be conducted that day, and with their pre-labs completed. Students are expected to turn-in lab reports on the days they are due.

Textbook(s) Information: This course does not have a required textbook. All experiment protocols and necessary files/information can be found on the Blackboard course website.

Required Materials

Required Textbooks:

Weaver R.F., 2008, *Molecular Biology*, 4th Ed. McGraw Hill Higher Education. Boston, MA. ISBN: 978-0-07-299524-4.

Glick B.R., Pasternak J.J., 2003. **Molecular Biotechnology: Principles and Applications of Recombinant DNA**, 3rd Ed. Washington, D. C., ASM Press. ISBN: 1555812244.

Suggested Materials

- Seidman L.A., 2008, **Basic Laboratory Calculations for Biotechnology**, San Francisco, CA. Pearson Education, Inc. publishing as Pearson Benjamin Cummings, ISBN 10-digit: 0-13-223810-1. ISBN 13-digit: 978-0-13-223810-6. www.aw-bc.com

You may purchase your textbook(s) at any one of Palm Beach State College's campus bookstores or online at <http://www.efollett.com>.

Web Content Information: <https://palmbeachstate.blackboard.com/webct/entryPage.doweбct>

Professor's Contact Information

Professor's Name: Dr. Alexandra Gorgevska

Office Location: SC 209

Telephone: 561-207-5003

Email address: gorgevska@palmbeachstate.edu

Home Page: <http://www.palmbeachstate.edu/x461.xml?id=Gorgevska>

Office Hours:

Monday: 9:00 am – 10:00 am; 12:00 pm – 2:00 pm

Tuesday: 9:00 am – 10:00 am; 1:00 pm – 2:00 pm

Wednesday: 9:00 am – 10:00 am; 12:00 pm – 2:00 pm

Thursday: 9:00 am – 10:00 am; 1:00 pm – 2:00 pm

Class Requirements

Assignments: Details for all assignments can be found on the website. There will be a class PowerPoint presentation project. The details of these projects can be found in the Assignment Folder on the course website. At the professor's discretion, there may or may not be additional extra credit assignments.

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Course Website Participation: Students will be expected to participate in course discussions on the website. Students are expected to post valid/relevant comments and participate in weekly discussions related to course materials. Students will be required to post **relevant** questions/answers/ideas every week for each reading assignment. These posts are required by **Sunday night at midnight** before the next class period. Late submissions will **not** count towards your minimum requirement. Each student will, therefore, be required to post a **minimum of 1 post per week for a total minimum of 12 posts for the semester.** Students are encouraged to carry-on these discussions and post above the minimum requirement. There will also be Case Studies available for additional discussion on the website. Refer to “Online Discussion Rubric” for grading guidelines.

Class procedures and schedule: Students are required to read and review two lectures per week. Questions pertaining to those lectures will be reviewed in the Discussion section. Students are expected to come to class having read all necessary material. Read the lecture slides first and use the recommended textbook chapters (along with any websites, videos, etc) as additional resources. Students are required to take all quizzes/exams related to the course and participate in all assignments.

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 an extension from the professor. Documented evidence from a doctor/emergency room etc will be necessary for extension requests. Assignments turned in late will have points deducted from them. It is at the Professor’s discretion to either accept or deny a late assignment. If an assignment is accepted late, points will be deducted.

Grading Scale and Policy: The grading scale is based upon the total of 200 points possible, obtained in two exams, two quizzes, homework assignments, website participation and attendance. The **midterm and the final, each one with 20 points (40 pts total); two quizzes, each one with 10 points (totaling 20pts); a presentation-based project worth 50 pts; a homework assignment worth 10 pts; classroom attendance worth 20 pts; online discussion participation worth 60 pts (12 mandatory online discussion participations worth 5 pts each);** for the total of 200 points. This means that participation and attendance makes a significant portion of the final grade. An accurate record of attendance will be kept for each course. If a student misses one-third or more of a class session, the student will be counted absent. Three tardies will count as one absence. Leaving early is the same as being tardy. If a student is absent on the day of an exam/quiz/assignment, they will receive a grade of zero. It is the student’s responsibility to ensure all assignments are turned in on time.

Grades will be calculated by the following scale:

| | Percentage |
|---|------------|
| A | 90-100 |
| B | 80-89 |
| C | 70-79 |
| D | 60-69 |
| F | ≤ 59 |

***Tentative* Exam & Event Schedule**

All quizzes and exams will take place during the on-campus Discussion Section in room SC 211.

- SBL-BIP Task 1 Due: Monday, January 30th at 5:15 pm. Room SC 211.
- Quiz #1: Monday, February 6th at 5:15 pm – 6:15 pm. Room SC 211.
- SBL-BIP Task 2a Due: Monday, February 13th at 5:15 pm. Room SC 211.
- SBL-BIP Task 2b Due: Monday, February 20th at 5:15 pm. Room SC 211.
- Midterm Exam: Monday, February 27th at 5:15 pm – 6:45 pm. Room SC 211.
- SBL-BIP Task 3 Due: Monday, March 19th at 5:15 pm. Room SC 211.
- Quiz #2: Monday, April 2nd at 5:15 pm – 6:15 pm. Room SC 211.
- SBL-BIP Task 4 Project Presentations Due: Monday, April 9th at 5:15 pm. Room SC 211.
- Final Exam: Monday, April 23rd at 5:15 pm – 6:45 pm. Room SC 211.
- Poster Session: Monday, April 30th at 1:00 pm – 3:00 pm. Room SC 127.

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Make-up Exam Policy: Make up tests/quizzes 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. For any other situation, a grade of zero will be given for missed exams/quizzes.

Minimum Requirements: Attendance to 100% of the classes is required and beneficial to your grade. Approval of the midterm, final exams, along with homework and quizzes.

Methods of instruction: Online hybrid lectures, on-campus lectures and class discussions.

Unique Requirements of the Course: Following the online content of lectures, plus attendance and participation of the weekly discussions on campus, plus all exams/quizzes/assignments/ course-related material.

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>

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>.

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 **January 10, 2012**. 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. **Failure to access the Blackboard course website prior to midnight on that date will result in the student being dropped from 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.

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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. **Attendance to the first day of class is Mandatory. Failure to do so will result in the student being dropped from the course.** Students will be expected to obtain all necessary lab materials from the website and participate in course discussions on the website. Students are expected to post valid/relevant comments and participate in discussions related to course materials. Students are required to access the course website *at least two times per week* to read the required lab materials, check the discussion board and course email regularly. Students are expected to attend ALL class-related sections/events. 100% attendance and participation is expected.

Electronic Device Use: The use of cell phones or other electronic devices during class is prohibited. If a student is caught using any such device, they will be asked to leave.

Email Policy: The blackboard e-mail system is the official electronic communication from the Professor to all the students registered in this course, and from all the students to the Professor. The **students are considered officially informed** of any changes or special instructions or announcements through this system. The instructor's Blackboard e-mail address and discussion board will be checked once per day Monday to Thursday from 9:00 am – 6:00 pm. This means that weekends and holidays are not officially check days. The instructor will do their best to respond to all emails within 24 – 48 hrs, however, response time may vary due to holidays/weekends.

Professor's Expectations: The student is expected to participate in 100% of the lectures and laboratories along with completion of all assignments, quizzes, and exams.

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:

- (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

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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 **March 27, 2012**. 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. Libby Handel
Office Location: SC 205
Telephone: 561-207-5059
Fax Number: 561-207-5048
Email address: handele@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 gorgevsa@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.
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!

(Each Week Will Cover ~100 slides)

| Week # | Week of: | Reading Assignment for the week: Units | Slides #: |
|--------|---|--|----------------|
| 1 | 09-Jan First Day of Class | 1 | 1-56 |
| 2 | 16-Jan MLK Day. No Class. Still required to read assignment. | 2 2 | 1-36 37-98 |
| 3 | 23-Jan | 3 3 | 1-60 61-103 |
| 4 | 30-Jan <i>SBL-BIP: Task 1 Due</i> | 4 5 | 1-44 1-45 |
| 5 | 06-Feb Quiz #1 Today | 6 7 | 1-56 1-53 |
| 6 | 13-Feb <i>SBL-BIP: Task 2a Due</i> | 8 8 | 1-45 46-102 |
| 7 | 20-Feb <i>SBL-BIP: Task 2b Due</i> | Review | |
| 8 | 27-Feb Midterm Exam | 1-8 | all |
| | 05-Mar Spring Break. No Class/No Reading Assignment. | | |
| 9 | 12-Mar | 9 9 | 1-47 48-106 |
| 10 | 19-Mar <i>SBL-BIP: Task 3 Due</i> | 10 10 | 1-39 40-114 |
| 11 | 26-Mar | 10 | 115-168 |
| 12 | 02-Apr Quiz #2 Today | 11 11 | 1-42 43-115 |
| 13 | 09-Apr <i>SBL-BIP: Task 4 Due: Presentations</i> | 12. Part I 12. Part II | 1-54 1-34 |
| 14 | 16-Apr Presentations (cont'd, if necessary) | Review | |
| 15 | 23-Apr Final Exam | 1-12 <small>+ Presentations</small> | all |
| 16 | 30-Apr Mandatory Poster Session | Rm SC127 1-3pm | |

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| | Online Discussion Rubric | | | |
|---|---|--|--|--|
| Performance Indicators & Total Possible points/post: | Inappropriate/ Unacceptable 0 pts/post | Needs Improvement 1.25 pts/post | Meets Expectations 2.5 pts/post | Exceptional 5 pts/post |
| Grading Criteria: | | | | |
| Promptness and Initiative | Does not respond to most postings; rarely participates freely | Responds to most postings several days after initial discussion; limited initiative | Responds to most postings within a 24 hour period; requires occasional prompting to post | Consistently responds to postings in less than 24 hours; demonstrates good self-initiative |
| Delivery of Post | Utilizes poor spelling and grammar in most posts; posts appear "hasty" | Errors in spelling and grammar evidenced in several posts | Few grammatical or spelling errors are noted in posts | Consistently uses grammatically correct posts with rare misspellings |
| Relevance of Post | Posts topics which do not relate to the discussion context; makes short or irrelevant remarks | Occasionally posts off-topic; most posts are short in length and offer no further insight into the topic | Frequently posts topics that are related to discussion context; prompts further discussion of topic | Consistently posts topics related to discussion topic; cites additional references related to topic |
| Expression within the Post | Does not express opinions or ideas clearly; no connection to topic | Unclear connection to topic evidenced in minimal expression of opinions or ideas | Opinions and ideas are stated clearly with occasional lack of connection to topic | Expresses opinions and ideas in a clear and concise manner with obvious connection to topic |
| Contribution to the Learning Community | Does not make effort to participate in learning community as it develops; seems indifferent | Occasionally makes meaningful reflection on group's efforts; marginal effort to become involved with group | Frequently attempts to direct the discussion and to present relevant viewpoints for consideration by group; interacts freely | Aware of needs of community; frequently attempts to motivate the group discussion; presents creative approaches to the topic |

Scenario-Based Learning Project: Bioinformatics Internship Program (BIP)

This scenario-based project will introduce different strategies to searching the National Center for Biotechnology Information (NCBI) databases. Comparison of DNA and protein sequence data will be used to establish phylogenetic relationships between organisms. Additional database mining will analyze epidemiologic data from the Centers for Disease Control (CDC) to establish and predict the spread of an influenza outbreak.

This project will draw upon the student's knowledge of basic concepts and principles covered in general biology, spreadsheet formulation, and presentation capabilities. This exercise in bioinformatics will develop the student's skill to address various issues that are encountered in controlling infectious diseases.

All required tasks must be submitted through the Blackboard course website. Presentations must be in PowerPoint. Computer software required to complete the tasks will be assessable through links embedded in the task itself.

Task 1: (5 pts) Due: January 30, 2012

Define terms, navigate the NCBI website and interpret a sample DNA database search. Participate in class discussion.

Task 2a: (10 pts) Due: February 13, 2012

Understand taxonomic and phylogenetic relationships; use BLAST to compare information from a DNA and protein sequence search. Prepare and submit assigned report.

Task 2b: (10 pts) Due: February 20, 2012

Use Taxonomic browser, FASTA, JalView and ClustalW to establish a phylogenic relationship (neighbor-group/out-group). Prepare and submit assigned report.

Task 3: (10 pts) Due: March 19, 2012

Search CDC database and compile records in Excel to create a histogram. Prepare and submit assigned figures and reports.

Task 4: (15 pts) Due: April 9, 2012

Use bioinformatics tools to investigate a new influenza strain; epidemiologic analysis, comparative DNA/protein sequence data analysis, and phylogenetic relationships. Prepare and submit assigned reports, class presentation.

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| SBL-BIP Grading Rubric | | | | | |
|------------------------|---|---|--|---|----------------------------|
| | Background | Data | Results | Conclusions | Total Possible Points/Task |
| Task 1 | Able to define & discuss terms (1pt) | Able to interpret results (2pts) | Participates in discussion showing learning (2pts) | - | 5 |
| Task 2a | Able to define taxonomy & phylogenetic relationships (2pts) | Demonstrates use of BLAST (2pts) | Compares and contrasts information from DNA vs. protein databases (2pts) | Provides concise report incorporating fore-mentioned items (4pts) | 10 |
| Task 2b | Able to define differences between neighbor and out groups (2pts) | Demonstrates use of FASTA, JalView, and ClustalW (3pts) | Provides concise report with clear diagrams of fore-mentioned items (5pts) | - | 10 |
| Task 3 | Compiled Excel spreadsheets (2pts) | Created histograms with compiled data (4pts) | Provides concise report with interpretation of data (4pts) | - | 10 |
| Task 4 | Compiled sequence data (3pts) | Created appropriate figure for data analysis (3pts) | Provides concise and clear report on fore-mentioned items (4pts) | Presentation Use Peer-Group Evaluation Forms (5pts) | 15 |