

BTEC101

Spring 2011

City College of San Francisco

Instructors

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Course Description: BTEC101 is an in-depth coverage of the principles and techniques of biomanufacturing. This course will give you experience in media preparation, sterile technique, large scale fermentation, with a heavy emphasis on protein recovery.

Prerequisites: The chemistry prerequisite will be enforced.

Standards of student behavior are carefully detailed in the City College General Catalog. You are responsible for adhering to all of them. **If you find that you unfortunately have to drop the class, you are responsible for the paperwork, and making sure you are no longer enrolled.**

Please turn off cell phones during class. The use of cell phones during exams is not allowed. Please bring a calculator.

Students at City College of San Francisco have the right to an environment in which there is freedom to learn. The College believes that each student has an earnest purpose and that he/she will adhere to acceptable standards of personal conduct. We believe students deserve a safe, civil and respectful environment that will enable them to reach their full potential. To this end we expect students to assist us in this mission. Promptly report any concerns or observations you have to your instructor or appropriate authorities. We value your assistance and take your concerns seriously. We will treat such matters as confidential to the fullest possible extent.

Required Dress: For safety reasons there is a dress code in the class. You must wear closed toed shoes, pants, and a protective outer garment (lab coat). This is to prevent any injury due to spillage. It is also the dress code employed by the biomanufacturing companies. Anyone not wearing these items will not be able to participate in class, due to safety concerns.

Final examination: The final examination for the lecture will be held:

Monday/Wednesday (night) Class: Wednesday May 23th 6-8pm

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Tuesday/Thursday (day) Class: Tuesday May 24th 1-3pm.

The finals are not the same. You can only take the final with your section.

Required Texts:

- 1) Molecular Biology of the Cell by Alberts et. al. ISBN # 0-8153-3218-1
- 2) BTEC 101 class reader.

Web site: fog.ccsf.edu/ekaeuper/BTEC101.htm

Required Laboratory Materials: These are materials you will need to buy at the start of the course because you will be using them throughout the semester:

1. A lab coat.
2. A sharpie for labeling.
3. Safety glasses.
4. A metric ruler – 15 cm length is adequate.
5. A pen with a fine point and **blue** ink for recording data in your batch records and for answering essay and fill-in questions in quizzes and examinations. Pencils will not be used at any point during this class except on Scantrons.
6. A three ring binder for keeping your batch records.
7. A scientific calculator capable of performing log conversions

Attendance: Attendance is **not** optional and will be taken at all sessions. The **maximum** allowable numbers of absences are as follows:

From laboratory sessions: 16 hours

Written assignments: All written assignments done outside of class must be completed using a **word processor**. If you do not have a computer at home, use one of the computers in the library. There are staff people available to help you use the computer.

Rules for examinations:

1. You must bring **two pens, two #2 pencils**, and a **good eraser** (not the one on the end of your pencil) to each exam.
2. Scan-Tron multiple choice answer sheets must be marked with a number 2 pencil.
3. **Ink** must be used on essays and fill in the blank questions.
4. No talking is allowed during the exam, except to the instructor (raise your hand first).
5. Looking at another student's paper is strictly prohibited, and not useful since there will be multiple versions of the exam.

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6. Do not cover your face with your paper. No large hats, sunglasses, ipod or cellphone.
7. You must cover your answers as much as possible to prevent another student from reading over your shoulder.
8. All written or printed materials that are not part of the examination must be completely out of sight and under your desk.
9. You may not use a foreign language dictionary or other reference during an exam. Only calculators may be used in the exam, no cell phones or other electronic devices. You may ask your instructor to explain any term or phrase in the exam that is not clear to you. However, if you ask for information you were expected to learn for the examination, you will be told: "You are supposed to know that."
10. Once you start an exam, you must stay in the exam room until you finish. There will be no bathroom breaks, so plan accordingly.
12. If you observe someone cheating in an examination, you are expected to report that person to the instructor.
13. Students **MUST** take the exams on the scheduled dates. There will be **NO MAKE UP EXAMS**. Please mark this date on your calendar.

Quizzes: Quizzes will be given sporadically at the beginning (during the first 15 minutes) of every class meeting. Some of the questions in the quizzes may be seen again on the final.

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Grading policy:

Minimum A 90%
 Minimum B 80%
 Minimum C 70%
 Minimum D 60%

Evaluation:

To determine your final grade in this class, the various examinations and graded assignments will be weighted as shown below:

Batch record notebook 15%
 Documentation projects 25%
 midterms (2) 30%
 quizzes 10%
 final 15%
 Final Lab Project Report 5%

BTEC101 Laboratory Syllabus (tentative)

Spring 2010

<i>Night Section</i>	<i>Day Section</i>	<i>Lecture Topic</i>	<i>Lab Exercise</i>	<i>Reading Assignment</i>
Jan. 19 w	Jan. <i>18t</i>	Introduction to class/ orientation on safety/ lecture on QA and QC	Lab equipment overview, quiz next session	Reader pgs16-28
Jan. 24 m	Jan. 20th	Lecture Manufacturing documentation/ Batch records/ Batch record activity.	Lab quiz on equipment	pg. 16-20 in The Cell
Jan. 26w	Jan. 25t	Lecture on SOPs	Making media for Gram staining and aseptic technique/ autoclave all necessary supplies for sterile technique/ start editing LB Batch 1	Reader pgs 33-37

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Jan.31m	Jan27tr	Lecture on prokaryote and gram staining	Sterile technique and gram staining/ Reader pg 39-43	pg. 11-26 in The Cell
Feb. 2w	Feb.1t	Lecture on eukaryotes	Make media for <i>E. coli</i> cell bank/ inoculate cultures/make arabinose and ampicillin Reader pgs 44-47	pg. 26-31,695-712 769-777in The Cell
	Feb 3 rd Tr	Lunar New Year Holiday No Class		
Feb. 7m	Feb. 8t	Lecture anaerobic fermentation	Make plates (10/group) create <i>E.coli</i> cell bank/ Reader pg50-51	pg.65-74,79-87 in The Cell
Feb. 9w	Feb. 10tr	Lecture on aerobic fermentation and fermentation basics	cell bank test/ make media for fermentor/ Reader pgs 52	pg. 97-103, in The Cell
Feb. 14m	Feb. 15t	Quiz and review of fermentor CIP and SIP lecture/SEC mini lecture	QC media for the fermentor/ SEC drip column Reader pg 54,65-67	Reader pgs 55-63
Feb. 16w	Feb. 17tr	Midterm		
Feb. 21m	Feb. 22t	Holiday		
Feb .24w	Feb.25tr	Lectures: GFP Prokaryotic transcription Fermenter Orientation	Inoculate GFP 48hr cultures for fermentor (ie make inoculum) Make HCl and NaOH Reader pgs68,69,71	pg. 330-352 in The Cell Reader pg. 75-80, 113-114
Feb. 28m	Mar. 1t	GFP <i>E.coli</i> Fermentor run come in at assigned times/ no lecture	Fermentor run Spin down to pellet <i>E. coli</i> cells and freeze Reader pg 122-124	Reader Pg. 73-75,81-93 Pages 116-121
Mar. 2w	Mar. 3tr	Lecture eukaryotic transcription/ LB batch record is due	Make 10 ml YEPD Reader pg 94 and inoculate/ make	pg. 330-352 in The Cell

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			YEPD plates Reader Pg 98	
Mar. 7m	Mar. 8t	Pichia fermentation Target Protein (tentative)	Make Pichia cell bank Reader pg 100/media for inoculation of spinner pg103 and fermentor pg 107/make media for spinner and fermentor autoclave pg 107 /108/YEPD for inoculation	
Mar. 9w	Mar. 10tr	Lecture on translation Assignment write SOP on assigned topic	QC Pichia cell bank/ inoculate cultures of YEPD reader pg 102,138	pg. 6-10, 330-352 in The Cell
Mar. 14m	Mar. 15t	Lecture on AOX promoter and different steps of fermentor run	Inoculation of fermentor Fermenter Run Orientation	Refer to Handout
Mar. 16w	Mar. 17tr	Pichia fermentor run come in at assigned times no lecture	Fermentor run Reader pages140-159	
Mar. 21m	Mar. 22t	Recovery and review/ plot fermentor data.	Spin Pichia product / recover	
Mar. 23w	Mar. 24tr	Tentative <i>Fermentation strategies , growth rate calculations</i>	Start GFP recovery—Lyse cells Spin down lysed cells and filter	Refer to Hand outs with procedure
Mar. 28m	Mar.29t	Spring Break		
Mar.30w	Mar.31tr	Spring Break		
April 4m	April 5t	Lecture on protein folding Lecture on Protein function (combined)	Ammonium sulfate ppt.— GFP	pg. 125-156 in The Cell/pg. BTEC101 reader 151-155
April 6w	April 7tr	Lecture on SDS PAGE	Run sample proteins Reader page 129	Reader pages 127-136 The Cell : 517- 519

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April 11m	April 12t	Midterm		
April 13w	April 14tr	Lecture Protein I (Purification overview) Chromatography calculations	FPLCs Orientation reader pg 181	Reader pg168-180 194-195
April 18m	April 19t	Lecture Protein II (Chromatography Definitions/ SEC) / Quiz after FPLC II HPLC demo	Intro to FPLCs part II/ Desalt SEC on FPLC Reader 184-186	pg. 481-484 in The Cell/pg 178-194 in the BTEC101 reader
April 20w	April 21tr	Lecture Protein III (HIC Genentech lecture) HIC Lecture	HIC column / prepare SDS sample from HIC and save for SDS-PAGE Reader 198- 203	See Handouts

April 25m	April 26t	Lecture on Antibodies /affinity chromatography	Run antibody column/run gel from HIC Reader 204-206	pg. 1552-1560,508 513- 515, 156-158 in The Cell See handouts
April 27w	April 28tr	Lecture on Ion exchange Chromatography Individual SOP assignment is due	Run gel filtration gel and interpret Reader 213	pg. 187 in The Cell See Handouts
May 2m	May 3t	Final Project		

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May 4w	May 5tr	Final Project	Ion exchange/Run antibody gels/ stain with coomassie overnight.	pg. 481-484 in the Cell/pg 205-209 in the BTEC101 reader
May 9m	May10t	Final Project	TBA	
May 11w	May 12tr	Final Project	TBA	
May 16m	May 17t	Review/Notebooks due	Interpret all gels	
May 23w	May 24tr	Final Exam		