

Schedule version 6		Key for Readings Abbreviations			
BioSc 157-159 Fall 2014		<b>SM:</b> (Seidman and Moore - Basic Laboratory Methods for Biotechnology : 2nd ed)			
		<b>TP:</b> (Thieman and Palladino-Introduction to Biotechnology : 2nd ed)			
		<b>D:</b> (Daugherty- Biotechnology:Science for the New Millenium, 1st ed)			
		<b>H:</b> Handout posted on the web			
		<b>S:</b> (Seidman - Basic Laboratory Calculations for Biotechnology)			
Date		BioSc157 (Lecture)	BioSc159 (Lab)	Relevant assignment ( <u>underlined</u> if an in-class exercise)	Supplemental Reading
8/18	M	Careers, Local Companies, Safety; <b>H: GLP/GCP/GMP overview;</b> GMP WHO presentation. <u>Math:</u> Algebra review.		Syllabus, Schedule, Course Outlines	<b>SM:</b> 2, 3; <b>TP:</b> 1, <b>D:</b> 1, 9
8/20	W		Lab introduction, Safety <u>Lab a1:</u> - Measurements: Mass, Volume, Length, Pipetting, Micro-pipetting.	<u>h1.</u> Begin in class	<b>SM:</b> 5, 19, p354- 367 <b>TP:</b> 12, <b>D:</b> 9, 3
8/25	M	SOP's and the regulated environment (FDA, GMP) Lab notebooks (initial SOP, resume builder); Making dilutions; Making media. <u>Math:</u> Unit conversions and calculations for lab a2		<b>h1.</b> Measurement review. ( <u>h2.</u> GLP Micropipetting please read prior to class)	<b>SM:</b> 4 (p68-74; 74- 79) , 6 (p91-99, 99-111), 13 <b>TP:</b> 12, <b>D:</b> 3 <b>H: GLP intro reading</b>
8/27	W		<u>Lab a2:</u> Measurements and observations with worms		<b>SM:</b> 26, 20, 14, 23 (p403-410, 413- 415) <b>TP:</b> - <b>D:</b> 3
9/1	M	LABOR DAY - NO CLASS			
9/3	W		<u>Lab b1 - SOP Quiz 1:</u> Follow an SOP to make bacterial media. <u>Lab a2:</u> View worms		<b>SM:</b> 8, 6, 14 <b>TP:</b> 12, 4.6 <b>D:</b> 3
9/8	M	Making media; dilutions, pH and buffers. GMP, GLP, SOP, Lab Book review. View worms. <u>Math:</u> concentrations		<b>QUIZ 1.</b> Vocab and calculation quiz. <b>h2.</b> GLP micropipetting <u>h3.</u> SOP homework	<b>SM:</b> 22 (p380-382, 385-391), 26, 15 <b>TP:</b> -- <b>D:</b> 2, 4

Date		BioSc157 (Lecture)	BioSc159 (Lab)	Relevant assignment (in-class)	Reading
9/10	W		Lab b2: Streak bacteria (GFP +/- induction); Lab d1: Making solutions Media preparation for plants; Demo Lab: Intro to Aseptic technique.	<b>h4.</b> Dilutions review <b>h5.</b> Media preparation review	<b>SM: 7, 15, 3 TP: 6 D: 10, 11 H: Plating Bacteria</b>
9/15	M	Model organisms, Plant tissue culture, Introduction to sterile technique; cGMP. Plasmids and bacterial transformation. <u>Lab c - SOP QUIZ 2:</u> Lab book entries. Math: concentrations $C1V1=C2V2$ , dilutions, recipe calculations		<b>QUIZ 2.</b> Vocab and calculation quiz. <b>h7.</b> Making solutions review <b>h8.</b> Industrial Media prep homework <b>h9</b> Biomanufacturing, bioreactors homework	<b>SM: 1, 30 (p563-573), 27 (p508-514), 4, 6, 20 TP: 2, 3, 5 D: 7</b>
9/17	W		<u>Lab d1:</u> Pour plant media plates with aseptic (sterile) technique <u>lab b:</u> finish by observing streaked bacteria	<b>Unit 1 DUE:</b> Homeworks 1-5, labs a-c, Quizzes 1, 2 and SOP Quizzes 1 and 2 <b>H: Notebook compliance form</b> (from appendix)	<b>SM: 25 (p464-465, 472-478, 490-491), 23, 20 TP: 6, 3 D: 8, 10 H: pGLO H2: AraC Promoter</b>
9/22	M	Dilutions; Protein production, Model Organisms (lab a vs b vs d); Aseptic technique; cGMP; pH; prep for lab d2 in notebook. <u>Math:</u> FW, $C1V1=C2V2$ review.		<b>h6.</b> pH and buffer review <b>h10.</b> cGMP homework ; <b>h11.</b> Aseptic article ( <b>read article prior to class</b> )	<b>SM: 27 (p508-514), 1 (review), 31 (p590-594), 26, 14, p257-267 TP: 7 D: 3, 9 H: Sterile technique</b>
9/24	W		<b>Lab d2 SOP QUIZ 3:</b> Sterilize, plate Arabidopsis thaliana seeds. Work on h6-11 and lab e calculations.		<b>SM: 12-I, 12-II, 26, 27 TP: 6 D: 11</b>
9/29	M	Intro to Experimental Design, plant hormones. <u>Math:</u> Recipe calculations for labs e and g.		<b>QUIZ 3.</b> Vocab and calculation quiz. <b>h12.</b> Calculations review <b>h13.</b> Sterilizing and contamination	<b>SM: 27 (p514-523), TP: 2 D: 14, 5, 3 H: Plant growth regulators I</b>

Date		BioSc157 (Lecture)	BioSc159 (Lab)	Relevant assignment (in-class)	Reading
10/1	W		<u>Lab e1</u> : Pour plant media with added hormones. <u>Lab g1</u> : Make solutions for protein extraction.	<b>lab e1 pre lab</b> : start <u>h14</u> , start <u>h15</u> , start <u>h16</u>	<b>SM</b> : 17, p190-192, 7, <b>TP</b> : 6 <b>D</b> : 5
10/6	M	Review Experimental design, plant hormones. Plant tissue culture. Biomolecules (protein); Protein gels, Intro to bioinformatics. Math: concentration review, recipe review		<b>h14</b> . Calculations review <b>h15</b> , <u>h16</u> . SOP for using hood and Sterile technique	<b>SM</b> : 17, 16, 508-521 <b>TP</b> : 3 <b>D</b> : 14 <b>H</b> : <b>Plant growth regulators II</b>
10/8	W		<u>Lab e2</u> : Plant bean embryos on hormone media; <u>Lab d</u> : Observe plants, dissecting, fluorescence, compound microscopes. <u>Lab g1</u> : Harvest, weigh, freeze plants for protein extraction.	<b>pre lab lab e2; pre lab lab g1</b>	<b>SM</b> : 28 (p524-531, 537-541), 441-451 <b>TP</b> : 6 <b>D</b> : 5
10/13	M	<u>Lab f</u> : Bioinformatics		<b>QUIZ 4</b> : Vocab and calculations quiz <b>h17</b> . Plant hormone review <b>absolutely required!</b>	<b>SM</b> : 35 (p675-684), 36, 21, 22 <b>TP</b> : 2, 4, 6 <b>D</b> : 5
10/15	W	Evaluate labmates notebooks and document observations.	<u>Lab e</u> : observe plants using compound, dissecting scope. <u>Lab g1</u> : Plant protein extraction	start <u>h18</u>	<b>SM</b> : 32 (p599-600, 604-5, 608-10), 29 (p542-552), 26 (review), 27 (review), 29, 16, 17 <b>TP</b> : 4, 6 <b>D</b> : 6
10/20	M	GxP and Process validation. Antibodies, Western Blotting. Using antibodies to detect biomolecules. Model systems and cell structure. <u>Math</u> : standard curves from spectrophotometry	<u>Demo Lab M1</u> : Introduction to Model organisms; <i>C. elegans</i> (worms), <i>S. cerevisiae</i> (yeast), <i>E. coli</i> (bacteria), <i>A. thaliana</i> (plant), (algae)	<b>Unit 2 DUE</b> : Homeworks 6-17, labs d-e, Quizzes 3-4, and SOP Quiz 3 <b>h18</b> : Solutions	<b>SM</b> : p542-550, p15-17, 4 <b>TP</b> : 5 <b>D</b> : - <b>H</b> : <b>Immunological techniques H: Graphing</b>

Date		BioSc157 (Lecture)	BioSc159 (Lab)	Relevant assignment (in-class)	Reading
10/22	W		<p><u>Lab g2</u>: SDS-PAGE gels. <u>Lab g3</u>: transfer for western blot; <u>lab e</u>: observe root, hypocotyl, and leaf cells under compound scope - measure cell sizes.</p>	<p>start <u>h20</u>, start <u>h22</u> <b>pre lab</b> lab g2/g3</p>	<p><b>SM</b>: 29 (p552-560); 24 (p451-460) <b>TP</b>: 4, 5 <b>D</b>: 11, 13</p>
10/27	M	<p>Detection with antibodies. <u>Math</u>: using concentration to calculate mass of protien loaded</p>	<p><u>Demo Lab M2</u>: comparison of Model organisms: yeast, bacteria, arabidopsis, c elegans, algae</p>	<p><b>QUIZ 5</b>. Vocab and calculations <u>h19</u>: Protein detection <b>h20</b>: solutions for protein detection</p>	<p><b>SM</b>: 16, 6 <b>TP</b>: 4-6 <b>D</b>: 11</p>
10/29	W		<p><u>Lab g3</u>: Western blot detection.</p>	<p><u>h21</u>: PCR solutions <u>h22</u>: protein review</p>	<p><b>H: Websites for the following</b>: Abcam, Santa Cruz aby, TAIR <b>TP</b>: 3-4</p>
11/3	M	<p>Analysis of western blots. Intro-<u>Lab h</u>: PCR -based screening. <u>Agarose gels Math</u>: Standard curve to calculate protein sizes</p>		<p><b>h22</b>: Protein review <u>h23</u>: Protein production preview</p>	<p><b>SM</b>: 24-II, 24-III, 24-IV, 29 (p550-559) 24 (p451-460) <b>TP</b>: 5, 4 <b>D</b>: 8, 7, 11, 13</p>
11/5	W		<p>Lab h1: Harvest and weigh plant tissue and make DNA extracts (<b>SOP Quiz 4</b>)</p>	<p><b>Unit 3 DUE</b>: <i>Homeworks 18-23, labs f-g, Quiz 5, SOP Quiz 4</i></p>	<p><b>SM</b>: 24 (p451-460), <b>TP</b>: 3, 4, 5 <b>D</b>: 7, 8, 3, 4</p>
11/10	M	<p><i>EXTRA LAB EXPERIENCE - TO BE SCHEDULED: <u>Lab h2</u>: Calculate and setup PCR reactions.</i></p>	<p><b>VETERANS DAY HOLIDAY</b></p>		<p><b>SM</b>: 17 (p296-302, 307-314) 24 (p432-452), 7 <b>TP</b>: 3, 8, 5 <b>D</b>: 13, 4; 8, 9</p>

Date		BioSc157 (Lecture)	BioSc159 (Lab)	Relevant assignment (in-class)	Reading
11/12	W	Lab i: Experimental design, Fermentation, Biomanufacturing, Bioreactors; Monitoring growth conditions and cGMP, Calculations, Bioreactors, Documentation and labeling; ( <u>Lab i2 lab i3 demo</u> );	<u>Lab h3</u> : pour agarose gels. Load, run gels.	<b>h25.</b> Read prior to class Agarose gel <u>h26.</u> PCR analysis <b>pre-lab:</b> h3	<b>SM:</b> 29, 30, 14 <b>TP:</b> 3, 5 <b>D:</b> 8, 9
11/17	M	Review of lab i4 experimental design. <u>Lab i4</u> : Make instructions for bacterial growth dilutions. <u>Math</u> : Make recipes and media for bacterial growth. Lab h analysis.	<u>lab i1</u> Prepare workstation for bacterial growth monitoring and media preparation; Media preparation for bacterial protein production	<u>h24.</u> cGMP Homework <u>h27.</u> Dilutions review homework <u>h28.</u> Sampling and pH homework <u>h29.</u> Finish up your SOP for culture monitoring and harvest <u>h30.</u> Solutions homework	<b>SM:</b> 30, 15, 17, 32 (review), 20, 21, 22 <b>H: Calibration Curves.</b>
11/19	W	<b><i>important lab, don't miss it!</i></b>	<u>Lab i4</u> : Monitor growing culture (temp, pH, density, fluorescence); Harvest samples;	<b>pre-lab:</b> i4	<b>SM:</b> 29, 30, 14 <b>TP:</b> 3, 5 <b>D:</b> 8, 9 <b>H: 10 GMP Rules</b>
11/24	M	Data analysis. Processes, Documentation and labeling, Protein chemistry. <u>Math</u> : Standard curve and gel loading calculations		<b>QUIZ 8.</b> Interview preparation <u>h31.</u> Graphing homework <u>h32.</u> cGMP homework <u>h33.</u> Protein solutions homework	
11/26	W		<u>Lab j - SOP QUIZ 5:</u> Bacterial protein extract, dilutions. <u>Group experiment</u> : Bradford assay	<u>h34.</u> Prot Assay Hwk start <u>h35.</u> Start <u>h37.</u> Bioseparations homework Start <u>h39</u>	<b>SM:</b> 31, 32 <b>TP:</b> 4 <b>D:</b> 5
12/1	M	Protein structure and purification. Chromatography Prepare for bioseparations lab. <u>Math</u> : Standard curve (with group data); Gel loading, serial dilution for unknown		<b>h35.</b> Protein detection review <b>h37.</b> Bioseparations homework <b>h39.</b> Solutions calculations	<b>SM:</b> 33 ( <u>p621-631</u> ) <b>TP:</b> 4 <b>D:</b> 5 <b>H:</b> <b>Chromatography</b>

Date		BioSc157 (Lecture)	BioSc159 (Lab)	Relevant assignment (in-class)	Reading
12/3	W		<b>SOP Quiz 6 - Skill review</b> Lab k1: Bioseparation of proteins using column chromatography <u>quantitate fractions</u> : Measuring protein concentration (bradford) - protocol in lab j;	<b>pre-lab: k1</b>	<b>SM:</b> 33 (p631-637) 25 (p472-486), 15, 23 <b>TP:</b> 4 <b>D:</b> 8-9 <b>H: Column Appendix H: Amino Acid Structures H: Promega Column Handout</b> <b>S:</b> 25.1, 25.2, 23.5, 23.6, 25.7
12/8	M	SDS-PAGE: Map and loading calculations.		<b>h36.</b> Standard curve and quantitation homework <u>h38.</u> Bioseparations review	<b>SM:</b> 33 (p621-631) <b>TP:</b> 4 <b>D:</b> 5 <b>H: Chromatography</b>
12/10	W		<u>Lab k2:</u> Bioseparation of proteins using SDS-PAGE. Run gels, stain.	<b>pre-lab: k2</b>	<b>SM:</b> 33 (p631-637) 25 (p472-486), 15, 23 <b>TP:</b> 4 <b>D:</b> 8-9 <b>H: Column Appendix H: Amino Acid Structures H: Promega Column Handout</b> <b>S:</b> 25.1, 25.2, 23.5, 23.6, 25.7
12/15	<b>FINAL S:</b>	Review protein production and analysis; Analyze SDS-PAGE gels. Review of course SOP's, cGMP, GLP, making media, calculations, lab notebooks.	Prep for Panel-interview/presentation	<b>QUIZ 6 and 7:</b> vocab and standard curves, skill documentation grid <u>h40.</u> Graphing and standard curve review <b>Review Lab notebook for final submission:</b>	<b>SM:</b> 33 (p629-640), p542-550 <b>D:</b> 8, 9, 5 <b>S:</b> 22.1-22.4, 23.3, 23.4
12/17	<b>FINAL S:</b>		Panel-interview/presentation.	<b>Unit 4 DUE:</b> Homeworks 24-40, labs h-k, Quiz 6-8 SOP Quiz 5-6. <b>Final lab notebook submission</b>	<b>SM:</b> 1, 5, 6, 3, p14, 33 (p629-640); 24 (p451-460) <b>TP:</b> 1, 12 <b>D:</b> 1, 5, 14 <b>S:</b> 23.1-2, 24.1-8