

## ROP Biotechnology Curriculum Map First Year Students

Month	Content/Unit	Essential Question	Materials	Skills	Standards:	Assessment	
August	Course Syllabus Review Safety Rules	How do I work safely in the research lab?	<a href="#">Website for Biotech</a> Fire Extinguisher	Evaluating a lab setup for safety issues.	6.0 Health and Safety		
		What do I do in case of an emergency?	Glo Germ U.V. Light	Monitoring the work area for potential safety issues.	9.0 Leadership and Teamwork		
	Lab Book	How do I organize my Research Notebook?	<a href="#">Website page on Technical Writing</a>		Writing 2.6, 2.5, 2.3, 1.5	<a href="#">Authentic Assessment on Lab Book</a>	
		How do I use web resources to help me learn?					
	Solution Making	How do I make a % solution (m/v)?	<a href="#">Biotech Math Handout</a>		Producing solutions with known concentrations	A1.0, A2.0	
		How do I make a .1 M solution?					
		How do I make a dilute solution?	Microcentrifuge tubes	Prepare dilute solutions.	A4.0	<a href="#">Authentic Assessment on Lab Book</a>	
	How do I make a compound solution? How do I make a	Volumetric flasks	Prepare compound Molar solutions using a volumetric				

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		<p>compound dilute solution?</p> <p>How do I make a solution with a particular concentration of solute in the solution?</p> <p>How do I use a micropipette?</p>	<p>.5 – 10 ul micropipette</p> <p>2-20ul micropipette</p> <p>20-200ul micropipette</p> <p>100-1000ul micropipette</p> <p>Appropriate tips</p>	<p>flask properly.</p> <p>Evaluating the proper information to be placed on the label of a solution</p> <p>Measuring/dispersing small volumes with a micropipette</p>		
	Making and Pouring Petri Plates for Microbiological applications	<p>How do I make LB Agar?</p> <p>How do I follow the Aseptic Technique?</p> <p>How do I use the Autoclave correctly?</p> <p>How do I Make Agar with other solutes added?</p>	<p>LB base</p> <p>60 x 15 mm disposable Petri Plates</p> <p>VWR AS12 Autoclave</p> <p>Ampicillin Powder</p>	<p>Make LB agar plates.</p> <p>Make LB agar plates with 100ug/ml amp in them.</p> <p>Make LB agar plates with 100ug/ml amp and .2mg/ml Arabinose.</p>	A.3.0	<a href="#">Authentic Assessment on Lab Book</a>
Sept	Microbiology	<p>How can I isolate bacterial from a mixture?</p> <p>How can I streak plate</p>	<p><i>E. coli</i> HB101 culture</p> <p>LB agar plates</p>	<p>Isolate bacterial from a mixture using a streak plate.</p> <p>Dispose of bacterial</p>		<a href="#">Authentic Assessment on Lab Book</a>

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		<p>them onto a Petri Plate?</p> <p>How can I stain them to determine their cell wall makeup?</p> <p>How can I dispose of the bacteria safely?</p>	<p><a href="#">Handout on Streak Plating</a></p> <p><a href="#">Handout on Gram Staining</a></p> <p>Autoclave</p>	<p>colonies safely.</p>		
	Bacterial Transformations	<p>How can I put a plasmid into a bacteria?</p> <p>How do I know if that transformation was successful?</p> <p>What type of controls do I need in order to determine if all components are viable?</p>	<p><a href="#">PPT on Transformation</a></p> <p><a href="#">Transformation Protocol</a></p> <p><a href="#">Electroporation and Competent Cell Production</a></p>	<p>Insert a plasmid into a bacterium.</p> <p>Deduce if the transformation was successful</p> <p>Plan out the proper use of time in order to get the transformation done in one hour.</p>	1d	<a href="#">Authentic Assessment on Lab Book</a>

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October		How can I clone many bacterial that have been transformed?	250ml culture top Erlenmeyer flasks	Inoculate a liquid culture of transformed <i>E. coli</i> HB101 in LB/AMP/Ara broth  Grow an overnight culture of transformed bacteria. (Save some in freezer for Protein Purfication)	1c, 5d, 5e,	
		How do I make LB broth with the proper concentrations of solutes in it?	LB Broth  Ampicillin powder  L-Arabinose			
		How can I purify plasmids from a culture of bacterial cells that contain them?	<a href="#">Quantum Prep Kit</a> Aurum Prep Kits			
		How can I determine the concentration of DNA in my miniprep?	Bio-Rad Smart Spec Plus Spectrophotometer			
Nov	DNA Electrophoresis	How can I separate DNA by size?	<a href="#">DNA PPT</a>	Load a horizontal Agarose gel beneath buffer.  Program the powersupply to run at 100 volts for 30 minutes with 1X buffer	5d	
		How do I pour a gel?	Bio-Rad minigel box			
		How do I load a gel	Bio-Rad Powerpac 300 powersupply  Micropipettes  Agarose Powder			

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		<p>How can I estimate the quantity of DNA on a gel using a control marker?</p> <p>How much DNA did I get in my miniprep?</p>	<p>1X, .5X TAE Buffer</p> <p>Fast Blast Stain</p> <p><a href="#">DNA Quantization by Electrophoresis</a></p>	<p>Estimate the concentration of DNA in a band of DNA on a gel image.</p> <p>Determine the concentration of DNA using a Smart Spec Plus Spectrophotometer</p>	<p>5d A6.0</p>	<p><a href="#">Authentic Assessment on Lab Book</a></p>
	Restriction Analysis	<p>How can DNA be cut with restriction enzymes?</p> <p>How do you set up a restriction digest?</p> <p>How can you determine where a restriction enzyme cuts by deduction?</p> <p>How do you use online tools to predict R.E. sites?</p>	<p><a href="#">Restriction Analysis Protocol</a></p>	<p>Estimate the length of DNA in each band by semilog graphing.</p> <p>Verify the number of predicted restriction sites as predicted by using NEBcutter.</p>	<p>1b</p> <p>5.0 Problem Solving and Critical Thinging</p>	<p><a href="#">Authentic Assessment on Lab Book</a></p>

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Dec	Protein Purification by Column Chromatography	How can a protein be purified from a mixture using HIC Chromatography?	HIC Columns Equilibration Buffer Binding Buffer TE Buffer  <a href="#">Protein Purification Protocol</a>	Purify a protein from a mixture using HIC column.	4e,4b,4d,4f	<a href="#">Authentic Assessment on Lab Book</a>
Jan	Protein Fingerprinting and Electrophoresis	How can proteins be extracted from muscle?  How does PAGE work?  How can the mass of a protein be estimated using a marker on a PAGE gel?	Mini P3 gel box  15% precast acrylamide gels  Various fish  Prestained Kalaidoscope standards Laemmli Buffer  1X TGS Buffer  <a href="#">Protein Electrophoresis PPT</a>  <a href="#">Protein Electrophoresis Protocol</a>	Extracting proteins from muscle using Laemmli Buffer  Setting up at vertical gel box (mini P3)  Loading a vertical gel box  Estimating the mass of proteins in a fish muscle extract	A6.0	<a href="#">Authentic Assessment on Lab Book</a>

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	Protein Quantitation	How can a spectrophotometer be used to determine protein concentration in a solution?	Bradford Reagent Smart Spec Plus Spectrophotometer Cuvettes BSA Standards  <a href="#">Bradford Protocol</a>	Determining Protein Concentration with a Spec.  Use Bradford Reagent to determine protein concentration.	A5.3	<a href="#">Authentic Assessment on Lab Book</a>
Feb	PCR	What is the Polymerase Chain Reaction?  How does it amplify a small region of DNA?  How do I extract DNA with Chelex?	2 ml screw-capped tubes  200ul thin walled tubes  Thermocycler  Master Mix  <a href="#">PCR Protocol</a>  <a href="#">Mt PCR Protocol</a>	Amplify a section of DNA using PCR.  Determine the size of the PCR product by electrophoresis.		<a href="#">Authentic Assessment on Lab Book</a>

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	ELISA	<p>What is an ELISA?</p> <p>How does an ELISA test find a protein?</p>	<p>96 well Polystyrene rack with strips of 12 cups</p> <p>BioRad ELISA Kit</p> <p><a href="#">ELISA Protocol</a></p>	<p>Determine if a sample has the protein present?</p> <p>Conduct an ELISA test</p>	10b, 10c, 10d, 10e, 10f	<a href="#">Authentic Assessment on Lab Book</a>
<b>March</b>	Project Proposal/Research	What type of research do I want to do?	<a href="#">Project Proposal Form</a>	Write a proposal for a research project or task		
<b>April</b>	Research	Proposed by students	<a href="#">Project Progress Check</a>	Application of all skills learned	A6.0 A6.3	
<b>May</b>	Communication	<p><a href="#">How do I make a PPT summarizing my research?</a></p> <p><a href="#">How do I write a Technical Paper?</a></p>			2.3 Written and Oral Language Conventions  2.4 Listening and Speaking	<p><b>PPT Presentation</b></p> <p><b>Research Paper</b></p>
<b>June</b>	<b>Final</b>				<b>4.0 Technology</b> <b>5.0 Problem</b>	<b>Final</b>

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**Solving and  
Critical  
Thinking**