

Discipline context: **SMHS**
 Unit context: Example purposes only
 Learning context: **Blended, pre and post laboratory learning activity**



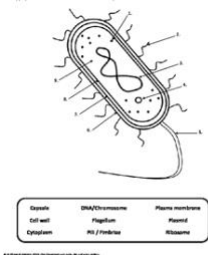
Week's learning outcomes

Students will be able to:

1. Describe the differences between eukaryotic and prokaryotic cells.
2. Identify the two types of bacterial cell wall composition.
3. Describe different bacterial cell shapes and arrangements.
4. Perform a Gram stain to determine the cell wall structure of basic bacterial species (Gram positive vs Gram negative).
5. Review the principles of the Gram stain and relate this to cell wall structure.

Phase	Learning Environment	Timing	Purpose	Activities		Resources and Technologies
				Teacher	Students	
Engage	Canvas LMS	Pre-lecture and lab 1 hour	Activate student curiosity about the topic. ID existing knowledge and recognise new concepts. Be explicit about: <ul style="list-style-type: none"> aspects to be explored during practical labs; concepts to be further discussed in lectures; what students will need to know prior to labs. 	Create a 'spark' question (or statement) to capture students' attention and curiosity. Upload to LMS: <ul style="list-style-type: none"> short videos or lecture recordings readings or links to resources for students to access. Create open-ended questions to prompt student enquiry into critical concepts. Ask students to identify terms that are familiar and note terms that are new or unclear.	Online self-paced learning activities: <ul style="list-style-type: none"> Login to LMS and watch videos/lecture. Complete pre-class readings. Acknowledge terms and concepts that are familiar. Note any points of confusion or uncertainty. Make notes on critical concepts to be further explored during lab classes and lectures. 	Lecture recordings YouTube videos Reading list items Links such as https://www.khanacademy.org/science/high-school-biology/hs-cells/hs-prokaryotes-and-eukaryotes/v/prokaryotic-and-eukaryotic-cells

<p>Explore</p>	<p>SuperLabs</p>	<p>2 hours</p>	<p>Learning outcomes 3, 4, 5</p> <p>Develop knowledge, through active learning experiences, of:</p> <ul style="list-style-type: none"> eukaryotic and prokaryotic cells, bacterial cell shapes and arrangements, bacterial cell wall composition. <p>Develop skills in Gram staining.</p>	<p>Present learning outcomes.</p> <p>Relay specific safety information.</p> <p>Gram Stain introduction:</p> <ul style="list-style-type: none"> Describe the basis of the gram stain, display image or key points via flat screens. Prepare gram stain image or slides prior to class. Demonstrate Gram stain technique, using Pan Zoom camera to capture, and display via flat screens. Give students an independent activity to complete – i.e. draw a diagram. Ask students to discuss their drawings in small groups. Choose groups to display their drawings using whiteboard/ pan zoom for discussion. <p>Gram stain activity:</p> <ul style="list-style-type: none"> In pairs, students perform Gram stain technique on two bacterial species, noting Gram reaction and cell shape and arrangement. Cover both Gram positive and negative as well as both coccus and bacillus amongst the group as a whole. Ask students to discuss their results in small groups. Choose groups of students to display stains using pan zoom camera. Debrief - discuss correct and incorrect aspects of student stains and observations. 	<p>Attend laboratory.</p> <p>Ask questions as required.</p> <p>Complete the lab activity independently.</p> <p>Discuss understanding with peers in small groups of 4, to compare drawings, clarify uncertainties and build shared understanding.</p> <p>Share and view examples with the wider lab class to further improve understanding, clarify errors and improve knowledge, using Pan Zoom camera or Whiteboards.</p> <p>Work in pairs to perform the Gram stain technique on two bacterial species, noting Gram reaction and cell shape and arrangement.</p> <p>Capture images from their microscopes and upload to their One-Note Lesson</p> <p>Write notes on points of uncertainty to follow-up in the lecture and post-lab activities.</p>	<p>PowerPoint slides.</p> <p>Pan Zoom cameras</p> <p>Sharing/projection to flat screens.</p> <p>Whiteboard</p> <p>OneNote</p> <p>Lab equipment</p>

<p>Explain</p>	<p>Lecture theatre or classroom</p>	<p>1 hour</p>	<p>Learning outcomes 1, 2, 3, 5</p> <p>Expand knowledge through presentation of complex elements.</p> <p>Engage students by connecting knowledge with laboratory experiences.</p> <p>Share and broaden understanding through collaboration.</p>	<p>Present learning outcomes.</p> <p>Prior to lecture, upload a group results table to the One-Note lesson for discussion during lecture and for post-lab student reflection.</p> <p>Create open-ended questions to prompt student enquiry.</p> <p>Present content.</p> <p>Respond to student questions.</p> <p>Ask students to discuss results, describe the Gram reaction and cell arrangement of the organisms tested.</p> <p>Make explicit links between the learning content, activities and assessments.</p>	<p>Discuss lab methods and experiences in small groups.</p> <p>Share ideas from small group discussion with the whole class.</p> <p>Ask questions to clarify uncertainties</p> <p>Note significant points to follow-up in post-lecture readings and activities.</p> <p>Note how the content and lab experiences relate to assessments.</p>	<p>PowerPoint</p> <p>OneNote lab records</p> <p>Panopto lecture capture</p>
<p>Elaborate</p>	<p>Canvas LMS</p>	<p>Post lecture and lab 2 – 3 hours</p>	<p>Encourage students to think deeply about content and apply their knowledge.</p>	<p>Upload to LMS:</p> <ul style="list-style-type: none"> Lecture recordings and resources. Compiled OneNote results from labs. Pan Zoom recordings or whiteboard images from the labs. <p>Create learning activities for students complete such as:</p> <ul style="list-style-type: none"> annotating bacterial cell wall composition diagram; self-paced quizzes for students to interrogate content and apply knowledge to interpret, evaluate or synthesise information. <p>Make explicit connections between content and assessments.</p>	<p>Students undertake:</p> <ul style="list-style-type: none"> self-paced learning activities revise lecture recordings; review lab materials; complete assigned readings. complete tasks connected with assessments. <p>Students should be encouraged to use the LMS discussion board to ask questions and seek clarity as required.</p>	<p>Lecture recordings</p> <p>Example diagram that could be shared via OneNote or LMS for students to complete</p> 

<p>Evaluate</p>	<p>Canvas LMS</p>		<p>Assessment and consolidation of learning</p>	<p>Provide feedback on Laboratory activities.</p> <p>Develop learning activities that encourage students to record laboratory activities,</p> <p style="padding-left: 40px;">i.e. what happens in a Gram-positive or Gram-negative cell wall during each step of the staining procedure</p> <p>then hypothesise what might happen if certain steps of the procedure were removed</p> <p style="padding-left: 40px;">i.e. what colour would the cells be if the alcohol decolorization step was removed, or the counterstain step was removed.</p> <p>Peer discussions (previously undertaken) also support students to consolidate their learning.</p> <p>Design assessment that allow students to receive formative feedback.</p> <p>Scaffold learning activities to allow students to receive feedback from peers prior to the final submission.</p>	<p>Independent, self-paced learning.</p> <p>Use of discussion forum to ask questions, share ideas and discuss the results of their independent activities with peers.</p> <p>Completion of learning activities and readings to consolidate learning.</p> <p>Review feedback provided in formative assessments, to correct misunderstandings, errors or omissions.</p> <p>Engage in peer review opportunities to explore diverse ideas and clarify understanding.</p>	