

Biomanufacturing Module Two: Upstream Process

Please Note: These labs are designed to be flexible. All documents are provided as '.doc' or '.ppt' so that teachers can download them and modify them to suit their curriculum, classroom, student population. Please refer to the Module 2 syllabus for different ways to carry out the bacterial culture scale up and spectrophotometer readings.

The Upstream Process Protocol is prepared in two forms.

- The entire Protocol for Days 1-5 in one large document
- Separate Protocols for Day 1, Day 2, Day 3, Day 4+5

	Topic / Activity	Summary
Day 1	Introduction to aseptic technique - <ul style="list-style-type: none"> • Practicing aseptic technique • Testing the sterility of LB 	On day one, students learn what aseptic technique is and perform an experiment to practice aseptic technique. Each student uses aseptic technique to test the sterility of the LB that will be used to grow RFP+ or GFP+ bacteria.
Day 2	Check Bacterial Plates Inoculate a small liquid culture with and RFP+ or GFP+ bacterial colony	On day two, student teams will check their bacterial plates to determine how well they performed aseptic technique. Using aseptic technique the Upstream biomanufacturing associates will inoculate a small liquid culture and grow it overnight.
Day 3	Scale up the bacterial culture to 50mL Take OD600 readings over a time course to plot a growth curve	On day three, Upstream Technicians scale up the bacterial culture to produce more RFP+ or GFP+ bacteria. Teams Process Engineers calibrate the spectrophotometer. The Upstream technician takes samples of the bacterial culture at designated time points. The QC Technician records the data. Student teams graph bacterial growth curves using their own data as well as a provided data set. The rest of the culture grows overnight.
Day 4	Induction of RFP or GFP production	On Day 4 Upstream Technicians add arabinose to the culture to induce protein production. The culture grows overnight again.
Day 5/6	Harvest of bacterial culture Bacterial plating to determine bacterial yield.	On Day 5 Upstream Technicians harvest the bacterial culture. The QC Technician carries out plating in order

Module 2 Syllabus

	Documentation - batch record	to calculate bacterial yield. Students fill out the batch record. The QA Technician signs off on the upstream process batch record.
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