

## **Biomanufacturing Kit Module 2 Syllabus**

**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 etc

In particular, the bacterial culture scale up (Module 2, Lesson 3) can be done in a variety of ways.

- In a short class period, each team could take an OD600 reading of their 50mL culture at time = 0 minutes and then take another reading after the culture has grown for 24 hours.
- In a longer class period, each team could take several readings at 15 or 20 minute time points.
- A second class that occurs right after the first class could continue the readings on a culture started by teams in the first class.

In any case, there is also data provided that can be used by students to graph an entire growth curve.

Bacterial cultures, both liquid and on plates, can be stored in the refrigerator between classes. Plates should always be stored upside down (ie agar side up).

### **Upstream Process**

1. Introduction to Aseptic Technique: Module 2, Lesson 1
  - a. Aseptic Technique slide deck
  - b. Aseptic Technique practice by all students: Testing the sterility of LB (SOP)Next class period:
  - c. Examine plates
  - d. Each team fills out the Aseptic Technique Check document
2. Bacterial Inoculation: Module 2, Lesson 2
  - a. Review Upstream Process – Overview of Biomanufacturing slide deck
  - b. Each team inoculates a small liquid culture in LB + ampicillin.
  - c. Each team fills out the appropriate parts of the Upstream Process Batch Record document
  - d. Recombinant Protein Production in Bacteria slide deck
3. Bacterial Culture Scale Up: Module 2, Lesson 3
  - a. Each team scales up their culture to 50mL of LB + ampicillin.
  - b. The Process Engineers prepare the spectrophotometer for use (SOP)
  - c. Each team takes OD600 readings at various time points
  - d. Each team records data in the appropriate part of the Upstream Process Batch Record

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- e. Bacterial Growth Curve Graphing – teams graph their own data and/or a provided data set to generate a growth curve (this can be homework)
- 4. Induction of Recombinant Protein Production (RFP or GFP): Module 2, Lesson 4
  - a. Induction of Protein Production slidedeck.
  - b. Each team adds the appropriate amount of the sterile arabinose stock to their bacterial culture.
  - c. Each team fills out the appropriate part of the Upstream Process Batch Record.
- 5. Bacterial Harvest and Determination of Bacterial Yield: Module 2, Lesson 5
  - a. Each team harvests their bacterial culture
  - b. Each team practices making serial dilutions (Serial Dilution Lab)
  - c. Each team performs a bacterial plating experiment in order to determine their cfu/mL
  - d. Each team fills out the appropriate part of the Upstream Process Batch Record.

Next class period:

- e. Examine serial dilution plates
- f. Each team calculates their bacterial yield
- g. Each team fills out a Colony Forming Unit Calculation Record
- h. Each team completes their Upstream Process Batch Record.