

Biomanufacturing Kit - Module 2: Upstream Process

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This section contains all curriculum documents for Module 2. Each module has an outline and syllabus. Each lesson has a teacher guide document. Each lesson is a separate subsection. Documentation forms for Module 2 are linked in the last subsection of the module on this page.

A. Module 2, Syllabus and Outline

- [Module 2 Syllabus](#)
- [Module 2 outline](#)

B. Module 2, Lesson 1 - Aseptic Technique

- [Module 2, Lesson 1 Teacher Guide: Module 2 Lesson 1 Teacher Guide](#)
- [Aseptic Technique slide deck: Aseptic Technique](#)
- [Testing the Sterility of LB SOP: Testing the Sterility of LB SOP](#)

C. Module 2, Lesson 2 - Bacterial Inoculation

- [Module 2, Lesson 2 Teacher Guide: Module 2 Lesson 2 Teacher Guide](#)
- [Recombinant Protein Production in Bacteria slide deck: Recombinant Protein Production in Bacteria](#)
- [Instructions for use of shaker/incubator: Shaker Incubator User Instructions](#)
- [Upstream Process Protocol Days 1-5 \(complete protocol\): Upstream Process Protocol Day 1-5 Complete Protocol](#)
 - **Note:** The above version of the upstream protocol is a compilation of all upstream protocols for Days 1-5. Individual upstream protocols for each day are also provided in the appropriate lesson sections. Download: [Upstream Process Protocol Day 2-5 Complete Protocol](#).

D. Module 2, Lesson 3 - Bacterial Culture Scale-Up

- [Module 2, Lesson 3 Teacher Guide: Module 2 Lesson 3 Teacher Guide](#)

- Directions for using the spectrophotometer (Teachers): Directions for Use of the Vis Spectrophotometer - Teacher
- Spectrophotometer SOP: Spectrophotometer Check SOP
- Upstream Process Protocol Day 2: Upstream Process Protocol Day 2
- Bacterial Growth Curve Graphing Documents:
 - Bacterial Growth Curve Graphing Protocol Excel
 - Bacterial Growth Curve Graphing Spreadsheet.
 - Bacterial Growth Curve
 - Graphing a Bacterial Growth Curve in Google Sheets
- Bacterial Growth Extension Lesson and KEY:
 - Module 2 Extension_Calculation of Bacterial Growth Assignment
 - Module 2 Extension_Calculation of Bacterial Growth KEY

E. Module 2, Lesson 4 - Induction of Protein Production

- Module 2, Lesson 4 Teacher Guide: Module 2 Lesson 4 Teacher Guide
- Induction of Protein Production slide deck: Induction of Protein Production
- Upstream Process Protocol Day 3: Upstream Process Protocol Day 3
- RFP Induction Time Line and Results: RFP Induction Timeline Results

F. Module 2, Lessons 5.1 and 5.2 - Bacterial Harvest & Calculation of Bacterial Yield

- Module 2, Lesson 5 Teacher Guide: Module 2 Lesson 5 Teacher Guide
- Serial Dilution Practice Lab: Serial Dilution Lab
- Upstream Process Protocol Days 4 and 5: Upstream Process Protocol Day 4 & 5

G. Module 2 Documentation

- Aseptic Technique Check Document
- Colony Forming Unit Calculation Record
- Upstream Process Batch Record

