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About this book

The book is laid out in twelve chapters. It begins with a chapter on Operational Excellence (OPEX), which will introduce you to the atmosphere in which biopharmaceuticals are produced to help ensure a quality product. The OPEX chapter is followed by ten chapters representing the unit operations within a biopharmaceutical manufacturing facility. The unit operations are grouped into three united or related occupations located within the biopharmaceutical manufacturing facility:

- **Engineering Unit.** OPEX, Facilities, Metrology, Validation, and Environmental Health and Safety (EHS).
- **Quality Unit.** Quality Assurance, Microbiological Control, and Quality Control Biochemistry.
- **Production Unit.** Upstream Processing, Downstream Processing, and Process Development.

A master glossary and addendum with basic information on science, biology, and chemistry are included. The authors, reviewers and other contributors involved in the production of this biomanufacturing textbook wanted to provide you with an inside look at the operations of a typical biopharmaceutical manufacturing plant as it exists today, along with the knowledge required to succeed in one of the eleven biomanufacturing jobs or career pathways covered.

We feel the text will be useful both to community college and university students who want to start careers in this interesting, challenging industry and to incumbent technicians already employed in biopharmaceutical manufacturing. It may also be of interest to a growing number of people wanting information about biomanufacturing in order to apply it to the biomanufacturing of biofuels, bioplastics, industrial enzymes, and other products of the emerging bioeconomy.

The textbook may be used alone or with NBC2 hands-on labs based on actual biopharmaceutical biomanufacturing Standard Operating Procedures (SOPs), or with other available resources. Ancillaries to support the textbook and hands-on labs can be found at the NBC2 support site at www.biomanonline.org. The website also includes seminal scientific articles and virtual upstream and downstream processing laboratories, based on actual hands-on laboratories. In time, the NBC2 hopes to offer the biomanufacturing student a completely virtual biopharmaceutical manufacturing experience, to go along with more traditional materials currently used for teaching and learning about biopharmaceutical manufacturing.

Sonia Wallman
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Portsmouth, NH
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