

Biomanufacturing (MR)

Degree Requirements

Students may choose from the degree tracks below to complete coursework within a focus area.

Degrees earned will be distributed as: "Master of Biomanufacturing" without focus area track specifications.

| Code | Title | Hours | Counts towards |
|---------------------|-------|-----------|----------------|
| Core Courses | | 18 | |

| | | | |
|---------|--|--|--|
| BEC 575 | Global Regulatory Affairs for Medical Products | | |
| BEC 577 | Advanced Biomanufacturing and Biocatalysis | | |
| BEC 590 | Industry Practicum in Biomanufacturing (two semesters) | | |
| BEC 601 | Biomanufacturing Seminar (two semesters)* | | |
| BEC 620 | Leadership and Preparation for Industry Internship in Biomanufacturing | | |
| ST 511 | Statistical Methods For Researchers I | | |
| BEC 515 | Biopharmaceutica Product Characterization Techniques | | |
| | or BEC 588 Animal Cell Culture Engineering | | |

Focus Area Track **6**

Select courses from a category listed under "Focus Area Track Courses" below

Professional Courses **9**

| | | | |
|--------------------------------------|---|--|--|
| BUS 554 | Project Management | | |
| Select two of the following courses: | | | |
| MBA 585 | Current Topics in BioSciences Management | | |
| MBA 586 | Legal, Regulatory and Ethical Issues in Life Science Industries | | |

| | | | |
|---------|---|--|--|
| MBA 590 | Special Topics In Business Management | | |
| BUS 501 | Strategic Management Foundations | | |
| COM 563 | Public Relations Theory | | |
| COM 598 | Special Topics In Communication (Intro to Science Communication: Theory/Practice) | | |

Elective Courses **3**

Select three credit hours from "Elective Courses" listed below each focus area category

Total Hours **36**

* BEC 601 is to be repeated twice to meet two total credit hours.

Focus Area Tracks

Upstream Track

| Code | Title | Hours | Counts towards |
|--------------------|--|----------|----------------|
| CHE 563 | Fermentation of Recombinant Microorganisms | 2 | |
| BBS 526 | Upstream Biomanufacturing Laboratory | 2 | |
| BEC 580 | cGMP Fermentation Operations | 2 | |
| Total Hours | | 6 | |

Elective Courses

| Code | Title | Hours | Counts towards |
|---|--|----------|----------------|
| Select three credits of the following courses: | | 3 | |
| BEC 525 | Molecular Biology for Biomanufacturing | 2 | |
| BEC 545 | Cell Line Development for Biomanufacturing | 2 | |
| BEC 532 | Foundations of Downstream Processing and Formulation | 2 | |
| BEC 536 | Introduction to Downstream Process Development | 2 | |
| BEC 585 | cGMP Downstream Operations | 2 | |

| | | |
|---------|---|-----|
| BEC 583 | Tissue Engineering Technologies | 2 |
| BEC 595 | Special Topics in Biomanufacturing | 1-6 |
| BIT 501 | Ethical Issues in Biotechnology | 1 |
| BEC 669 | Biomanufacturing Research Projects | 1-4 |
| BIT 510 | Core Technologies in Molecular and Cellular Biology | 4 |
| BIT 566 | Animal Cell Culture Techniques | 2 |

Downstream Track

| Code | Title | Hours | Counts towards |
|--------------------|--|----------|----------------|
| BEC 532 | Foundations of Downstream Processing and Formulation | 2 | |
| BEC 536 | Introduction to Downstream Process Development | 2 | |
| BEC 585 | cGMP Downstream Operations | 2 | |
| Total Hours | | 6 | |

Elective Courses

| Code | Title | Hours | Counts towards |
|---|--|-------|----------------|
| Select three credits of the following courses: | | | 3 |
| BEC 525 | Molecular Biology for Biomanufacturing | 2 | |
| BEC 545 | Cell Line Development for Biomanufacturing | 2 | |
| CHE 563 | Fermentation of Recombinant Microorganisms | 2 | |
| BBS 526 | Upstream Biomanufacturing Laboratory | 2 | |
| BEC 580 | cGMP Fermentation Operations | 2 | |
| BEC 583 | Tissue Engineering Technologies | 2 | |
| BEC 595 | Special Topics in Biomanufacturing | 1-6 | |

| | | |
|---------|---|-----|
| BIT 501 | Ethical Issues in Biotechnology | 1 |
| BEC 669 | Biomanufacturing Research Projects | 1-4 |
| BIT 510 | Core Technologies in Molecular and Cellular Biology | 4 |
| BIT 566 | Animal Cell Culture Techniques | 2 |

Faculty

Full Professors

Ruben G. Carbonell

Amy Michele Grunden

Harold Henry Lamb

Paul Edward Mozdziak

Balaji M. Rao

Heike Inge Ada Sederoff

John Douglas Sheppard

Associate Professors

Paul T. Hamilton

Gavin John Williams

Assistant Professors

Stefano Menegatti

Practice/Research/Teaching Professors

Kirill Efimenko

Gary Louis Gilleskie

Imara Yasmin Perera

John H. van Zanten

Emeritus Faculty

Michael Carl Flickinger