

# (CHE2) BIOENGINEERING - BIOCHEMICAL, BIOMEDICAL, BIOENVIRONMENTAL SUB-PLAN, B.A.SC. (2024)

### Second Year CORE 2021-2022

| Code        | Title                                       | Units |
|-------------|---|-------|
| CHEE 209    | Analysis Of Process Data                    | 3.50  |
| CHEE 221    | Chemical Processes And Systems              | 3.50  |
| CHEE 229    | Cell Based Engineering Princip              | 4.00  |
| ENCH 211    | Main Group Chemistry                        | 4.75  |
| MTHE 225    | Ordinary Differential Equations             | 3.50  |
| ENCH 212    | Princip Of Chem Reactivity                  | 4.00  |
| APSC 200    | Engineering Design & Practice II            | 4.00  |
| APSC 293    | Engineering Communications                  | 1.00  |
| CHEE 210    | Thermodynamics of Energy Conversion Systems | 3.50  |
| CHEE 218    | Laboratory Projects I                       | 2.50  |
| CHEE 222    | Process Dynamics & Num Methods              | 3.50  |
| CHEE 223    | Fluid Mechanics                             | 3.50  |
| ENCH 245    | Applied Organic Chemistry I                 | 4.75  |
| Total Units |   | 46.00 |

#### Third Year CORE 2022-2023

| Code                             | Title  | Units |
|----------------------------------|--|-------|
| APSC 221                         | Economic And Business Practice                       | 3.00  |
| CHEE 311                         | Fluid Phase And Reaction Equilibrium                 | 3.50  |
| CHEE 321                         | Chemical Reaction Engineering                        | 3.50  |
| CHEE 330                         | Heat And Mass Transfer                               | 3.50  |
| CHEE 342                         | Environmental Biotechnology                          | 3.50  |
| CHEE 380                         | Biochemical Engineering                              | 3.50  |
| CHEE 315                         | Laboratory Projects II                               | 4.00  |
| CHEE 319                         | Process Dynamics & Control                           | 3.50  |
| CHEE 331                         | Design of Unit Operations                            | 4.50  |
| CHEE 340                         | Biomedical Engineering                               | 3.50  |
| CHEE 361                         | Engineering Communications, Ethics & Professionalism | 1.00  |
| CHEE 371                         | Mitigation of Industrial Pollution                   | 3.50  |
| Elective - Complementary Studies |  | 3.00  |
| Total Units                      |  | 43.50 |

Note: It is recommended that students take APSC 221 Economic And Business Practice during the fall term in preparation for CHEE 331 Design of Unit Operations in the winter term.

## Fourth Year CORE 2023-2024

| Code             | Title   | Units |
|------------------|---|-------|
| CHEE 418         | Strategies Proc Investigations                                    | 3.50  |
| CHEE 452         | Transport Phenomena in Physiological Systems <sup>2</sup>         | 3.50  |
| CHEE 471         | Chemical Process Design   | 7.00  |
| Elective - Techi | nical Elective  | 9.00  |
| Elective - Comp  | olementary Studies  | 6.00  |
| Select from the  | e following:  | 7.00  |
| APSC 400         | Technology, Engineering & Managemen (TEAM)                        | t     |
| APSC 401         | Interdisciplinary Projects (PLUS a TECH elective) <sup>1</sup>    |       |
| APSC 480         | Multi-disciplinary Industry                                       |       |
| CHEE 408         | Bioengineering Research Project                                   |       |
| CHEE 410         | Engineering Innovation and Entrepreneurship (PLUS a TECH elective | ) 1   |
| CHEE 420         | Laboratory Projects III (PLUS a TECH elective) <sup>1</sup>       |       |

**Total Units** 36.00

For 2023-2024 only students will take CHEE 412 in the fall term instead of CHFF 452 in the winter term.

#### **Technical Electives**

Students in the CHE2 Bioengineering - Biochemical, Biomedical, Bioenvironmental sub-plan take one technical elective (TECH) course from the Technical Electives Group A list and two (2) courses from either the Technical Electives Group A or Technical Electives Group B technical electives list. NOTE: Students in the Bioengineering option are encouraged to select electives from the relevant elective groupings.

Chemical Process and Bioengineering Sub-plan: Technical Electives (https://queensu-ca-public.courseleaf.com/ engineering-applied-sciences/academic-plans/chemicalengineering/chemical-process-bioengineering-sub-plantechnical-electives/)

PLUS a technical elective from either Group A or Group B count together as one choice. This technical elective is counted separate from the technical elective requirements of the program.



# **Complementary Studies**

Students choose a total of 9 credits from the approved Lists A or B, of which 3 credits must be taken from List A.

Refer to the Complementary Studies section of this calendar for details regarding the requirements for all Engineering plans.

# **Engineering Economics**

To meet the engineering economics requirement, students take APSC 221 Economic And Business Practice (this is a CORE course).

## **Communications**

To meet the communications course requirement, students take APSC 293 Engineering Communications and CHEE 361 Engineering Communications, Ethics & Professionalism (these are CORE courses).