

# Bioengineering Curriculum - Stream 1 (Biological Materials & Mechanics)

Non-CEGEP Entry

<b>1st Semester (Fall)</b>		15 credits	Prerequisites/Co-requisites
CHEM 110	General Chemistry 1	4	-
FACC 100	Introduction to the Engineering Profession	1	-
MATH 133	Linear Algebra and Geometry	3	-
MATH 140	Calculus 1	3	-
PHYS 131	Mechanics and Waves	4	C - MATH 140
<b>2nd Semester (Winter)</b>		18 credits	Prerequisites/Co-requisites
BIOL 112	Cell and Molecular Biology	3	-
CHEM 120	General Chemistry 2	4	-
CS	Complimentary Studies - Group B (HSSML) - 1	3	-
MATH 141	Calculus 2	4	P - MATH 140
PHYS 142	Electromagnetism and Optics	4	P - PHYS 131 / C - MATH 141
<b>3rd Semester (Fall)</b>		17 credits	Prerequisites/Co-requisites
BIEN 200	Introduction to Bioengineering	2	P - Permission of Instructor
BIOL 200	Molecular Biology	3	P - BIOL 112 / C - CHEM212
CHEM 212	Introductory Organic Chemistry 1	4	P - CHEM 110 / C - CHEM 120
MATH 262	Intermediate Calculus	3	P - MATH 141, MATH 133
MATH 263	Ordinary Differential Equations for Engineers	3	C - MATH 262
MECH 210	Mechanics 1	2	-
<b>4th Semester (Winter)</b>		12 credits	Prerequisites/Co-requisites
BIEN 210	Electrical and Optical Properties of Biological Systems	3	P - BIEN 200, BIOL 112
BIOC 212	Molecular Mechanisms of Cell Function	3	P - BIOL 200
BREE 301	Biothermodynamics	3	-
COMP 208	Computers in Engineering	3	P - MATH 140, MATH 141
<b>5th Semester (Fall)</b>		16 credits	Prerequisites/Co-requisites
BIEN 290	Bioengineering Measurement Laboratory	4	P - BIEN 200, PHYS 142
CIVE 281	Analytical Mechanics	3	C - MATH 262, MATH 263
MATH 264	Advanced Calculus for Engineers	3	P - MATH 262 / C - MATH 263
TC STREAM 1 (BIEN 320)	Molecular, Cellular, and Tissue Biomechanics	3	P - Permission of Instructor
TC STREAM 1 (MIME 261)	Structure of Materials	3	-
<b>6th Semester (Winter)</b>		13 credits	Prerequisites/Co-requisites
CHEE 310	Physical Chemistry for Engineers	3	P - CHEE 220 or MIME 212 or BREE 301
CS	Complimentary Studies - Group B (HSSML)	3	-
PHYS 319	Introduction to Biophysics	3	P - BIOL 200; MATH 222/MATH 262; PHYS 230 and (PHYS 232 or PHYS 253), or Permission of Instructor
TC STREAM 1 (CIVE 207)	Solid Mechanics	4	P - CIVE 205 or MECH 210
<b>7th Semester (Fall)</b>		12 credits	Prerequisites/Co-requisites
BIEN 390	Bioengineering Laboratory	3	P - BIEN 290
FACC 300	Engineering Economy	3	-
TC STREAM 1 (CHEE 314)	Fluid Mechanics	3	P - CHEE 204 or BIEN 200 / C - MATH 264
TC STREAM 1 (MIME 470)	Engineering Biomaterials	3	P - MIME 261 or Permission of Instructor
<b>8th Semester (Winter)</b>		12 credits	Prerequisites/Co-requisites
BIEN 340	Transport Processes in Biological Systems	3	P - Permission of Instructor
CCOM 206	Communication in Engineering	3	-
CS	Complimentary Studies - Group A (Impact)	3	-
TC STREAM 1 (BIEN 462)	Engineering Principles in Physiological Systems	3	-
<b>9th Semester (Fall)</b>		13 credits	Prerequisites/Co-requisites
BIEN 470	Bioengineering Design Project (first half)	3	P - BIEN 390
FACC 400	Engineering Professional Practice	1	P - FACC 100 or BREE 205, 60 program credits
TC STREAM 1 (BIEN 510)	Nanoparticles in Biological Environments	3	P - Permission of Instructor
TC STREAM 1 (BIEN 570)	Active Mechanics in Biology	3	-
TC STREAM 1 (BMDE 504)	Biomaterials and Bioperformance	3	-
<b>10th Semester (Winter)</b>		14 credits	Prerequisites/Co-requisites
BIEN 470	Bioengineering Design Project (second half)	3	P - BIEN 390
BIEN 471	Bioengineering Research Project	2	P - Permission of Instructor
TC STREAM 1 (BMDE 505)	Cell and Tissue Engineering	3	-
TC STREAM 1 (CHEE 563)	Biofluids and Cardiovascular Mechanics	3	P - CHEE 314 or MECH 331 or Permission of Instructor
TC STREAM 1 (MECH 547)	Mechanics of Biological Materials	3	P - MECH 210, MIME 260 or MIME 261, or Permission of Instructor

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Technical Complementary courses are selected from an approved list given on the next page

The Complementary Studies (CS) courses are Impact of Technology courses (Group A) and Humanities & Social Sciences, Management Studies and Law courses (Group B). These must be chosen from an approved list of courses/departments, found in the program list under "Complementary Studies" in the Programs, Courses and University Regulations Calendar .

Elective courses (EC) may be chosen from any course at the 200-level or higher in the Desautels Faculty of Management, Faculty of Agricultural and Environmental Sciences, Faculty of Arts, Faculty of Engineering, Faculty of Religious Studies, Faculty of Science, and/or Schulich School of Music.

## Technical Complementary Courses - Bioengineering

		Credits	Prerequisites/Co-requisites
BIEN 320	Molecular, Cellular, and Tissue Biomechanics	3	P - Permission of Instructor
BIEN 462	Engineering Principles in Physiological Systems	3	-
BIEN 510	Applications of Nanoparticles in the Biomedical Sciences	3	P - Permission of Instructor
BIEN 570	Active Mechanics in Biology	3	-
BMDE 504	Biomaterials and Bioperformance	3	-
BMDE 505	Cell and Tissue Engineering	3	-
CHEE 314	Fluid Mechanics	3	P - CHEE 204 or BIEN 200 / C - MATH 264
CHEE 563	Biofluids and Cardiovascular Mechanics	3	P - CHEE 314 or MECH 331 or Permission of Instructor
CIVE 207	Solid Mechanics	4	P - Permission of Instructor
MECH 547	Mechanics of Biological Materials	3	P - MECH 210, MIME 260 or MIME 261, or Permission of Instructor
MIME 261	Structure of Materials	3	-
MIME 470	Engineering Biomaterials	3	P - MIME 261 or equivalent; Permission of Instructor

Last update: July 2016