ADDENDUM

Faculty of Engineering

3/2/2004

List of new programs and programs for which the requirements were modified this year. For details please see below.

Chemical Engineering

BASc in Chemical Engineering

Environmental Engineering option

Engineering Management and Entrepreneurship option

BASc in Chemical Engineering / BSc in Computing Technology

BASc in Chemical Engineering / BSc with concentration in Biochemistry

BASc in Chemical Engineering / BSc with honours in Biochemistry

Mechanical Engineering

BASc in Mechanical Engineering with Biomedical Enginneering Design Option

Chemical Engineering

BASc in Chemical Engineering 147 cr.

First year 36

Fall:

CHM1310	Principles of Chemistry	4
ENG1112	Technical Report Writing	3
GNG1100	Engineering Mechanics	4
GNG1101	Fundamentals of Engineering Computation	4
MAT1320	Calculus I	3

Winter:

CHG1120	Introduction to Chemical Engineering	4
CHM1320	Organic Chemistry I	4
MAT1322	Calculus II	3
MAT1341	Introduction to Linear Algebra	3
PHY1102	Fundamentals of Physics II	3
PHY1304	Physics Laboratory for Engineers	1

Second year 36

Fall:

CHG2312	Fluid Flow	3
CHG2317	Introduction to Chemical Process Analysis and Design	3
CHM2130	Physical chemistry: Introduction to the molecular properties of matter	3
MAT2322	Calculus III for Engineers	3
MAT2331	Ordinary Differential Equations and Numerical Methods	4
Complementary studies elective 1		3

Winter:

CHG2314	Heat Transfer Operations	3
CHM2136	Laboratory of Physical Chemistry	2
CHM2131	Chemical Thermodynamics of Gases and Solutions	3
MAT2377	Probability and Statistics for Engineers	3
ECO1192	Engineering Economics	3
HIS2129 1	Technology, Society and Environment since 1800	3
or		
PHI2394 1	Scientific Thought and Social Values	3

Third year 36

Fall:

CHG3316	Transport Phenomena	3
CHG3324	Fundamentals and Applications of Chemical Engineering Thermodynamics	3
CHG3331	Application of Mathematical Methods to Chemical Engineering	3
CHG3335	Process Control	3
CHG3337	Data Collection and Interpretation	3
Technical elective 2		3

Winter:

CHG3111	Unit Operation	3
CHG3112	Process Synthesis, Design and Economics	3
CHG3122	Chemical Engineering Practice	3
CHG3127	Chemical Reaction Engineering	3
CHG3326	Principles of Phase Equilibria and Chemical Reaction Equilibria	3
Complementary studies elective 1		3

Fourth year 39

Fall:

CHG4305	Advanced Materials in Chemical Engineering	3
CHG4116	Chemical Engineering Laboratory	3
CHG4343	Computer-Aided Design in Chemical Engineering	3
CHG4381	Introduction to Biochemical Engineering	3
Technical elective 2		3

Winter:

CHG4300	Thesis and Seminar	6
or		
Technical electives		6
CHG4306	Microelectronics Manufacturing Processes	3
CHG4307	Microelectronics Manufacturing Processes	3
CHG4244	Plant Design Project	6
GNG4170	Engineering Law	3
Technical elective 2		3

(1) For a complete list of complementary studies electives, consult the Academic Regulations section. Depending on scheduling, HIS2129 or PHI2394 may be interchanged with a complementary studies elective.

(2) List of technical electives (courses are not necessarily offered every year).

CHG4157	Strategies for Engineering Process Analysis	3
CHG4300	Thesis and Seminar	6
CHG4301	Air Pollution Control Processes	3
CHG4302	Environmental Biotechnology	3
CHG4303	Hazardous Waste Control	3
CHG4331	Introduction to Polymer Reaction Engineering	3
CHG4333	Fundamentals of Polymer Processing	3
CHG4355	Science and Technology of Pulp and Paper	3
CHG4359	Selected Topics I	3
CHG4360	Selected Topics II	3
CHG4361	Selected Topics III	3
CHG4362	Selected Topics IV	3
CHG4367	Enhanced Oil Recovery	3
CHG4371	Properties and Treatment of Particulate Wastes - Sludges	3
CHG4372	Polymers in the Environment	3
CHG4377	Risk Assessment and Hazard Analysis	3
CHG4385	Adsorption Separations for Environmental Applications	3
GNG4128	Introduction to Nuclear Engineering	3
GNG4151	Statistical Process Control	3

Chemical Engineering

Environmental Engineering option

151 cr.

Pollution control and environmental engineering have always been a major part of the chemical engineering profession. In addition, today's society is becoming more and more concerned with environmental questions. In order to respond to these needs, the Department of Chemical Engineering offers a structured undergraduate option in environmental engineering. This option is offered in collaboration with the Department of Civil Engineering, where a similar structured option exists in environmental engineering.

Although Biology 4U is not a factor in admission to the Faculty, students considering the environmental engineering option are strongly encouraged to take it as their sixth credit.

First year — 36

Fall:

CHM1310	Principles of Chemistry	4
ENG1112	Technical Report Writing	3
GNG1100	Engineering Mechanics	4
GNG1101	Fundamentals of Engineering Computation	4
MAT1320	Calculus I	3

Winter:

CHG1120	Introduction to Chemical Engineering	4
CHM1320	Organic Chemistry I	4
MAT1322	Calculus II	3
MAT1341	Introduction to Linear Algebra	3
PHY1102	Fundamentals of Physics II	3
PHY1304	Physics Laboratory for Engineers	1

Second year — 43

Fall:

CHG2312	Fluid Flow	3
CHG2317	Introduction to Chemical Process Analysis and Design	3
CHM2130	Physical chemistry: Introduction to the molecular properties of matter	3
CVG2131	Fundamentals of Environmental Engineering	4
MAT2322	Calculus III for Engineers	3
MAT2331	Ordinary Differential Equations and Numerical Methods	4
Complementary studies elective 1		3

Winter:

CHG2314	Heat Transfer Operations	3
CHM2136	Laboratory of Physical Chemistry	2
CHM2131	Chemical Thermodynamics of Gases and Solutions	3
ECO1192	Engineering Economics	3
EVS1101	Introduction to Environmental Science	3
MAT2377	Probability and Statistics for Engineers	3
HIS2129 1	Technology, Society and Environment since 1800	3
or		
PHI2394 1	Scientific Thought and Social Values	3

Third year — 36

Fall:

CHG3316	Transport Phenomena	3
CHG3324	Fundamentals and Applications of Chemical Engineering Thermodynamics	3
CHG3331	Application of Mathematical Methods to Chemical Engineering	3
CHG3335	Process Control	3
CHG3337	Data Collection and Interpretation	3
Technical elective 2		3

Winter

CHG3111	Unit Operation	3
CHG3112	Process Synthesis, Design and Economics	3
CHG3122	Chemical Engineering Practice	3
CHG3127	Chemical Reaction Engineering	3
CHG3326	Principles of Phase Equilibria and Chemical Reaction Equilibria	3
Complementary studies elective 1		3

Fourth year 36

Fall:

CHG4305	Advanced Materials in Chemical Engineering	3
CHG4116	Chemical Engineering Laboratory	3
CHG4343	Computer-Aided Design in Chemical Engineering	3
CHG4381	Introduction to Biochemical Engineering	3
Technical elective 2		3

Winter:

CHG4300	Thesis and Seminar	6
or		
Technical electives 2		6
CHG4306	Microelectronics Manufacturing Processes	3
CHG4307	Microelectronics Manufacturing Processes	3
CHG4244	Plant Design Project	6
GNG4170	Engineering Law	3

(1) For a complete list of complementary studies electives, consult the Academic Regulations section. Depending on scheduling, HIS2129 or PHI2394 may be interchanged with a complementary studies elective.

(2) List of technical electives for the environmental option (courses are not necessarily offered every year).

BIO2109	Ecology	4
CHG4300 3	Thesis and Seminar	6
CHG4301	Air Pollution Control Processes	3
CHG4302	Environmental Biotechnology	3
CHG4303 4	Hazardous Waste Control	3
CHG4355	Science and Technology of Pulp and Paper	3
CHG4359 3	Selected Topics I	3
CHG4360 3	Selected Topics II	3
CHG4361 3	Selected Topics III	3
CHG4362 3	Selected Topics IV	3
CHG4371	Properties and Treatment of Particulate Wastes - Sludges	3
CHG4372	Polymers in the Environment	3
CHG4377	Risk Assessment and Hazard Analysis	3
CHG4385	Adsorption Separations for Environmental Applications	3
CHG8192	Membrane Applications in Environmental Engineering	3
CVG3120	Hydrology	3

CVG3132	Physical / Chemical Unit Operations of Water and Wastewater Treatment	3
CVG4130	Advanced Environmental Engineering	3
CVG4132 4	Hazardous Waste Management	3
CVG4133	Solid Waste Management	3
CVG4301	Waste Geotechnique	3
GNG4128	Introduction to Nuclear Engineering	3

(3) This course must be in the field of environmental engineering.

(4) The following courses may not be combined for credit: CHG4303 and CVG4132

Chemical Engineering

Engineering Management and Entrepreneurship option

150 cr.

The engineering management and entrepreneurship option will appeal to students interested in managing their own enterprise. These skills are also important for engineers who are working in teams on both large and small-scale projects, as they need to be able not only to design a product or process but also to market it effectively to both their technical and administrative associates.

Entrepreneurs are knowledgeable about the legal, financial, and administrative procedures involved when starting up new companies comprising like-minded individuals and they are aware of the pitfalls involved. In this option students take the bulk of their complementary studies requirements from the School of Management, starting in second year.

First year 36

Fall:

CHM1310	Principles of Chemistry	4
ENG1112	Technical Report Writing	3
GNG1100	Engineering Mechanics	4
GNG1101	Fundamentals of Engineering Computation	4
MAT1320	Calculus I	3

Winter:

CHG1120	Introduction to Chemical Engineering	4
CHM1320	Organic Chemistry I	4
MAT1322	Calculus II	3
MAT1341	Introduction to Linear Algebra	3
PHY1102	Fundamentals of Physics II	3
PHY1304	Physics Laboratory for Engineers	1

Second year 36

Fall:

ADM1100	Introduction to Business Management	3
CHG2312	Fluid Flow	3
CHG2317	Introduction to Chemical Process Analysis and Design	3
CHM2130	Physical chemistry: Introduction to the molecular properties of matter	3
MAT2322	Calculus III for Engineers	3
MAT2331	Ordinary Differential Equations and Numerical Methods	4

Winter:

CHG2314	Heat Transfer Operations	3
CHM2131	Chemical Thermodynamics of Gases and Solutions	3
CHM2136	Laboratory of Physical Chemistry	2
ECO1192	Engineering Economics	3
MAT2377	Probability and Statistics for Engineers	3
HIS2129	Technology, Society and Environment since 1800	3
or		
PHI2394	Scientific Thought and Social Values	3

Third year 39

Fall:

ADM2340	Financial Accounting	3
CHG3316	Transport Phenomena	3

CHG3324	Fundamentals and Applications of Chemical Engineering Thermodynamics	3
CHG3331	Application of Mathematical Methods to Chemical Engineering	3
CHG3335	Process Control	3
CHG3337	Data Collection and Interpretation	3

Winter:

ADM2320	Marketing	3
CHG3111	Unit Operation	3
CHG3112	Process Synthesis, Design and Economics	3
CHG3122	Chemical Engineering Practice	3
CHG3127	Chemical Reaction Engineering	3
CHG3326	Principles of Phase Equilibria and Chemical Reaction Equilibria	3

Fourth year 39

Fall:

CHG4305	Advanced Materials in Chemical Engineering	3
CHG4116	Chemical Engineering Laboratory	3
CHG4343	Computer-Aided Design in Chemical Engineering	3
CHG4381	Introduction to Biochemical Engineering	3
Elective for the management / entrepreneurship option 1		3

Winter:

ADM3313	Introduction to Entrepreneurship	3
CHG4300	Thesis and Seminar	6

or

Technical electives 2		6
CHG4306	Microelectronics Manufacturing Processes	3
CHG4307	Microelectronics Manufacturing Processes	3
CHG4244	Plant Design Project	6
GNG4170	Engineering Law	3

(1) List of electives for the engineering management and entrepreneurship option

ADM1101	Social Context of Business	3
ADM2336	Organizational Behaviour	3
ADM3318	International Business	3
ADM3319	Comparative Management	3
ADM3334	Industrial Relations	3
ADM3326	Advertising and Sales Promotion Management	3
PHI2397	Business Ethics	3

(2) Consult the list of technical electives shown in the regular program.

NOTE: Other elective courses may be allowed but must be approved by the Department of Chemical Engineering.

Chemical Engineering

BASc in Chemical Engineering

181 cr.

BSc in Computing Technology

The combined program in chemical engineering and computing technology is offered jointly by the Department of Chemical Engineering and the School of Information Technology and Engineering (SITE). The program's goal is to provide a strong background for a career in chemical engineering along with a solid foundation in computing technology. As a result of this innovative curriculum, graduates will have the same preparation as students in the regular chemical engineering program, as well as training in software engineering, computer hardware, programming languages and operating systems, expert systems, networks, process modelling and simulation, and instrumentation and actuation. This training will allow graduates not only to compete on the job market but also to excel in their careers.

The combined program requires five years of study and leads to two degrees: the BASc in chemical engineering and the BSc in computing technology. The program can also be completed under the co-operative education option.

The BASc in chemical engineering is recognized by the Canadian Society for Chemical Engineering, the Engineering Institute of Canada, the Professional Engineers of Ontario, the Ordre des ingénieurs du Québec, and the Canadian Engineering Accreditation Board of the Canadian Council of Professional Engineers.

Admission to the program is limited. To remain in the program, students must satisfy Faculty regulations.

First year 42

Fall:

CHM1310	Principles of Chemistry	4
ENG1112	Technical Report Writing	3
GNG1100	Engineering Mechanics	4
GNG1101	Fundamentals of Engineering Computation	4
GNG1102	Fundamentals of Computer Hardware	2
MAT1320	Calculus I	3

Winter:

CHG1120	Introduction to Chemical Engineering	4
CHM1320	Organic Chemistry I	4
CSI1102	Fundamentals of Software Design	4
MAT1322	Calculus II	3
MAT1341	Introduction to Linear Algebra	3
PHY1102	Fundamentals of Physics II	3
PHY1304	Physics Laboratory for Engineers	1

Second year 34

Fall:

CHG2312	Fluid Flow	3
CHG2317	Introduction to Chemical Process Analysis and Design	3
CHM2130	Physical chemistry: Introduction to the molecular properties of matter	3
CSI2165	Prolog Concepts Laboratory	2
MAT2322	Calculus III for Engineers	3
MAT2331	Ordinary Differential Equations and Numerical Methods	4

Winter:

CHG2314	Heat Transfer Operations	3
CHM2131	Chemical Thermodynamics of Gases and Solutions	3
CHM2136	Laboratory of Physical Chemistry	2
CSI2172	C++ Concepts Laboratory	2
ECO1192	Engineering Economics	3
MAT2377	Probability and Statistics for Engineers	3

Third year 36

Fall:

CHG3316	Transport Phenomena	3
CHG3324	Fundamentals and Applications of Chemical Engineering Thermodynamics	3
CHG3331	Application of Mathematical Methods to Chemical Engineering	3
CHG3337	Data Collection and Interpretation	3
CSI2111	Computer Architecture	3
CSI2114	Data Structures	3

Winter:

CHG3111	Unit Operation	3
CHG3112	Process Synthesis, Design and Economics	3
CHG3122	Chemical Engineering Practice	3
CHG3127	Chemical Reaction Engineering	3
CHG3326	Principles of Phase Equilibria and Chemical Reaction Equilibria	3
CSI2121	Principles of Assembly Language Programming	3

Fourth year 35

Fall:

CHG3335	Process Control	3
CHG4116	Chemical Engineering Laboratory	3
CHG4343	Computer-Aided Design in Chemical Engineering	3
CSI3103	Data Transmission and Computer Networks	3
CSI3125	Concepts of Programming Languages	4

Winter:

CHG4306	Microelectronics Manufacturing Processes	3
CHG4307	Microelectronics Manufacturing Processes	3
SEG3300	Introduction to Software Engineering	3
ELG2331	Electric Circuits and Machines for Mechanical Engineering	4
HIS2129 1	Technology, Society and Environment since 1800	3
or		
PHI2394 1	Scientific Thought and Social Values	3

Fifth year 34

Fall:

ADM1100	Introduction to Business Management	3
CHG4305	Advanced Materials in Chemical Engineering	3
CHG4381	Introduction to Biochemical Engineering	3
ELG3331	Electronics for Mechanical Engineers	4
Complementary studies elective 1		3

Winter:

CHG4300	Thesis and Seminar	6
or		
Technical electives 2		6
CHG4244	Plant Design Project	6
CSI3310	Operating System Principles	3

GNG4170	Engineering Law	3
SEG3310	Object-Oriented Analysis, Design and Programming	3

(1) For a complete list of complementary studies electives, consult the Academic Regulations section. Depending on scheduling, HIS2129 or PHI2394 may be interchanged with a complementary studies elective.
(2) Consult the list of technical electives shown in the regular program.

Chemical Engineering

BASc in Chemical Engineering

185 cr.

BSc with concentration in Biochemistry

The program in biochemistry and chemical engineering is organized jointly by the departments of Biochemistry and Chemical Engineering and provides its graduates with a strong background for a career in either of these two disciplines or in the rapidly developing field of biotechnology itself.
Biotechnology includes the large-scale isolation and industrial use of enzymes; the industrial application of genetic engineering; the production of industrially or medically valuable substances by cell culture or microbial fermentation; food processing by biochemical techniques; industrial waste treatment and by-product recovery by biochemical or microbial methods, and other areas.
The combined program requires five years of study and leads to two degrees: a BSc with concentration or honours in biochemistry, and a BASc in chemical engineering. Students fulfill the requirements of both departments by careful choice of electives, and by one summer of full-time study between the fourth and fifth years for those students who complete the BSc honours. (The summer term is not required for those completing the BSc with concentration.) Entry into graduate studies in biochemistry or chemical engineering requires an honours BSc or BASc, respectively, with a minimum second-class standing. The BASc in chemical engineering is recognized by the Canadian Society for Chemical Engineering, the Engineering Institute of Canada, the Association of Professional Engineers of Ontario, the Ordre des ingénieurs du Québec, and the Canadian Engineering Accreditation Board of the Canadian Council of Professional Engineers. Admission to the program is limited. Students who complete the required threshold courses for biochemistry with good marks may apply for entry into the Department of Biochemistry option for the combined program, subject to the approval of both departments. Such students will have to take an additional course in second year (CHG 1120 Introduction to Chemical Engineering); therefore, it is strongly recommended that applicants for the combined program take this course in the first year. To remain in the combined program, students must satisfy Faculty regulations that apply to both science programs and engineering programs. After the third year, students have the following alternatives:
a) they may graduate with the BSc honours in biochemistry in their fourth year and then transfer to the Department of Chemical Engineering for completion of the BASc during one summer and their fifth year;
b) they may complete the BSc with concentration in biochemistry and then transfer to the Department of Chemical Engineering for the additional two years required to complete the BASc.
All students with concentration in biochemistry are eligible to enter the co-operative program in chemical engineering.

First year

38

Fall:

BIO1120	Introduction to Organismal Biology	4
CHM1310	Principles of Chemistry	4
MAT1320	Calculus I	3
MAT1341	Introduction to Linear Algebra	3
PHY1101	Fundamentals of Physics I	3
PHY1201	Physics Laboratory	3

(This course runs from September to April)

Winter:

BIO1110	Introduction to Cell Biology	4
CHG1120 1	Introduction to Chemical Engineering	4
CHM1320	Organic Chemistry I	4
MAT1322	Calculus II	3
PHY1102	Fundamentals of Physics II	3

Second year

39

Fall:

CHM2154	Analytical Chemistry	3
CHM2120	Organic Chemistry II	3
CHM2126	Laboratory of Organic Chemistry II	2
CHM2130	Physical chemistry: Introduction to the molecular properties of matter	3
GNG1101 1	Fundamentals of Engineering Computation	4

MAT2331	Ordinary Differential Equations and Numerical Methods	4

Winter:

BCH2140	Introduction to Biochemistry	3
BCH2336	Biochemistry Laboratory I	2
BIO2123	Genetics	4
CHM2118	Laboratory of Analytical Chemistry	2
CHM2131	Chemical Thermodynamics of Gases and Solutions	3
ENG1112	Technical Report Writing	3
MAT2377	Probability and Statistics for Engineers	3

Third year 36

Fall:

BCH3170	Molecular Biology	3
BCH3356	Molecular Biology Laboratory	3
BIO3124	General Microbiology	3
CHG2312	Fluid Flow	3
CHG2317	Introduction to Chemical Process Analysis and Design	3
MAT2322	Calculus III for Engineers	3

Winter:

BCH3120	General Intermediary Metabolism	3
BCH3125	Protein Structure and Function	3
BCH3346	Biochemistry Laboratory II	3
CHG2314	Heat Transfer Operations	3
ECO1192	Engineering Economics	3
GNG4170	Engineering Law	3

Fourth year 36

Fall:

CHG3316	Transport Phenomena	3
CHG3324	Fundamentals and Applications of Chemical Engineering Thermodynamics	3
CHG3331	Application of Mathematical Methods to Chemical Engineering	3
CHG3335	Process Control	3
CHG3337	Data Collection and Interpretation	3
HIS2129 2	Technology, Society and Environment since 1800	3
or		
PHI2394 2	Scientific Thought and Social Values	3

Winter:

CHG3111	Unit Operation	3
CHG3112	Process Synthesis, Design and Economics	3
CHG3122	Chemical Engineering Practice	3
CHG3127	Chemical Reaction Engineering	3
CHG3326	Principles of Phase Equilibria and Chemical Reaction Equilibria	3
Complementary studies elective 2		3

Fifth year 36

Fall:

CHG4305	Advanced Materials in Chemical Engineering	3

CHG4116	Chemical Engineering Laboratory	3
CHG4343	Computer-Aided Design in Chemical Engineering	3
CHG4381	Introduction to Biochemical Engineering	3
Technical electives 3		3

Winter:

CHG4300	Thesis and Seminar	6
or		
Technical electives 3		6
CHG4306	Microelectronics Manufacturing Processes	3
CHG4307	Microelectronics Manufacturing Processes	3
CHG4244	Plant Design Project	6
Complementary studies elective 2		3

(1) CHG1120 must be taken in either first or second year (first year is recommended). It is also recommended that GNG1101 be taken in first or second year.

(2) For a complete list of complementary studies electives, consult the Academic Regulations section. Depending on scheduling, HIS2129 or PHI2394 may be interchanged with a complementary studies elective.

(3) Consult the list of technical electives shown in the regular program.

Note: The Department of Biochemistry reserves the right to alter the scheduling of courses between sessions.

Chemical Engineering

BASc in Chemical Engineering

209 cr.

BSc with honours in Biochemistry

First year 38

Fall:

BIO1120	Introduction to Organismal Biology	4
CHM1310	Principles of Chemistry	4
MAT1320	Calculus I	3
MAT1341	Introduction to Linear Algebra	3
PHY1101	Fundamentals of Physics I	3
PHY1201	Physics Laboratory	3

(This course runs from September to April)

Winter:

BIO1110	Introduction to Cell Biology	4
CHG1120 1	Introduction to Chemical Engineering	4
CHM1320	Organic Chemistry I	4
MAT1322	Calculus II	3
PHY1102	Fundamentals of Physics II	3

Second year 39

Fall:

CHM2154	Analytical Chemistry	3
CHM2120	Organic Chemistry II	3
CHM2126	Laboratory of Organic Chemistry II	2
CHM2130	Physical chemistry: Introduction to the molecular properties of matter	3
GNG1101 1	Fundamentals of Engineering Computation	4
MAT2331	Ordinary Differential Equations and Numerical Methods	4

Winter:

BCH2140	Introduction to Biochemistry	3
BCH2336	Biochemistry Laboratory I	2
BIO2123	Genetics	4
CHM2118	Laboratory of Analytical Chemistry	2
CHM2131	Chemical Thermodynamics of Gases and Solutions	3
ENG1112	Technical Report Writing	3
MAT2377	Probability and Statistics for Engineers	3

Third year 36

Fall:

BCH3170	Molecular Biology	3
BCH3356	Molecular Biology Laboratory	3
BIO3124	General Microbiology	3
CHG2312	Fluid Flow	3
CHG2317	Introduction to Chemical Process Analysis and Design	3
MAT2322	Calculus III for Engineers	3

Winter:

BCH3120	General Intermediary Metabolism	3
BCH3125	Protein Structure and Function	3
BCH3346	Biochemistry Laboratory II	3
CHG2314	Heat Transfer Operations	3
ECO1192	Engineering Economics	3
GNG4170	Engineering Law	3

Fourth year 59

Fall:

BCH4032	Séminaire de biochimie / Biochemistry Seminar	2
(This course runs from September to April)		
BCH4040	Projet de recherche - biochimie / Honours Research - Biochemistry	9
(This course runs from September to April)		
BCH4122	Macromolecules	3
CHG3316	Transport Phenomena	3
CHG3324	Fundamentals and Applications of Chemical Engineering Thermodynamics	3
CHG3331	Application of Mathematical Methods to Chemical Engineering	3
CHG3337	Data Collection and Interpretation	3

Winter:

BCH4125	Cellular Regulation and Control	3
BCH4172	Topics in Biotechnology	3
BPS3101	Genomics	3
or		
BPS4101	Human Genome Structure and Function	3
HIS2129 2	Technology, Society and Environment since 1800	3
or		
PHI2394 2	Scientific Thought and Social Values	3

Summer:

CHG3111	Unit Operation	3
CHG3112	Process Synthesis, Design and Economics	3
CHG3122	Chemical Engineering Practice	3
CHG3127	Chemical Reaction Engineering	3
CHG3326	Principles of Phase Equilibria and Chemical Reaction Equilibria	3
Complementary studies elective 2		3

Fifth year 39

Fall:

CHG3335	Process Control	3
CHG4305	Advanced Materials in Chemical Engineering	3
CHG4116	Chemical Engineering Laboratory	3
CHG4343	Computer-Aided Design in Chemical Engineering	3
CHG4381	Introduction to Biochemical Engineering	3
Technical elective 3		3

Winter:

CHG4300	Thesis and Seminar	6
or		

Technical electives 3		6
CHG4306	Microelectronics Manufacturing Processes	3
CHG4307	Microelectronics Manufacturing Processes	3
CHG4244	Plant Design Project	6
Complementary studies elective 2		3

(1) CHG1120 must be taken in either first or second year (first year is recommended). It is also recommended that GNG1101 be taken in first or second year.
(2) For a complete list of complementary studies electives, consult the Academic Regulations section. Depending on scheduling, HIS2129 or PHI2394 may be interchanged with a complementary studies elective.
(3) Consult the list of technical electives shown in the regular program.

Note: The Department of Biochemistry reserves the right to alter the scheduling of courses between sessions.

Mechanical Engineering

BASc in Mechanical Engineering with Biomedical Enginneering Design Option

158 cr.

First year 34

Fall:

CHM1310	Principles of Chemistry	4
ENG1112	Technical Report Writing	3
GNG1100	Engineering Mechanics	4
GNG1101	Fundamentals of Engineering Computation	4
MAT1320	Calculus I	3

Winter:

ECO1192	Engineering Economics	3
MAT1322	Calculus II	3
MAT1341	Introduction to Linear Algebra	3
MCG1901	Dessin industriel et dissection mécaniques/Mechanical Drawing and Dissection	3
PHY1102	Fundamentals of Physics II	3
PHY1304	Physics Laboratory for Engineers	1

Second year 44

Fall:

ADM1100	Introduction to Business Management	3
MAT2322	Calculus III for Engineers	3
MAT2331	Ordinary Differential Equations and Numerical Methods	4
MCG2107	Mechanics II	4
MCG2135	Thermodynamics I	4
MCG2355	Engineering Materials I	4

Winter:

CVG2140	Mechanics of Materials I	3
ELG2331	Electric Circuits and Machines for Mechanical Engineering	4
MAT2377	Probability and Statistics for Engineers	3
MCG2101	Introduction to Design	3
MCG2175	Thermodynamics II	4
MCG2365	Engineering Materials II	4
MCG2910	Pratique de la profession d'ingénieur / Professional Engineering Practice	1

Third year 42

Fall:

ELG3331	Electronics for Mechanical Engineers	4
MAT3320	Mathematics for Engineers	3
MCG3124	Dynamics of Machinery	4
MCG3301	Control Systems I	4
MCG3335	Fluid Mechanics I	4

Winter:

GNG4170	Engineering Law	3

MCG3105	Heat Transfer	4
MCG3126	Machine Design	4
MCG3140	Advanced Strength of Materials	4
MCG3302	Control Systems II	4
MCG3345	Fluid Mechanics II	4

Biomedical Engineering Design Option

Fourth year 38

Fall:

MCG4322	Computer-Aided Design and Manufacturing (CAD/CAM)	6
MCG4323	Manufacturing	4
MCG4150	Bioinstrumentation and Biocontrols	3
MCG4151	Biomechanics and Biomaterials of Joint Prostheses	3
MCG4152	Artificial Organs	3

Six credits of technical electives from the following list:		6
MCG4102	Finite Element Analysis	3
MCG4155	Advanced Engineering Materials	3
MCG4329	Reliability and Maintainability in Engineering Design	3

No more than one of the following:

MCG4108	Industrial Control Systems	3
MCG4132	Robot Mechanics	3
MCG4134	Robot Design and Control	3
MCG4136	Mechatronics	3

Winter:

HIS2129	Technology, Society and Environment since 1800	3
or		
PHI2394	Scientific Thought and Social Values	3
PHI2396	Bioethics	3