2019 / 2020 CURRICULUM - COMPUTER ENGINEERING

ENTRY FROM CEGEP   **Total credits:** **111**

First Semester (Fall 2019)		15 credits
ECSE 202	**Intro. to Software Development**	(3 cr)
ECSE 205	**Probability & Statistics for Eng.**	(3 cr)
MATH 262	**Intermediate Calculus**	(3 cr, P-MATH 141, MATH 133 or equiv)
MATH 263	**ODEs for Engineers**	(3 cr, C - MATH 262)
XXXX xxx	Humanities & Social Sciences *	(3 cr)

Second Semester (Winter 2020)		16 credits
COMP 250	**Introduction to Computer Science**	(3 cr)
ECSE 222	**Digital Logic**	(3 cr, P - ECSE 202)
ECSE 200	**Electric Circuits 1**	(3 cr, P - PHYS 142 or CEGEP Equivalent; C - MATH 263)
CCOM 206	**Communication in Engineering**	(3 cr)
XXXX xxx	Impact of Technology on Society **	(3 cr)
FACC 100	**Intro. to Engineering Profession**	(1 cr)

Third Semester (Fall 2020)		16 credits
ECSE 210	**Electric Circuits 2**	(3 cr, P - ECSE 200)
ECSE 211	**Design Principles and Methods**	(3 cr, P - ECSE 200, ECSE 202)
ECSE 206	**Intro. to Signals & Systems**	(3 cr, P - ECSE 200)
ECSE 324	**Computer Organization**	(4 cr, P - ECSE 200, ECSE 222)
ECSE 223	**Model-based Programming**	(3 cr, P - ECSE 202)

Fourth Semester (Winter 2021)		15 credits
COMP 251	**Algorithms and Data Structures**	(3 cr, P - COMP 250, C - MATH 240)
ECSE 321	**Intro. to Software Engineering**	(3 cr, P - ECSE 202)
ECSE 310	**Thermodynamics of Computing**	(3 cr, P - ECSE 200, ECSE 205, ECSE 222)
ECSE 325	**Digital Systems**	(3 cr, P - ECSE 324)
MATH 240	**Discrete Structures 1**	(3 cr, C - MATH 133)
FACC 250	**Resp. of the Prof. Engineer**	(0 cr, P - FACC 100)

Fifth Semester (Fall 2021)		17 credits
ECSE 331	**Electronics**	(4 cr, P - ECSE 210)
ECSE 308	**Intro. Comm. Sys. & Networks**	(4 cr, P - ECSE 205, ECSE 206)
ECSE 353	**Electromagnetic Fields & Waves**	(3 cr, P - MATH 262, MATH 263, ECSE 210)
ECSE 427	**Operating Systems**	(3 cr, P - ECSE 324)
XXXX xxx	Natural Science Complementary ***	(3 cr)

Sixth Semester (Winter 2022)		16 credits
ECSE 458 N1	Capstone Design Project	(3 cr, P - CCOM 206, ECSE 211, ECSE 324, ECSE 331)
XXXX xxx	**Technical Complementary 1**	(3 cr)
XXXX xxx	**Technical Complementary 2**	(3 cr)
ECSE 425	**Computer Architecture**	(3 cr, P - ECSE 324)
ECSE 444	**Microprocessors**	(4 cr, P - ECSE 324)

Seventh Semester (Fall 2022)		16 credits
ECSE 458 N2	Capstone Design Project	(3 cr)
XXXX xxx	**Technical Complementary 3**	(3 cr)
XXXX xxx	**Technical Complementary 4**	(3 cr)
XXXX xxx	**Elective Course****	(3 cr)
FACC 300	**Engineering Economy**	(3 cr)
FACC 400	**Engineering Professional Practice**	(1 cr, P - FACC100, FACC 250, and 60 program credits)

Courses shown in boldface above must be passed with a grade "C" or better. A "D" is *only* acceptable in the courses *not* in boldface. Also, a grade of "C" is required in all prerequisites in order to proceed with the follow-on courses. (Exception: A student who fails a course with a grade of D may take an ECSE course that has it as a prerequisite, provided that the failed course is retaken at the same time. Students thinking of doing this should meet with a Departmental advisor).

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

* For instructions on selecting valid "Humanities and Social Sciences" courses, see www.mcgill.ca/ece, then: Undergraduate Studies > Program Information > Complementary Studies.

** For instructions on selecting valid "Impact of Technology on Society" courses, see www.mcgill.ca/ece, then: Undergraduate Studies > Program Information > Complementary Studies.

*** "Natural Science Complementary" courses must be chosen from the list below.

**** One 3-credit course at the 200-level or higher from any department at McGill, approved by the Undergraduate Programs Office in the Department of Electrical and Computer Engineering. For approval, please contact our office at undergrad.ece@mcgill.ca.

ECSE 458, Capstone Design Project course is a spanned course given in both the fall and winter terms. A course that spans across two semesters may be taken in Fall-Winter or Winter-Fall. Students wishing to take the Fall-Winter sequence will need to register for ECSE 458 D1/D2. For a Winter-Fall sequence, students need to register for ECSE 458 N1/N2.

This sample curriculum is for students who wish to complete their degree requirements in 7 semesters. Students may, at any time, deviate from this structure. However, it is the student's responsibility to devise a study plan that has no course conflicts or prerequisite/corequisite violations. Academic advisors are available for help with course selection.

Revised May 2019

COMPUTER ENGINEERING

A:Technical Complementaries (3 courses) 9 credits (minimum)
Three technical complementary courses must be chosen from this list:

COMP 424	Artificial Intelligence	(3 cr, P - ECSE 205, COMP 251 & (COMP 206 or ECSE 321)
ECSE 335	Microelectronics	(4 cr, P - ECSE 331)
ECSE 412	Discrete-Time Signal Processing	(3 cr, P - ECSE 206 or ECSE 306)
ECSE 416	Telecom. Networks	(4 cr, P - COMP 250, ECSE 205 and (ECSE 308 or ECSE 316)
ECSE 420	Parallel Computing	(3 cr, P - ECSE 427)
ECSE 421	Embedded Systems	(3 cr, P - ECSE 324)
ECSE 422	Fault Tolerant Computing	(3 cr, P - ECSE 324, COMP 250)
ECSE 424	Human-Computer Interaction	(3 cr, P - ECSE 324, COMP 250)
ECSE 428	Software Engineering Practice	(3 cr, P - ECSE 321)
ECSE 429	Software Validation	(3 cr, P - ECSE 321 or COMP 303)
ECSE 439	Software Language Engineering	(3 cr, P - ECSE 321 or COMP 303)

B:Technical Complementaries (1 course) 3 credits (minimum)
One other technical complementary course must be chosen from list A or from list B:

ECSE 307	Linear Systems & Control	(4 cr, P - ECSE 206, ECSE 210)
ECSE 403	Control Systems	(4 cr, P - ECSE 307)
ECSE 408	Communication Systems	(4 cr, P - ECSE 205, ECSE 308)
ECSE 415	Intro. to Computer Vision	(3 cr, P - ECSE 206 and ECSE 205)
ECSE 435	Mixed Signal Test Techniques	(3 cr, P - ECSE 206, ECSE 335)
ECSE 436	Signal Processing Hardware	(3 cr, P - ECSE 324, ECSE 325, ECSE 206)
ECSE 446	Realistic Image Synthesis	(3 cr, P - ECSE 202, ECSE 205, COMP 250)
ECSE 450	Electromagnetic Compatability	(3 cr, P - ECSE 222, ECSE 331 and (ECSE 353 or ECSE 354)
ECSE 472	Fundamentals of Circuit Simulation an	(3 cr, P - ECSE 206, ECSE 331, ECSE 251)
ECSE 532	Computer Graphics	(3 cr, P - ECSE 322) *
COMP 551	Applied Machine Learning	(4 cr, MATH 323 or ECSE 205 or ECSE 305 or equivalent)
COMP 559	Fundamentals of Computer Animation	(4 cr)

NATURAL SCIENCE COMPLEMENTARY COURSES

The following is the list of approved natural science complementary courses.

ATOC 214, Introduction: Physics of the Atmosphere
(3) (Fall) (3 hours lectures) (Prerequisite: CEGEP Physics) An introduction
to physical meteorologydesigned for students in the physical sciences.
Topics include: composition of the atmosphere; heat transfer; the upper atmosphere;
atmospheric optics; formation of clouds and precipitation; instability;
adiabatic charts.

ATOC 215 Oceans, Weather and Climate
(3) (Winter) (3 hours lectures) (Prerequisite: CEGEP Physics or permission
of the instructor) Laws of motion, geostrophic wind, gradient wind. General
circulation of the atmosphere and oceans, local circulation features.
Air-sea interaction, including hurricanes and sea-ice formation, extra-tropical
weather systems and fronts, role of the atmosphere and oceans in climate.

ATOC 219 Introduction to Atmospheric Chemistry
(3) (Winter) (3 hours lectures) (Prerequisite: CHEM 110 and CHEM 120,
and one of MATH 139 or MATH 140 or MATH 150, or a CEGEP DEC in Science,
or permission of instructor. An introduction to the basic topics
in atmospheric chemistry. The fundamentals of the chemical composition
of the atmosphere and its chemical reactions. Selected topics
such as smog chamber, acid rain, and ozone hole will be examined.

BIOL 200 Molecular Biology
(3) (Fall) (3 hours lecture, 1 hour optional tutorial) (Prerequisite: BIOL 112 or
equivalent.) (Corequisite: CHEM 212 or equivalent) The physical and chemical
properties of the cell and its components in relation to their structure and
function. Topics include: protein structure, enzymes and enzyme kinetics;
nucleic acid replication, transcription and translation; the genetic code, mutation,
recombination, and regulation of gene expression.

BIOL 215 Introduction to Ecology and Evolution
(3) (Fall) (3 hours lecture) (Prerequisite: BIOL 111) (Restrictions: Not open to
students who have taken BIOL 208, BIOL 304 or BIOL 305. Not open to
students who have taken ENVR 200 and/or ENVR 202.) An introduction
to the fundamental processes of ecology and evolution that bear on the
nature and diversity of organisms and the processes that govern
their assembly into ecological communities and their roles in
ecosystem function.

CHEM 203 Survey of Physical Chemistry
(3) (Fall) (3 lectures) (Prerequisites: CHEM 110 and CHEM 120 or equivalent.)
(Restriction: Intended for students in biological science programs requiring
 only one course in physical chemistry) (Restriction: Not open to students
who have taken or are taking CHEM 204 or CHEM 213) A survey of the
principles and methods of physical chemistry with emphasis on the use of
biological examples. Topics will include thermodynamics, transport properties,
kinetics, molecular structure and interactions, and spectroscopy.

ENVR 200 The Global Enviroment
(3) (Fall) (Section 001: Dowtown Campus) (Section 051: MacDonald
Campus). A systems approach to study the different components of the
environment involved in global climate change: the atmosphere, biosphere,
hydrosphere, and lithosphere. The interactions among these components.
Their role in global climate change. The human dimension to global change.

EPSC 201 Understanding Planet Earth
(3) (Fall or Winter) (3 hours lecture) Earth & Planetary Sciences : Learn about Earth's
origin, its place in the solar system, its internal structure, rocks and minerals, the
formation of metal and fossil fuel deposits, and the extinction of dinosaurs. Discover
the impact of the volcanic eruptions, earthquakes and mountain chains on Earth's
past, present and future. Explore 125 million-year-old Mount Royal.

EPSC 203 Structural Geology
(3) (Winter) (2 hours lectures, 3 hours laboratory) Primary igneous and
sedimentary structures, attitudes of planes and lines, stress and strain, fracturing
of rocks, faulting, homogeneous strain, description and classification
of folds, foliation and lineation, orthographic and stereographic projections.

EPSC 210 Introductory Mineralogy
(3) (Fall) (2 hours lectures, 3 hours laboratory) Crystal chemistry and
 identification of the principal rock-forming and ore minerals. Elementary
crystallography. Optional 2-day field trip.

ESYS 200 Earth System Processes
(3) (Winter) (3 hours lecture) Complex interactions among the atmosphere,
biosphere, geosphere and hydrosphere. Biological, chemical and
 physical processes within and between each "sphere" that extend over
spatial scales ranging from microns to the size of planetary orbits and
that span time scales from fractions of a second to billions of years.

MIMM 211 Introductory Microbiology
(3) (Fall) (3 hours lecture) (Corequisite: BIOL 200) A general treatment of microbiology
bearing specifically on the biological properties of microorganisms. Emphasis will be
on procaryotic cells. Basic principles of microbial genetics are also introduced.

PHYS 214 Introductory Astrophysics
(3) (Fall) (Prerequisite: Cegep physics or PHYS 102 or PHYS 142.)
(Restriction: Not open to students who have taken or are taking PHYS
205 or PHYS 206.) An introduction to astrophysics with emphasis
placed on methods of observation and current models. Stellar radiation and
detectors, quasars, black holes. Galaxies, large scale structure of the universe,
cosmology.

PHYS 224 Physics of Music
(3) (Fall) (3 hours lectures) Restriction: Not open to students who have taken PHYS
225. An introduction to the physics of music. Properties of sound and their percep-
tion as pitch, loudness, and timbre. Dissonance, consonance, and musical intervals
and tuning. Physics of sound propagation and reflection. Resonance. Acoustic
properties of pipes, strings, bars, and membranes, and sound production in wind,
string, and percussion instruments. The human voice. Room reverberation and
acoustics. Directional characteristics of sound sources.

PHYS 230 Dynamics of Simple Systems
(3) (Fall) (3 hours lecture) (Prerequisite: CEGEP physics.) (Corequisite: MATH 222)
(Restricion: Not open to students taking or having passed PHYS 251)
Translational motion under Newton's laws; forces, momentum, work/energy theorem.
Special relativity; Lorentz transforms, relativistic mechanics, mass/energy
equivalence. Topics in rotational dynamics. Noninertial frames.

PHYS 260 Modern Physics and Relativity
(3) (Fall) (3 hours lectures) (Corequisite: MATH 222)
History of special relativity; Lorentz transformations:
kinematics and dynamics; transformation of electric and magnetic
forces; introduction to topics in modern physics.