2014 / 2015 CURRICULUM - COMPUTER ENGINEERING

ENTRY FROM CEGEP **Total credits: 113**

First (Fall) Semester		**15 credits**
CIVE 281	**Analytical Mechanics**	(3 cr, C - MATH 262 & MATH 263)
COMP 202	**Foundations of Programming**	(3 cr)
MATH 262	**Intermediate Calculus**	(3 cr, P-MATH 141 & MATH 133 or equiv)
MATH 263	**Ord. Differential Eqns. For Engineers**	(3 cr, C - MATH 262)
XXXX xxx	Humanities & Social Sciences *	(3 cr)

Second (Winter) Semester		**16 credits**
COMP 250	**Introduction to Computer Science**	(3 cr)
ECSE 200	**Electric Circuits 1**	(3 cr, P - PHYS 142 or CEGEP Equivalent; C - MATH 263)
ECSE 221	**Intro. to Computer Engineering**	(3 cr, P - COMP 202)
FACC 100	**Intro. to the Engineering Profession**	(1 cr)
MATH 264	**Advanced Calculus for Engineers**	(3 cr, P - MATH 262 or equiv; C - MATH 263)
MATH 270	**Applied Linear Algebra**	(3 cr, P - MATH 263)

Third (Fall) Semester		**17 credits**
ECSE 210	**Electric Circuits 2**	(3 cr, P - ECSE 200)
ECSE 211	**Design Principles and Methods**	(3 cr, C - ECSE 291, P - ECSE 200 & COMP 202)
ECSE 291	**Electrical Measurements Lab**	(2 cr, C - ECSE 210)
ECSE 322	**Computer Engineering**	(3 cr, P - ECSE 221 & ECSE 200 or MECH 383)
XXXX xxx	Impact of Technology on Society **	(3 cr)
CCOM 206	**Communication in Engineering**	(3 cr)

Fourth (Winter) Semester		**17 credits**
ECSE 306	**Fundamentals of Signals & Systems**	(3 cr, P - ECSE 210 & MATH 270)
ECSE 321	**Intro. to Software Engineering**	(3 cr, P - COMP 202 or COMP 208)
ECSE 323	**Digital Systems Design**	(5 cr, P - CCOM 206, ECSE 211, ECSE 221 & ECSE 291)
ECSE 330	**Introduction to Electronics**	(3 cr, P - ECSE 210)
MATH 363	**Discrete Mathematics**	(3 cr, P - MATH 263 & MATH 264)

Fifth (Fall) Semester		**15 credits**
COMP 251	**Algorithms and Data Structures**	(3 cr, P - COMP 250)
ECSE 305	**Probability & Random Signals 1**	(3 cr, P - ECSE 303 or ECSE 306)
ECSE 353	**Electromagnetic Fields & Waves**	(3 cr, P - MATH 264 & ECSE 210)
ECSE 427	**Operating Systems**	(3 cr, P - ECSE 322 or COMP 273)
XXXX xxx	Natural Science Complementary ***	(3cr)

Sixth (Winter) Semester		**18 credits**
ECSE 334	**Introduction to Microelectronics**	(3 cr, P - ECSE 291, ECSE 330 & ECSE 303 or ECSE 306)
ECSE 425	**Computer Org. & Architecture**	(3 cr, P - ECSE 322 & ECSE 323)
ECSE 426	**Microprocessor Systems**	(3 cr, P - ECSE 323 & CCOM 206)
ECSE 456	**ECSE Design Project 1**	(3 cr, P - ECSE 211, ECSE 322, ECSE 323 & ECSE 330)
FACC 300	**Engineering Economy**	(3 cr)
ECSE 4xx t1	**Technical Complementary 1**	(3 cr)

Seventh (Fall) Semester		**15 credits**
ECSE 414	**Intro. to Telecom Networks**	(3 cr, P - ECSE 304 or ECSE 306 & ECSE 322)
ECSE 457	**ECSE Design Project 2**	(3 cr, P-ECSE 456)
XXXX xxx t2	**Technical Complementary 2**	(3 cr)
XXXX xxx t3	**Technical Complementary 3**	(3 cr)
ECSE 4xx	**Lab Complementary**	(2 cr or 3 cr)
FACC 400	**Engineering Professional Practice**	(1 cr, P - FACC100, 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.

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

The Lab Complementary course is normally taken in conjunction with a technical complementary.

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

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

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

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.

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TECHNICAL AND LAB COMPLEMENTARY COURSES - COMPUTER ENGINEERING PROGRAM

Technical Complementaries (3 courses) 9 credits

Students following the Computer Engineering program must take 3 courses (9 credits) from the following list. It is possible that not all the courses listed will be offered in any given year. Please refer to the up-to-date course assignments before selecting any course. Permission will not be granted to take Technical Complementary courses that are not on this list. ECSE 500 level technical complementaries are restricted to students with a minimum CGPA of 3.0 and B+ or better in the prerequisites.

Course	Course Title	Pre-Requisites and Co-Requisites
COMP 424	Artificial Intelligence	(3 cr, P - COMP 206 or ECSE 321, COMP 251)
ECSE 404	Control Systems	(3 cr, C - ECSE 304 or ECSE 306)
ECSE 411	Communications Systems 1	(3 cr, P - ECSE 305 & ECSE 304 or ECSE 306)
ECSE 412	Discrete-Time Signal Processing	(3 cr, P - ECSE 304 or ECSE 306)
ECSE 415	Introduction to Computer Visions	(3 cr, P - ECSE 304 or ECSE 306)
ECSE 420	Parallel Computing	(3 cr, P - ECSE 427)
ECSE 421	Embedded Systems	(3 cr, P - ECSE 322 & ECSE 323)
ECSE 422	Fault Tolerant Computing	(3 cr, P - ECSE 322)
ECSE 424	Human-Computer Interaction	(3 cr, P - ECSE 322)
ECSE 428	Software Engineering Practice	(3 cr, P - ECSE 321 or COMP 335)
ECSE 429	Software Validation	(3 cr, P - ECSE 321 or COMP 303
ECSE 431	Introduction to VLSI CAD.	(3 cr, P - ECSE 323 & ECSE 330)
ECSE 436	Signal Processing Hardware	(3 cr, P - ECSE 322, ECSE 323 & ECSE 304 or ECSE 306)
ECSE 443	Intro to Numerical Methods in EE	(3 cr, P - ECSE 221, ECSE 330 & ECSE 351 or ECSE 353)
ECSE 450	Electromagnetic Compatability	(3 cr, P - ECSE 221, ECSE 334 & ECSE 352 or ECSE 353)
ECSE 530	Logic Synthesis	(3 cr, P - ECSE 323)
ECSE 532	Computer Graphics	(3 cr, P - ECSE 322)
ECSE 537	Advanced Digital Intergrated Circuits	(3 cr, P - ECSE 323 & ECSE 334)
ECSE 548	Introduction to VLSI Systems	(3 cr, P - ECSE 323 & ECSE 334)

Laboratory Complementary (one course) 2 credits

Students following the regular Computer Engineering program must take one course (2 credits) from the following list. It is possible that not all the courses listed will be offered in any given year. Please refer to the up-to-date course assignments before selecting any course. Permission will not be granted to take Laboratory Complementary courses that are not on this list.

Course	Course Title	Pre-Requisites and Co-Requisites
ECSE 434	Microelectronics Laboratory	(2 cr, P - CCOM 206, ECSE 334)
ECSE 436	Signal Processing Hardware	(3 cr, P - ECSE 322, ECSE 323 & ECSE 304 or ECSE 306)
ECSE 487	Computer Architecture Laboratory	(2 cr, P - CCOM 206; C - ECSE 425)
ECSE 489	Telecommunication Network Laboratory	(2 cr, P - CCOM 206; C - ECSE 414 or ECSE 528)
ECSE 490	Digital Signal Processing Lab	(2 cr, P - ECSE 291 & CCOM 206; C - ECSE 412 or ECSE 512)
ECSE 491	Communications Systems Lab	(2 cr, P - CCOM 206 & ECSE 291; C - ECSE 411 or ECSE 511)
ECSE 493	Control & Robotics Lab	(2 cr, P - CCOM 206 & ECSE 291;C - ECSE 404 or ECSE 501)

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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 perception 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.