# SECONDARY SCIENCE AND TECHNOLOGY (B.ED.) (120 CREDITS)

**Offered by:** Integrated Studies in Ed (Faculty of Education)
**Degree:** Bachelor of Education
**Program credit weight:** 120 credits

## Program Description

The Bachelor of Education (B.Ed.) - Secondary Science and Technology program requires 120 credits and leads to teacher certification. Students who have not completed Quebec CEGEP, French Baccalaureate, International Baccalaureate, or at least one year of university studies prior to commencing the B.Ed. must also complete a minimum of 30 credits of Freshman courses (in addition to the 120 credits for the program) for a total of 150 credits.

The aim of the B.Ed. Secondary Education program is to prepare strong beginning teachers for the secondary school level. This integrated program consists of courses in Education (including field experiences) and courses in the subject area of the teaching specialization. Students also take 6 credits of free electives. For all teacher education programs, course sequencing is highly structured. For this reason, the advising information in this Course Catalogue section must be used in conjunction with the summary companion document (Program Overview) found at http://www.mcgill.ca/dise/progs/secscitech.

The Secondary Science and Technology program provides students with the subject matter expertise in the Living World, Earth and Space, the Material World, and the Technological World needed to teach the secondary science curriculum in Quebec schools.

Please note that graduates of teacher education programs are recommended by the University to the Quebec Ministry of Education for Quebec teacher certification. For more information about teacher certification in Quebec, please refer to the Faculty of Education section under "Overview of Faculty Programs," "Undergraduate Education Programs," and "Quebec Teacher Certification."

Note: Students entering this program from CEGEP or with Advanced Standing should have completed two biology courses, two chemistry courses, two math courses and two physics courses at the CEGEP level. Students entering from CEGEP without having completed these prerequisites (or their equivalents) will be required to make up any deficiencies in these courses over and above the degree requirements.

**Note**: For information about Fall 2025 and Winter 2026 course offerings, please check back on May 8, 2025. Until then, the "Terms offered" field will appear blank for most courses while the class schedule is being finalized.

## Freshman Program - Basic Sciences

Freshmen in the Science and Technology program must complete the 29 to 30 credits of Basic Science courses listed below in their first year of studies.

### Fall Term

Expand allContract all

| Course | Title | Credits |
|---|---|---|
| BIOL 111 | Principles: Organismal Biology. | 3 |
| CHEM 110 | General Chemistry 1. | 4 |
| MATH 139 | Calculus 1 with Precalculus. | 4 |
| or MATH 140 | Calculus 1. | |
| or MATH 150 | Calculus A. | |
| PHYS 101 | Introductory Physics - Mechanics. | 4 |
| or PHYS 131 | Mechanics and Waves. | |

### Winter term

Expand allContract all

| Course | Title | Credits |
|---|---|---|
| BIOL 112 | Cell and Molecular Biology. | 3 |
| CHEM 120 | General Chemistry 2. | 4 |
| MATH 141 | Calculus 2. | 4 |
| or MATH 151 | Calculus B. | |
| PHYS 102 | Introductory Physics - Electromagnetism. | 4 |
| or PHYS 142 | Electromagnetism and Optics. | |

Students should consult a program adviser for guidance on which Fall and Winter term Math and Physics courses should be taken. Course choices depend on a student's background in science and plans for upper-level Physics courses.

Expand allContract all

| Course | Title | Credits |
|---|---|---|
| BIOL 111 | Principles: Organismal Biology. | 3 |
| BIOL 112 | Cell and Molecular Biology. | 3 |
| CHEM 110 | General Chemistry 1. | 4 |
| CHEM 120 | General Chemistry 2. | 4 |
| MATH 139 | Calculus 1 with Precalculus. | 4 |
| MATH 140 | Calculus 1. | 3 |
| MATH 141 | Calculus 2. | 4 |
| MATH 150 | Calculus A. | 4 |
| MATH 151 | Calculus B. | 4 |
| PHYS 101 | Introductory Physics - Mechanics. | 4 |
| PHYS 102 | Introductory Physics - Electromagnetism. | 4 |
| PHYS 131 | Mechanics and Waves. | 4 |
| PHYS 142 | Electromagnetism and Optics. | 4 |

## Freshman Program - Complementary

For Freshman students with Advanced Standing in one or more of the basic sciences, the Faculty also recommends some of the courses listed below. French Second Language (FRSL) courses require a placement test to determine the course level.

Expand allContract all

| Course | Title | Credits |
|---|---|---|
| EDEM 220 | Contemporary Issues in Education. | 3 |
| FRSL 101 | Beginners French 1. | 3 |
| FRSL 102 | Beginners French 2. | 3 |
| FRSL 207D1 | Elementary French 01. | 3 |
| FRSL 207D2 | Elementary French 01. | 3 |
| FRSL 211D1 | Oral and Written French 1. | 3 |
| FRSL 211D2 | Oral and Written French 1. | 3 |
| WCOM 250 | Research Essay and Rhetoric. | 3 |

# Required Courses (60 credits)

Expand allContract all

| Course | Title | Credits |
|---|---|---|
| EDEC 201 | First Year Professional Seminar. | 1 |
| EDEC 215 | English Exam for Teacher Certification. | 0 |
| EDEC 233 | Indigenous Education. | 3 |
| EDEC 247 | Policy Issues in Quebec and Indigenous Education. | 3 |
| EDEC 254 | Second Professional Seminar (Secondary). | 1 |
| EDEC 260 | Philosophical Foundations. | 3 |
| EDEC 262 | Media, Technology and Education. | 3 |
| EDEC 351 | Third Professional Seminar (Secondary). | 2 |
| EDEC 404 | Fourth Year Professional Seminar (Sec). | 3 |
| EDES 335 | Teaching Secondary Science 1. | 3 |
| EDES 350 | Classroom Practices. | 3 |
| EDES 435 | Teaching Secondary Science 2. | 3 |
| EDFE 200 | First Field Experience (K/Elem and Secondary). | 2 |
| EDFE 254 | Second Field Experience (Secondary). | 3 |
| EDFE 351 | Third Field Experience (Secondary). | 8 |
| EDFE 451 | Fourth Field Experience (Secondary). | 7 |
| EDPE 300 | Educational Psychology. | 3 |
| EDPE 304 | Measurement and Evaluation. | 3 |
| EDPI 309 | Diverse Learners. | 3 |
| EDPI 341 | Instruction in Inclusive Schools. | 3 |

# Complementary Courses (3 credits)

3 credits selected as described below:

## Equity Education

3 credits from:

Expand allContract all

| Course | Title | Credits |
|---|---|---|
| EDEC 248 | Equity and Education. | 3 |
| EDEC 249 | Global Education and Social Justice. | 3 |

# Secondary Science and Technology (51 credits)

51 credits in designated science courses selected to provide subject matter expertise in the four areas of:

the Material World

- Earth and Space
- the Living World
- the Technological World

All students need to plan their course selections with attention to the prerequisites.

## Required Courses (15 credits)

3 credits of Statistics:

Expand allContract all

| Course | Title | Credits |
|---|---|---|
| MATH 203 | Principles of Statistics 1. | 3 |

3 credits of History of Science:

Expand allContract all

| Course | Title | Credits |
|---|---|---|
| EDTL 520 | Perspectives on Knowledge in Mathematics and Science. | 3 |

3 credits of the Material World:

Expand allContract all

| Course | Title | Credits |
|---|---|---|
| CHEM 281 | Inorganic Chemistry 1. | 3 |

3 credits of the Living World:

Expand allContract all

| Course | Title | Credits |
|---|---|---|
| BIOL 206 | Methods in Biology. | 3 |

3 credits of the Technological World:

Expand allContract all

| Course | Title | Credits |
|---|---|---|
| EDTL 525 | Teaching Science and Technology. | 3 |

## Core Complementary Courses (10 credits)

### The Living World

3 credits from:

Expand allContract all

| Course | Title | Credits |
|---|---|---|
| BIOL 200 | Molecular Biology. | 3 |
| LSCI 202 | Molecular Cell Biology. | 3 |

### The Material World

3 credits from:

Expand allContract all

| Course | Title | Credits |
|---|---|---|
| CHEM 203 | Survey of Physical Chemistry. | 3 |
| CHEM 213 | Introductory Physical Chemistry 1: Thermodynamics. | 3 |

4 credits from:

Expand allContract all

| Course | Title | Credits |
|---|---|---|
| CHEM 212 | Introductory Organic Chemistry 1. | 4 |
| CHEM 232 | Organic Chemistry Principles. | 4 |

## Complementary Courses (26 credits)

At least 9 of the 26 credits must be taken at the 300 level or above, distributed as follows:

- 3 to 15 credits from the Living World complementary list;
- 3 to 18 credits from Earth and Space complementary list;
- 3 to 18 credits from Earth and Space - Environment complementary list;
- 0 to 15 credits from the Material World complementary list;
- 3 to 12 credits from the Technological World complementary list.

### Living World

Students select a minimum of 3 credits to a maximum of 15 credits from the following lists:

#### Cell and Molecular Biology

Expand allContract all

| Course | Title | Credits |
|---|---|---|
| BIOL 201 | Cell Biology and Metabolism. | 3 |
| BIOL 202 | Basic Genetics. | 3 |
| BIOL 300 | Molecular Biology of the Gene. | 3 |
| BIOL 301 | Cell and Molecular Laboratory. | 4 |
| BIOL 313 | Eukaryotic Cell Biology. | 3 |

#### Human and Organismal Biology

Expand allContract all

| Course | Title | Credits |
|---|---|---|
| BIOL 205 | Functional Biology of Plants and Animals. | 3 |
| EDKP 292 | Nutrition and Wellness. | 3 |
| EDKP 395 | Exercise Physiology. | 3 |
| NUTR 207 | Nutrition and Health. | 3 |
| NUTR 307 | Metabolism and Human Nutrition. | 3 |
| PHGY 209 | Mammalian Physiology 1. | 3 |
| PHGY 210 | Mammalian Physiology 2. | 3 |

#### Populations, Ecosystems, and Evolution

Expand allContract all

| Course | Title | Credits |
|---|---|---|
| BIOL 215 | Introduction to Ecology and Evolution. | 3 |
| BIOL 240 | Monteregian Flora. | 3 |
| BIOL 304 | Evolution. | 3 |
| BIOL 305 | Animal Diversity. | 3 |
| BIOL 308 | Ecological Dynamics. | 3 |
| BIOL 310 | Biodiversity and Ecosystems. | 3 |
| BIOL 331 | Ecology/Behaviour Field Course. | 3 |
| BIOL 352 | Dinosaur Biology. | 3 |
| ENVB 305 | Population and Community Ecology. | 3 |
| EPSC 334 | Invertebrate Paleontology. | 3 |

### Earth and Space

Students select a minimum of 3 credits to a maximum of 18 credits from the following list:

Expand allContract all

| Course | Title | Credits |
|---|---|---|
| ATOC 214 | Introduction: Physics of the Atmosphere. | 3 |
| ATOC 215 | Oceans, Weather and Climate. | 3 |
| ATOC 219 | Introduction to Atmospheric Chemistry. | 3 |
| ATOC 309 | Weather Radars and Satellites. | 3 |
| ATOC 315 | Thermodynamics and Convection. | 3 |
| ENVR 202 | The Evolving Earth. | 3 |
| EPSC 201 | Understanding Planet Earth. | 3 |
| EPSC 210 | Introductory Mineralogy. | 3 |
| EPSC 212 | Introductory Petrology. | 3 |
| EPSC 220 | Principles of Geochemistry. | 3 |
| EPSC 221 | General Geology. | 3 |
| EPSC 225 | Properties of Minerals. | 1 |
| EPSC 233 | Earth and Life Through Time | 3 |
| EPSC 303 | Structural Geology. | 3 |
| EPSC 320 | Elementary Earth Physics. | 3 |
| EPSC 350 | Tectonics. | 3 |
| ESYS 200 | Earth-System Interactions. | 3 |
| ESYS 300 | Earth Data Analysis. | 3 |
| ESYS 301 | Earth System Modelling. | 3 |
| GEOG 272 | Earth's Changing Surface. | 3 |
| GEOG 321 | Climatic Environments. | 3 |
| PHYS 320 | Introductory Astrophysics. | 3 |

### Earth and Space - Environment

Students select a minimum of 3 credits to a maximum of 18 credits from the following list:

Expand allContract all

| Course | Title | Credits |
|---|---|---|
| ENVR 200 | The Global Environment. | 3 |
| ENVR 201 | Society, Environment and Sustainability. | 3 |
| ENVR 203 | Knowledge, Ethics and Environment. | 3 |
| ENVR 301 | Environmental Research Design. | 3 |
| GEOG 200 | Geographical Perspectives: World Environmental Problems. | 3 |
| GEOG 203 | Environmental Systems. | 3 |

| | | |
|---|---|---|
| GEOG 205 | Global Change: Past, Present and Future. | 3 |
| GEOG 221 | Environment and Health. | 3 |

### The Material World

Students select a maximum of 15 credits from the following list:

Note: Students who plan to teach Grade 11 Chemistry or Physics should select the maximum 15 credits from this list:

Expand allContract all

| Course | Title | Credits |
|---|---|---|
| CHEM 222 | Introductory Organic Chemistry 2. | 4 |
| CHEM 267 | Introductory Chemical Analysis. | 3 |
| CHEM 273 | Introductory Physical Chemistry 2: Kinetics and Methods. | 3 |
| CHEM 302 | Introductory Organic Chemistry 3. | 3 |
| CHEM 381 | Inorganic Chemistry 2. | 3 |
| CHEM 392 | Experimental Chemistry 1. | 3 |
| CHEM 429 | Chemistry of Energy, Storage and Utilization. | 3 |
| MATH 222 | Calculus 3. | 3 |
| PHYS 224 | Physics of Music. | 3 |
| PHYS 230 | Dynamics of Simple Systems. | 3 |
| PHYS 232 | Heat and Waves. | 3 |
| PHYS 241 | Signal Processing. | 3 |
| PHYS 242 | Electricity and Magnetism. | 2 |
| PHYS 257 | Experimental Methods 1. | 3 |
| PHYS 258 | Experimental Methods 2. | 3 |
| PHYS 271 | Introduction to Quantum Physics. | 3 |
| PHYS 328 | Electronics. | 3 |
| PHYS 331 | Topics in Classical Mechanics. | 3 |
| PHYS 333 | Thermal and Statistical Physics. | 3 |
| PHYS 339 | Measurements Laboratory in General Physics. | 3 |
| PHYS 340 | Majors Electricity and Magnetism. | 3 |
| PHYS 342 | Majors Electromagnetic Waves. | 3 |
| PHYS 346 | Majors Quantum Physics. | 3 |
| PHYS 432 | Physics of Fluids. | 3 |
| PHYS 434 | Optics. | 3 |
| PHYS 447 | Applications of Quantum Mechanics. | 3 |

### The Technological World

Students select a minimum of 3 credits to a maximum of 12 credits from the following list:

Expand allContract all

| Course | Title | Credits |
|---|---|---|
| COMP 102 | Computers and Computing.[1] | 3 |
| COMP 202 | Foundations of Programming.[2] | 3 |
| COMP 206 | Introduction to Software Systems. | 3 |
| COMP 280 | History and Philosophy of Computing.[1] | 3 |
| COMP 364 | Computer Tools for Life Sciences. | 3 |
| MATH 204 | Principles of Statistics 2. | 3 |

1 Note: Students may take either COMP 102 Computers and Computing. or COMP 280 History and Philosophy of Computing., but not both.

2 Note: Credit will not be given for COMP 102 Computers and Computing. if it is taken concurrently with or after COMP 202 Foundations of Programming..

## Elective Courses (6 credits)