



COLLEGE OF
THE ROCKIES

BIOLOGY AND MEDICINE PRE-MAJOR PATHWAY

**PROGRAM PLANNING GUIDE
2024/2025**



Contents

BIOLOGY & MEDICINE PRE-MAJOR PATHWAY	3
DISCLAIMER.....	4
ASSOCIATE OF SCIENCE CHECKLIST	5
SAMPLE SEQUENCING PLANS	6
<i>Biology</i>	7
<i>Biochemistry</i>	8
<i>Institution Specific Science Requirements that can be completed at COTR within the ASc:</i>	9
<i>University of Lethbridge</i>	9
<i>University of Victoria</i>	9
<i>University of Northern British Columbia</i>	9
<i>University of British Columbia - Vancouver</i>	9
<i>University of British Columbia - Okanagan</i>	9
COURSE DESCRIPTIONS.....	10

BIOLOGY & MEDICINE PRE-MAJOR PATHWAY

Our Biology and Medicine Pre-Major Associate degree helps lay out the courses you may need for the first two years of study toward a degree in Biology.

This Associate degree also provides the courses recommended for admission into the UBC School of Medicine in the first two of three required years of study before applying to medical school.

Why Consider the Biology and Medicine Pre-Major?

- Provides a great starting point in a biology degree pathway that and opens up endless education and career opportunities.
- Explore a wide-range of courses to discover your specific areas of interest.
- Take advantage of transfer and dual admission agreements to start your education at the College before completing a credential elsewhere.

DISCLAIMER

This document is provided for information only.

Students should always consult the course calendar of the degree-granting institution to ensure that they have taken appropriate prerequisites.

COTR Education advisors are available for further assistance.

For current course transfer agreements between COTR and BC institutions
please consult [bctransferguide.ca](https://www.bctransferguide.ca)

For transfer to AB institutions
please consult transferalberta.alberta.ca/transfer-alberta-search

For University of Lethbridge transfer agreements
please consult bridge.uleth.ca/PROD/uofl_ro_tc_agrmnts.front_end

Sequencing plans are samples.

Students may need to modify plans based on prerequisite requirements or course scheduling and availability.

ASSOCIATE OF SCIENCE CHECKLIST

Biology & Medicine Pre-Major

36 credits in SCIENCE

at least 3 credits in laboratory science,
15 credits other science courses and at least
18 credits in 200 level in 2 or more areas

			U of L BSc. Biological Science	U of L BSc. Biochemistry	UVic BSc Biology	UVic BSc. Biochemistry	UBC BSc. Biology	UBC BSc. Biochemistry	UNBC BSc. Biology	UNBC BSc. Biochemistry
1.	BIOL 101	Introduction to Biology 1	X	X	X	X	X	X	X	X
2.	BIOL 102	Introduction to Biology 2	X	X	X	X	X	X	X	X
3.	BIOL 200	Introduction to Microbiology	X	X		X	X*		X	X
4.	BIOL 201	Cell Biology	X	X	X	X	X	X	X	X
5.	BIOL 202	Introduction to Biochemistry	X	X	X	X		X	X	X
6.	BIOL 203	Genetics	X	X	X	X	X	X	X	X
7.	BIOL 204	Introduction to Ecology	X		X		X		X	
8.	BIOL 208	Vertebrate Biology	R				X*		X	
9.	CHEM 101	Fundamentals of Chemistry 1	X	X	X	X	X	X	X	X
10.	CHEM 102	Fundamentals of Chemistry 2	X	X	X	X	X	X	X	X
11.	CHEM 201	Organic Chemistry 1	X	X	X	X	X	X	X	X
12.	CHEM 202	Organic Chemistry 2	X	X	X	X	X	X	X	X
13.	CHEM 215	Analytical Chemistry		X				X		

6 credits in ENGLISH

1.	ENGL 100	English Composition	X	X	X	X	X	X	X	X
2.	ENGL 101	Intro to Poetry and Drama	X*	X*	X*	X*	X*	X*	X*	X*
3.	ENGL 102	Intro to Prose Fiction	X*	X*	X*	X*	X*	X*	X*	X*

6 credits in MATH (at least 3 credits in Calculus)

1.	MATH 103	Differential Calculus	X	X	X	X	X	X	X	X
2.	MATH 104	Integral Calculus	X*	X	X	X	X	X	X*	X
3.	MATH 101	Finite Math 1			X					
4.	MATH 102	Finite Math 2			X					
5.	MATH 201	Multivariable Calculus					X			
6.	STAT 106	Statistics	X*			X	X		X*	X

6 credits in ARTS (other than English)

1.	Elective		X	X	X	X	X	X	X	X
2.	Elective		X	X	X	X	X	X	X	X

6 credits in ARTS, SCIENCE or OTHER AREAS

1.	PHYS 103	Introduction to Physics 1	X	X	X		X			X
2.	PHYS 104	Introduction to Physics 2		X	X		X			X
3.	COMP 105	Introduction to C and C++								
4.	MATH 221	Linear Algebra								

NOTE: the above listed are EXAMPLE INSTITUTIONS
Consult bctransferguide.ca for transfer to these and
other institutions

* - indicates that there is more than one option.
ex. English 101 or 102 will help fulfill the English requirement, but English 100 is required.

R - indicates recommended elective

x¹ - indicates non-specific credit granted

SAMPLE SEQUENCING PLANS

Biology

MAJOR

YEAR 1

FA

BIOL 101

Introduction to Biology 1

CHEM 101

Fundamentals of Chemistry 1

MATH 103

Differential Calculus

PHYS 103

Introduction to Physics 1

ENGL 100

English Composition

WI

BIOL 102

Introduction to Biology 2

CHEM 102

Fundamentals of Chemistry 2

MATH 104

Integral Calculus

PHYS 104

Introduction to Physics 2

OR

**Arts
Elective**

ENGL 101

Intro to Poetry & Drama

OR

ENGL 102

Intro to Prose

YEAR 2

FA

BIOL 201

Cell Biology

BIOL 204

Ecology

BIOL 203

Genetics

CHEM 201

Organic Chemistry 1

**Arts, Science
or Other Elective**

WI

BIOL 202

Introduction to Biochemistry

BIOL 208

Vertebrate Biology

BIOL 200

Introduction to Microbiology

CHEM 202

Organic Chemistry 2

CHEM 215

Analytical Chemistry

OR

**Arts, Science
or Other
Elective**

Biochemistry

MAJOR

YEAR 1

FA

BIOL 101

Introduction to Biology 1

CHEM 101

Fundamentals of Chemistry 1

MATH 103

Differential Calculus

PHYS 103

Introduction to Physics 1

ENGL 100

English Composition

WI

BIOL 102

Introduction to Biology 2

CHEM 102

Fundamentals of Chemistry 2

MATH 104

Integral Calculus

PHYS 104

Introduction to Physics 2

OR

**Arts
Elective**

ENGL 101

Intro to Poetry & Drama

OR

ENGL 102

Intro to Prose

YEAR 2

FA

BIOL 201

Cell Biology

MATH 101

*Finite Math 1
(U of L)*

OR

STATS 106

*Statistics
(UVic, UBC, UNBC)*

COMP105

Intro to C++

CHEM 201

Organic Chemistry 1

**Arts, Science
or Other Elective**

WI

BIOL 202

Introduction to Biochemistry

BIOL 203

Genetics

BIOL 200

*Intro to Microbiology
(U of L)*

OR

MATH 201

*Multivariate Calc
(UBC)*

CHEM 202

Organic Chemistry 2

CHEM 215

Analytical Chemistry



Institution Specific Science Requirements that can be completed at COTR within the ASc:

University of Lethbridge

BSc. Biology	BSc. Biochemistry
BIOL 101, 102, 200, 203, 204 CHEM 101, 102, 201, 202 MATH 103 PHYS 103	BIOL 101, 102, 200, 201, 202, 203 CHEM 101, 102, 201, 202, 215 MATH 103, 104 PHYS 103

University of Victoria

BSc. Biology	BSc. Biochemistry
BIOL 101, 102, 201, 202, 203, 204 CHEM 101, 102, 201, 202 MATH 103, 104 PHYS 103	BIOL 102, 200, 201, 203 CHEM 101, 102, 201, 202, 215 MATH 103, 104 PHYS 103, 104 STAT 106

University of Northern British Columbia

BSc. Biology	BSc. Biochemistry
BIOL 101, 102, 200, 203, 201, 202, 204 CHEM 101, 102, 201, 202 MATH 103 PHYS 103 STAT 106	BIOL 101, 102, 200, 201, 202, 203 CHEM 101, 102, 201, 202, 215 MATH 103, 104 PHYS 103, 104 STAT 106

University of British Columbia - Vancouver

BSc. Biology	BSc. Biochemistry
BIOL 101, 102, 201, 203, 204, 200 or 208 CHEM 101, 102, 201, 202 MATH 103, 104 PHYS 103	BIOL 101, 102, 200, 201, 202, 203 CHEM 101, 102, 201, 202, 215 MATH 103, 104 PHYS 103, 104 STAT 106

University of British Columbia - Okanagan

BSc. Biology	BSc. Biochemistry
BIOL 101, 102, 201, 203, 204, 200 or 208 CHEM 101, 102, 201, 202 MATH 103, 104 PHYS 103, 104	BIOL 101, 102, 200, 201, 202, 203 CHEM 101, 102, 201, 202, 215 MATH 103, 104, 201 PHYS 103, 104 STAT 106

COURSE DESCRIPTIONS

These courses form the core of the Associate of Science Degree Program. Please see course calendar or course outlines for specific course prerequisites and when choosing courses, please consult receiving institution for specific degree requirements.

36 Credits in Science

at least 3 credits in lab science, up to 15 credits in other science courses and at least 18 credits in second year science in two or more subject area

BIOL 101 Introduction to Biology 1

An introduction to the structure and function of organisms with particular reference to molecular, biochemical and physiological aspects of the living world. Designed for students seeking a degree or diploma in a field of science or technology, BIOL 101, with BIOL 102, lays the foundations on which the higher-level courses in Biology are based. It is also suitable as an elective course for general interest or arts students.

Credits: 3.00

BIOL 102 Introduction to Biology 2

BIOL 102 is an introduction to organismic and population biology with emphasis on reproduction, genetics, developmental biology, evolution, diversity, and ecology.

Credits: 3.00

CHEM 101 Fundamentals of Chemistry 1

This course presents the fundamental principles of chemistry with particular reference to acid base and redox chemistry, electronic structure of atoms and molecules, properties of liquids, gases, solids and their solutions, phase changes, and thermochemistry. The associated laboratory exercises emphasize proper experimental techniques, data collection and analysis, safety and technical writing skills.

Credits: 3.00

CHEM 102 Fundamentals of Chemistry 2

Together with CHEM 101, CHEM 102 provides a solid foundation in fundamental chemical principles. Topics include equilibrium, thermodynamics, kinetics, electrochemistry, chemistry of the main group elements and the chemistry of organic and biomolecules. The associated laboratory exercises emphasize proper experimental techniques, data collection and analysis, safety and technical writing skills.

Credits: 3.00

ENSC 101 Introduction to Environmental Science

This course introduces students to scientific analysis and communication of environmental issues. Students will learn about natural systems and the complex interactions among their biological, physical, chemical and anthropogenic components. Students will consider Western and Indigenous perspectives, governance, and economic factors to critically evaluate and communicate environmental problems. Students will investigate how these issues affect various aspects of the ecosphere, including humans, and will use integrated knowledge and perspectives to explore sustainable solutions. Laboratory activities, field trips and guest lectures will offer the opportunity to study regional environments and local environmental issues.

Credits: 3.00

PHYS 103 Introduction to Physics 1

This course introduces the student to how calculus is used to build physical theory and to solve problems in kinematics, dynamics, momentum, and center of mass calculations. In addition, the student is introduced to several conservation laws, in particular conservation of mechanical energy and linear and angular momentum.

Credits: 3.00

PHYS 104 Introduction to Physics 2

This course builds on PHYS 103. Electric and magnetic fields are used as examples of vector fields, and the concept of flux and Gauss's theorem are used to calculate the electric field in simple cases. Line integrals and the gradient are introduced as a means of going between electric field and potentials. Students are taught the uses for resistors, capacitors, and inductors and how to do calculations for circuits which use them. Ideas from relativity and quantum mechanics are introduced.

Credits: 3.00

BIOL 200 Introduction to Microbiology

Introduction to Microbiology is an introduction to the general principles of microbiology. Lectures and laboratory exercises explore fundamental topics of microbiology, environmental microbiology and molecular microbiology such as diversity of microorganisms, microbial structure, metabolism, genetics and microbial ecology emphasizing applied, medical and environmental microbiology. The laboratory introduces methods for safe handling of microorganisms, techniques of microbial isolation, enumeration and identification as well as experiments relevant to lectures.

Credits: 3.00

BIOL 201 Cell Biology

This course studies the relationship between cell structure and cell function. The structure function of the cell membrane and most organelles are covered in detail. Topics also include the evolution of the eukaryotic cell, cell movements, and cell reproduction. An introduction to cytogenetics are also presented. The material in Biology 201 is an integral part of an undergraduate biological sciences program and is especially appropriate for students interested in health-related sciences, microbiology, genetics, developmental biology, biochemistry, botany, zoology, and general biology.

Credits: 3.00

BIOL 202 Introduction to Biochemistry

BIOL 202 is continuation of BIOL 201. Through lectures and labs the course emphasizes the structural and functional aspects of cellular chemistry. Topics include cellular energetics, enzyme kinetics, respiration, photosynthesis, membrane transport, the genetic code, glycobiology, lipid biology, and protein biology. The laboratory exercises emphasize proper experimental techniques, data collection and analysis and technical writing skills.

Credits: 3.00

BIOL 203 Genetics

Genetics is the study and understanding of inheritance and development of organisms. This course will provide an introduction to genes and gene function. Mendelian and extra-mendelian genetics and molecular genetics review and expand on these topics explored in first year biology. Topics in transmission, molecular and quantitative genetics will also be discussed. Lab material will include descriptive aspects, techniques, data analysis and experimentation.

Credits: 3.00

BIOL 204 Ecology

The course studies the interactions between organisms and their environment at the organismal, population, community and ecosystem levels. Topics considered include energy flow, nutrient cycling, ecological succession, population dynamics and evolutionary processes. Local examples may be used to illustrate some of the principles.

Credits: 3.00

BIOL 208 Vertebrate Biology

This course covers the evolution and comparative anatomy of cephalochordates, urochordates, fish, amphibians, reptiles, birds, and mammals. The comparative anatomy of major organ systems among fishes, amphibians, birds, and mammals will be studied in the lab via dissection of representative organisms. The lab will emphasize the relationship between structure and function of vertebrate organisms while the lecture will focus on current controversies and discoveries in the scientific study of vertebrate evolution.

Credits: 3.00

CHEM 201 Organic Chemistry

CHEM 201 is an introductory course in organic chemistry including the structure and reactions of aliphatic and aromatic hydrocarbons and their derivatives. The laboratory stresses the techniques of preparation, purification and identification of organic compounds.

Credits: 3.00

CHEM 202 Organic Chemistry 2

CHEM 202 is a continuation of CHEM 201 involving the structure and reactions of the more complex aliphatic, aromatic and heterocyclic systems including an introduction to natural product chemistry and industrially important organic compounds. The laboratory stresses synthetic methods and some analytical procedures.

Credits: 3.00

CHEM 215 Analytical Chemistry

This course provides a solid background in the principles of analytical chemistry and their applications in fields such as environmental science. Topics include measurements and their errors, the use of statistics in data analysis and sampling, redox-, complexometric- and acid-base titrations, absorption and emission forms of atomic and molecular spectroscopy, electrochemical methods of analysis and separation techniques. The laboratory exercises emphasize proper experimental techniques, data collection and analysis, safety and technical writing skills.

Credits: 3.00

OR Any Science, Statistics, Kinesiology or Mathematics course not used for other requirements

6 Credits in first year English (ENG 100 and one of ENG 101 or ENG 102)

ENGL 100 English Composition

English 100 focuses on composition for academic purposes and develops a student's ability to write clearly and effectively. Students also learn the fundamentals of critical thinking, persuasive writing techniques (including rhetorical appeals and devices), scholarly research, and academic reading.

Credits: 3.00

ENGL 101 Introduction to Poetry and Drama

An introduction to the critical reading of literature through the study and analysis of poetry and drama across historical periods from Shakespeare to twenty-first century poets and dramatists. While this course will teach students how to perform college-level literary analysis of canonical texts, it will also teach students how to question and evaluate the cultural narratives that literature circulates. As such, the class will explore questions of gender, class, race, nationhood/nation building, and the problematic literary canon in order to develop strategies for negotiating complex literary texts and to become better, more nuanced readers.

Credits: 3.00

ENGL 102 Introduction to Prose

English 102 introduces students to the genre of literary fiction from the origins of the short story in early nineteenth century to the novels of twentieth and twenty-first century. The aim of English 102 is to read fiction with an understanding of genre, technique and form; to apply various critical strategies to literary texts; and to develop analytical writing skills appropriate to essays at the university level. Ultimately, the course encourages students to consider how narrative forms can shape, challenge and respond to their moral, social, and political contexts.

Credits: 3.00

6 Credits in Mathematics (at least 3 credits in calculus)

MATH 103 Differential Calculus

This course is intended for students who are pursuing a Bachelor of Science degree. Topics include functions, limits, continuity, derivatives and their interpretation, differentiation rules, techniques of differentiation, implicit differentiation, inverse functions, exponential functions, logarithms, applications of differentiation such as linear approximations, Newton's method, related rates, analysis of graphs and optimization, the Mean Value Theorem, definite and indefinite integrals, integration by substitution, Riemann sums, and applications of integration. Calculus is a necessary step in any career in the sciences including Biology, Chemistry, Commerce, Computer Science, Engineering, Geology, Mathematics, Medicine, and Physics. It is also useful in any field which uses statistics to analyze data.

Credits: 3.00

MATH 104 Integral Calculus

Topics include: Logarithmic, exponential and hyperbolic functions, complex numbers, integration techniques (substitution, parts, partial fractions, trigonometric substitution, numerical methods), L'Hopital's rule, improper integrals, sequences, series, convergence tests (divergence, integral, comparison, limit comparison, ratio, root, and alternating series tests), Taylor Maclaurin and Fourier series, vectors (dot products, vector valued functions), and polar curves. Calculus is a necessary step in any career in the sciences including Biology, Chemistry, Commerce, Computer Science, Engineering, Geology, Mathematics, Medicine, and Physics. It is also useful in any field which uses statistics to analyze data.

Credits: 3.00

STAT 106 Statistics

This course introduces the fundamental ideas of statistics and can be applied to any discipline. Topics include: collection, description, and presentation of data; calculating central tendency and dispersion; probability and statistical inference; hypothesis testing (means, proportions, variances, one and two samples); correlation and regression; decision making and sampling, Goodness of Fit Tests, and Contingency Tables.

Credits: 3.00

MATH 101 Finite Mathematics 1

This course is intended for students who require an appreciation of higher mathematics but don't require calculus. Math 101 stresses a logical and critical thinking approach while investigating an introduction to linear algebra, linear programming, the simplex method, set theory and counting, an introduction to probability and statistics, and game theory.

Credits: 3.00

MATH 102 Finite Mathematics 2

This course is intended for students entering programs that require an appreciation of higher mathematics, but do not require calculus. The course covers regular and absorbing Markov Processes, operations and conversions in other bases, introduction to logic (statements, truth tables, laws, simplification), Boolean Algebra, logic gates, sets and relations, logical puzzles, algorithms and flowcharts, graphs, directed graphs, trees, and Euler and Hamiltonian graphs. MATH 102 is usually taken by students working towards a B.A. or a B. Ed. Students planning to take a B.Sc may take MATH 102 as an elective, but need to take Calculus, as well, as a requirement of that degree. MATH 102 is often taken by Business students, as it is good preparation for further study in computing.

Credits: 3.00

6 Credits in Arts (other than English)

ANTH 105 Introduction to Health and Wellness in Indigenous Communities

This course adopts a holistic approach to understanding health and wellness within Indigenous communities. Students examine many factors and conditions that impact Indigenous community health from a strength based rather than problem focused approach. This course also focuses on Indigenous worldviews in terms of how community health and wellness is articulated and maintained. Traditional knowledge and Indigenous scholarship are incorporated alongside anthropological perspectives. Whether delivered face to face or online, the course is treated as an interactive lecture series. Indigenous representatives from local communities and scholars knowledgeable about course topics share their valuable insights and knowledge with students.

Credits: 3.00

ANTH 250 Indigenous Community Health and Healing

This course engages students in an in-depth study of the traditional and contemporary approaches used by Indigenous people to support and heal their communities from a contemporary anthropological, decolonized and indigenized approach. Students are challenged to integrate these approaches to examine, articulate and develop their own practice frameworks and ethical perspectives. Elder teachings, engagement with Indigenous community members and indigenous scholarship are integral to this course.

Credits: 3.00

PSYC 101 Introduction to Psychology 1

This course provides an introduction to the history, principles, and methods of psychology. Topics may include the brain and behaviour, sensation and perception, learning and memory, thinking and language, and states of consciousness.

Credits: 3.00

PSYC 102 Introduction to Psychology 2

This course is a continuation of Psychology 101. Topics may include development across the lifespan, intelligence, motivation, emotion, stress and health, personality, psychological disorders, therapy, and social behaviour.

Credits: 3.00

6 Credits in Arts, Science or other areas

BIOL 204 Ecology

The course studies the interactions between organisms and their environment at the organismal, population, community and ecosystem levels. Topics considered include energy flow, nutrient cycling, ecological succession, population dynamics and evolutionary processes. Local examples may be used to illustrate some of the principles.

Credits: 3.00

BIOL 208 Vertebrate Biology

This course covers the evolution and comparative anatomy of cephalochordates, urochordates, fish, amphibians, reptiles, birds, and mammals. The comparative anatomy of major organ systems among fishes, amphibians, birds, and mammals will be studied in the lab via dissection of representative organisms. The lab will emphasize the relationship between structure and function of vertebrate organisms while the lecture will focus on current controversies and discoveries in the scientific study of vertebrate evolution.

Credits: 3.00

STAT 206 Calculus Based Statistics

This course is intended for students who are pursuing Engineering on a Bachelor of Science degree. Topics include: probability theory, random variables, expected values, variance, moments, probability distributions (binomial, hypergeometric, Poisson, normal, geometric, negative binomial, and gamma), estimation (properties of estimators, method of maximum likelihood, and method of moments), hypothesis testing (type I and II errors, and generalized likelihood ratio tests), distributions (χ^2 , t, and F) and their tests, goodness of fit and contingency tables, regression, and ANOVA. Statistics are used to analyze data throughout the sciences, including Biology, Chemistry, Commerce, Computer Science, Engineering, Geology, Mathematics, Medicine, and Physics.

Credits: 3.00

OR any science, arts, or other course not used to meet other requirements