BIOSYSTEMS ENGINEERING/ RED RIVER COLLEGE POLYTECHNIC ARTICULATION AGREEMENT

Biosystems Engineering/Red River College Polytechnic Articulation Agreement

Mechanical Engineering Technology Diploma Program

Course	Title	Hours
Preliminary Engineering Program		
CHEM 1100	Introductory Chemistry 1: Atomic and Molecular Structure and Energetics	3
CHEM 1122	Introduction to Chemistry Techniques for Engineering 1	1.5
COMP 1012	Computer Programming for Scientists and Engineers	3
ENG 1430	Design in Engineering	3
ENG 1440	Introduction to Statics [RRC1]	3
ENG 1450	Introduction to Electrical and Computer Engineering [RRC2]	3
ENG 1460	Introduction to Thermal Sciences [RRC3]	3
MATH 1210	Techniques of Classical and Linear Algebra	3
MATH 1510	Applied Calculus 1 [RRC4]	3
MATH 1710	Applied Calculus 2	3
PHYS 1050	Physics 1: Mechanics	3
"W" Elective - One course that satisfies the university "writing" requirement		3
CS Elective 1 - One complementary studies elective [RRC5]		3
Program courses and electives taught by the department		
BIOE 2480	Impact of Engineering on the Environment	3
BIOE 2590	Biology for Engineers	3
BIOE 2790	Fluid Mechanics [RRC6]	4
BIOE 2800	Solid Mechanics [RRC7]	4
BIOE 2900	Biosystems Engineering Design 1	4
BIOE 3110	Heat Transfer in Biological Systems	4
BIOE 3270	Instrumentation and Measurement for Biosystems	4
BIOE 3320	Engineering Properties of Biological Materials	4
BIOE 3400	Design of Structural Components in Machines	4
BIOE 3590	Mechanics of Materials in Biosystems	4
BIOE 3670	Engineering Management of Waste Streams	4
BIOE 3900	Biosystems Engineering Design 2	4
BIOE 4240	Graduation Project	3
BIOE 4900	Biosystems Engineering Design 3	4
BIOE 4950	Biosystems Engineering Design 4	4
Design 1 - Lists available for each Specialization		4
Design 2 - Lists available for each specialization		4
Program courses taught by other academic departments		
CHEM 1110	Introductory Chemistry 2: Interaction, Reactivity, and Chemical Properties	3
CHEM 1126	Introduction to Chemistry Techniques for Engineering 2	1.5
ENG 2022	Engineering CAD Technology for Biosystems [RRC8]	3
ENG 3000	Engineering Economics	3
MATH 2130	Engineering Mathematical Analysis 1	3
MATH 2132	Engineering Mathematical Analysis 2	3
MBIO 1220	Essentials of Microbiology	3
MECH 2150	Mechanical Engineering Modelling and Numerical Methods [RRC9]	4
MECH 3482	Kinematics and Dynamics	4
STAT 2220	Contemporary Statistics for Engineers [RRC10]	3
Electives taught by other departments		
One course in Technology and Society:		3
ENG 3020	Technology, Society and the Future	
or ANTH 243	Ecology, Technology and Society	
One Indigenous Knowledge course from the list provided		3
Science 1 - Lists available for each Specialization		3
Science 2 - Lists available for each Specialization		3
CS Elective 2 - Lists available for each Specialization		3
Free 1 - Lists available for each Specialization		3-4
Free 2 - Lists available for each Specialization		3-4
Total Hours		**154-156**

RRC1 RRC Polytech Equivalent Course: ENGI 1043 Applied Mechanics

RRC2 RRC Polytech Equivalent Course: ELEC 1061 Electrical/Electronic Fundamentals AND ENGI 1076 Instrumentation and Control AND ENGI 1048 Mechatronics

RRC3 RRC Polytech Equivalent Course: ENGI 1159 Thermodynamics

RRC4 RRC Polytech Equivalent Course: MATH 1074 Calculus

RRC5 RRC Polytech Equivalent Course: COMM 1234 Technical Communication AND ENGI 1051 Engineering Tech Project (corresponds to UM ENG 2040 Engineering Communication)

RRC6 RRC Polytech Equivalent Course: ENGI 1037 Fluid Mechanics

RRC7 RRC Polytech Equivalent Course: ENGI 1152 Strength of Materials

RRC8 RRC Polytech Equivalent Course: COMP 1154 Computer Aided Design AND ENGI 2035 Engineering Design II (ENGI 2035 must be taught by a registered professional engineer at RRC Polytech in order to receive transfer credit)

RRC9 RRC Polytech Equivalent Course: COMP 1153 Numerical Methods (course must be taught by a registered professional engineer at RRC Polytech in order to receive transfer credit)

RRC10 RRC Polytech Equivalent Course: MATH 1017 Applied Statistics

RRC11 RRC Polytech Equivalent Course: ENGI 1046 Engineering Materials and ENGI 1101 Metallurgy (corresponds to UM MECH 2272 Engineering Materials I)

Civil Engineering Technology Diploma Program

Municipal Engineering Technology Stream

Course	Title	Hours
Preliminary Engineering Program		
CHEM 1100	Introductory Chemistry 1: Atomic and Molecular Structure and Energetics	3
CHEM 1122	Introduction to Chemistry Techniques for Engineering 1	1.5
COMP 1012	Computer Programming for Scientists and Engineers	3
ENG 1430	Design in Engineering	3
ENG 1440	Introduction to Statics [RRC1]	3
ENG 1450	Introduction to Electrical and Computer Engineering	3
ENG 1460	Introduction to Thermal Sciences	3
MATH 1210	Techniques of Classical and Linear Algebra	3
MATH 1510	Applied Calculus 1 [RRC2]	3
MATH 1710	Applied Calculus 2	3
PHYS 1050	Physics 1: Mechanics	3
"W" Elective - One course that satisfies the university "writing" requirement		3
CS Elective 1 - One complementary studies elective [RRC3]		3
Program courses and electives taught by the department		
BIOE 2480	Impact of Engineering on the Environment	3
BIOE 2590	Biology for Engineers	3
BIOE 2790	Fluid Mechanics [RRC4]	4
BIOE 2800	Solid Mechanics	4
BIOE 2900	Biosystems Engineering Design 1	4
BIOE 3110	Heat Transfer in Biological Systems	4
BIOE 3270	Instrumentation and Measurement for Biosystems	4
BIOE 3320	Engineering Properties of Biological Materials	4
BIOE 3400	Design of Structural Components in Machines	4
BIOE 3590	Mechanics of Materials in Biosystems	4
BIOE 3670	Engineering Management of Waste Streams	4
BIOE 3900	Biosystems Engineering Design 2	4
BIOE 4240	Graduation Project	3
BIOE 4900	Biosystems Engineering Design 3	4
BIOE 4950	Biosystems Engineering Design 4	4
Design 1 - Lists available for each Specialization		4
Design 2 - Lists available for each Specialization		4
Program courses taught by other academic departments		
CHEM 1110	Introductory Chemistry 2: Interaction, Reactivity, and Chemical Properties	3
CHEM 1126	Introduction to Chemistry Techniques for Engineering 2	1.5
ENG 2022	Engineering CAD Technology for Biosystems	3
ENG 3000	Engineering Economics [RRC5]	3
MATH 2130	Engineering Mathematical Analysis 1	3
MATH 2132	Engineering Mathematical Analysis 2	3
MBIO 1220	Essentials of Microbiology	3
MECH 2150	Mechanical Engineering Modelling and Numerical Methods	4
MECH 3482	Kinematics and Dynamics	4
STAT 2220	Contemporary Statistics for Engineers	3
Electives taught by other departments		
One course in Technology and Society:		3
ENG 3020	Technology, Society and the Future	
or ANTH 243	Ecology, Technology and Society	
One Indigenous Knowledge course (from the list provided)		3
Science 1 - Lists available for each Specialization		3
Science 2 - Lists available for each Specialization		3
CS Elective 2 - Lists available for Specialization [RRC6]		3
Free 1 - Lists available for each Specialization [RRC7]		3-4
Free 2 - Lists available for each Specialization [RRC8]		3-4
Total Hours		**154-156**

RRC1 RRC Polytech Equivalent Course: CIVL 1013 Statics and Strength of Materials 1 AND CIVL 2025 Statics and Strength of Materials 2

RRC2 RRC Polytech Equivalent Course: CIVL 2001 Calculus & Statistics

RRC3 RRC Polytech Equivalent Course: CIVL 1016 Technical Communication 1 AND CIVL 2027 Technical Communication 2 (corresponds to UM ENG-2040 Engineering Communication)

RRC4 RRC Polytech Equivalent Course: CIVL 2066 Hydromatics

RRC5 RRC Polytech Equivalent Courses: CIVL 3026 Engineering Economics

RRC6 RRC Polytech Equivalent Course: CIVL 1020 Professional Ethics (corresponds to UM PHIL 2XXX)

RRC7 RRC Polytech Equivalent Course: CIVL 2011 Geotechnical Materials 1 AND CIVL 3015 Geotechnical Materials 2 (corresponds to UM CIVL 3730 Geotechnical Materials and Analysis)

RRC8 RRC Polytech Equivalent Course: CIVL 3016 Hydrology (corresponds to UM CIVL 3750 Hydrology)

Structural Engineering Technology Stream

Course	Title	Hours
Preliminary Engineering Program		
CHEM 1100	Introductory Chemistry 1: Atomic and Molecular Structure and Energetics	3
CHEM 1122	Introduction to Chemistry Techniques for Engineering 1	1.5
COMP 1012	Computer Programming for Scientists and Engineers	3
ENG 1430	Design in Engineering	3
ENG 1440	Introduction to Statics [RRC1]	3
ENG 1450	Introduction to Electrical and Computer Engineering	3
ENG 1460	Introduction to Thermal Sciences	3
MATH 1210	Techniques of Classical and Linear Algebra	3
MATH 1510	Applied Calculus 1 [RRC2]	3
MATH 1710	Applied Calculus 2	3
PHYS 1050	Physics 1: Mechanics	3
"W" Elective - One course that satisfies the university "writing" requirement		3
CS Elective 1 - One complementary studies elective [RRC3]		3
Program courses and electives taught by the department		
BIOE 2480	Impact of Engineering on the Environment	3

BIOE 2590	Biology for Engineers	3
BIOE 2790	Fluid Mechanics	4
BIOE 2800	Solid Mechanics	4
BIOE 2900	Biosystems Engineering Design 1	4
BIOE 3110	Heat Transfer in Biological Systems	4
BIOE 3270	Instrumentation and Measurement for Biosystems	4
BIOE 3320	Engineering Properties of Biological Materials	4
BIOE 3400	Design of Structural Components in Machines	4
BIOE 3590	Mechanics of Materials in Biosystems	4
BIOE 3670	Engineering Management of Waste Streams	4
BIOE 3900	Biosystems Engineering Design 2	4
BIOE 4240	Graduation Project	3
BIOE 4900	Biosystems Engineering Design 3	4
BIOE 4950	Biosystems Engineering Design 4	4
Design 1 - Lists available for each Specialization		4
Design 2 - Lists available for each Specialization		4
Program courses taught by other academic departments		
CHEM 1110	Introductory Chemistry 2: Interaction, Reactivity, and Chemical Properties	3
CHEM 1126	Introduction to Chemistry Techniques for Engineering 2	1.5
ENG 2022	Engineering CAD Technology for Biosystems	3
ENG 3000	Engineering Economics [RRC5]	3
MATH 2130	Engineering Mathematical Analysis 1	3
MATH 2132	Engineering Mathematical Analysis 2	3
MBIO 1220	Essentials of Microbiology	3
MECH 2150	Mechanical Engineering Modelling and Numerical Methods	4
MECH 3482	Kinematics and Dynamics	4
STAT 2220	Contemporary Statistics for Engineers	3
Electives taught by other departments		
One course in Technology and Society:		3
ENG 3020	Technology, Society and the Future	
or ANTH 243	Ecology, Technology and Society	
One Indigenous Knowledge course from the list provided		3
Science 1 - Lists available for each Specialization		3
Science 2 - Lists available for each Specialization		3
CS Elective 2 - Lists available for each Specialization [RRC6]		3
Free 1 - Lists available for each Specialization [RRC7]		3-4
Free 2 - Lists available for each Specialization [RRC8]		3-4
Total Hours		**154-156**

RRC1 Polytech Equivalent Course: CIVL 1013 Statics and Strength of Materials 1 AND CIVL 2025 Statics and Strength of Materials 2

RRC2 Polytech Equivalent Course: CIVL 2001 Calculus & Statistics

RRC3 Polytech Equivalent Course: CIVL 1016 Technical Communication 1 AND CIVL 2027 Technical Communication 2 (corresponds to UM ENG 2040 Engineering Communication)

RRC4 Polytech Equivalent Course: CIVC 1044 Project Administration AND CIVL 3005 Applied Research Project

RRC5 Polytech Equivalent Course: CIVL 3026 Engineering Economics

RRC6 Polytech Equivalent Course: CIVL 1020 Professional Ethics (corresponds to UM PHIL 2XXX)

RRC7 Polytech Equivalent Course: CIVL 3021 Foundation Design (corresponds to UM CIVL 4220 Geotechnical Design)

RRC8 Polytech Equivalent Course: CIVL 2017 Reinforced Concrete Design 1 AND CIVL 3022 Reinforced Concrete Design 2 (corresponds to UM CIVL 4390 Reinforced Concrete Structures)

Environment Engineering Technology Stream

Course	Title	Hours
Preliminary Engineering Program		
CHEM 1100	Introductory Chemistry 1: Atomic and Molecular Structure and Energetics	3
CHEM 1122	Introduction to Chemistry Techniques for Engineering 1	1.5
COMP 1012	Computer Programming for Scientists and Engineers	3
ENG 1430	Design in Engineering	3
ENG 1440	Introduction to Statics [RRC1]	3
ENG 1450	Introduction to Electrical and Computer Engineering	3
ENG 1460	Introduction to Thermal Sciences	3
MATH 1210	Techniques of Classical and Linear Algebra	3
MATH 1510	Applied Calculus 1 [RRC2]	3
MATH 1710	Applied Calculus 2	3
PHYS 1050	Physics 1: Mechanics	3
"W" Elective - One course that satisfies the university "writing" requirement		3
CS Elective 1 - One complementary studies elective [RRC3]		3
Program courses and electives taught by the department		
BIOE 2480	Impact of Engineering on the Environment	3
BIOE 2590	Biology for Engineers	3
BIOE 2790	Fluid Mechanics	4
BIOE 2800	Solid Mechanics	4
BIOE 2900	Biosystems Engineering Design 1	4
BIOE 3110	Heat Transfer in Biological Systems	4
BIOE 3270	Instrumentation and Measurement for Biosystems	4
BIOE 3320	Engineering Properties of Biological Materials	4
BIOE 3400	Design of Structural Components in Machines	4
BIOE 3590	Mechanics of Materials in Biosystems	4
BIOE 3670	Engineering Management of Waste Streams	4
BIOE 3900	Biosystems Engineering Design 2	4
BIOE 4240	Graduation Project [RRC4]	3
BIOE 4900	Biosystems Engineering Design 3	4
BIOE 4950	Biosystems Engineering Design 4	4
Design 1 - Lists available for each Specialization		4
Design 2 - Lists available for each Specialization		4
Program courses taught by other academic departments		
CHEM 1110	Introductory Chemistry 2: Interaction, Reactivity, and Chemical Properties	3
CHEM 1126	Introduction to Chemistry Techniques for Engineering 2	1.5
ENG 2022	Engineering CAD Technology for Biosystems	3
ENG 3000	Engineering Economics [RRC5]	3
MATH 2130	Engineering Mathematical Analysis 1	3
MATH 2132	Engineering Mathematical Analysis 2	3
MBIO 1220	Essentials of Microbiology	3

MECH 2150	Mechanical Engineering Modelling and Numerical Methods	4
MECH 3482	Kinematics and Dynamics	4
STAT 2220	Contemporary Statistics for Engineers	3
Electives taught by by other departments		
One course in Technology and Society:		3
ENG 3020	Technology, Society and the Future	
or ANTH 243	Ecology, Technology and Society	
One Indigenous Knowledge course from the list provided		3
Science 1 - List available for each Specialization		3
Science 2 - Lists available for each Specization		3
CS Elective 2 - Lists available for each Specialization [RRC6]		3
Free 1 - Lists available for each Specialization [RCC7]		3-4
Free 2 - Lists available for each Specialization [RRC8]		3-4
Total Hours		**154-156**

RRC1 RCC Polytech Equivalent Course: CIVL 1013 Statics and Strength of Materials 1 AND CIVL 2025 Statics and Strength of Materials 2

RRC2 RCC Polytech Equivalent Course: CIVL 2001 Calculus & Statistics

RRC3 RCC Polytech Equivalent Course: CIVL 1016 Technical Communication 1 AND CIVL 2027 Technical Communication 2 (corresponds to UM ENG 2040 Engineering Communication)

RRC4 RCC Polytech Equivalent Course: CIVC 1044 Project Administration AND CIVL 3005 Applied Research Project

RRC5 RCC Polytech Equivalent Course: CIVL 3026 Engineering Economics

RRC6 RCC Polytech Equivalent Course: CIVL 1020 Professional Ethics (corresponds to UM PHIL 2XXX)

RRC7 RCC Polytech Equivalent Course: CIVL 3016 Hydrology (corresponds to UM CIVL 3750 Hydrology)

RRC8 RCC Polytech Equivalent Course: CIVL 3007 Waste Management (corresponds to UM CIVL 4130 Solid Waste Management)

Geomatics Technology Stream

Course	Title	Hours
Preliminary Engineering Program		
CHEM 1100	Introductory Chemistry 1: Atomic and Molecular Structure and Energetics	3
CHEM 1122	Introduction to Chemistry Techniques for Engineering 1	1.5
COMP 1012	Computer Programming for Scientists and Engineers	3
ENG 1430	Design in Engineering	3
ENG 1440	Introduction to Statics [RRC1]	3
ENG 1450	Introduction to Electrical and Computer Engineering	3
ENG 1460	Introduction to Thermal Sciences	3
MATH 1210	Techniques of Classical and Linear Algebra	3
MATH 1510	Applied Calculus 1 [RRC2]	3
MATH 1710	Applied Calculus 2	3
PHYS 1050	Physics 1: Mechanics	3
"W" Elective - One course that satisfies the university "writing" requirement		3
CS Electives 1 - One complementary studies elective [RRC3]		3
Program courses and electives taught by the department		
BIOE 2480	Impact of Engineering on the Environment	3
BIOE 2590	Biology for Engineers	3
BIOE 2790	Fluid Mechanics	4
BIOE 2800	Solid Mechanics	4
BIOE 2900	Biosystems Engineering Design 1	4
BIOE 3110	Heat Transfer in Biological Systems	4
BIOE 3270	Instrumentation and Measurement for Biosystems	4
BIOE 3320	Engineering Properties of Biological Materials	4
BIOE 3400	Design of Structural Components in Machines	4
BIOE 3590	Mechanics of Materials in Biosystems	4
BIOE 3670	Engineering Management of Waste Streams	4
BIOE 3900	Biosystems Engineering Design 2	4
BIOE 4240	Graduation Project	3
BIOE 4900	Biosystems Engineering Design 3	4
BIOE 4950	Biosystems Engineering Design 4	4
Design 1 - Lists available for each Specialization		4
Design 2 - Lists available for each Specialization		4
Program courses taught by other academic departments		
CHEM 1110	Introductory Chemistry 2: Interaction, Reactivity, and Chemical Properties	3
CHEM 1126	Introduction to Chemistry Techniques for Engineering 2	1.5
ENG 2022	Engineering CAD Technology for Biosystems	3
ENG 3000	Engineering Economics [RRC4]	3
MATH 2130	Engineering Mathematical Analysis 1	3
MATH 2132	Engineering Mathematical Analysis 2	3
MBIO 1220	Essentials of Microbiology	3
MECH 2150	Mechanical Engineering Modelling and Numerical Methods	4
MECH 3482	Kinematics and Dynamics	4
STAT 2220	Contemporary Statistics for Engineers	3
Electives taught by other departments		
One course in Technology and Society:		3
ENG 3020	Technology, Society and the Future	
or ANTH 243	Ecology, Technology and Society	
One Indigenous Knowledge course from the list provided		3
Science 1 - Lists available for each Specialization		3
Science 2 - Lists available for each Specialization		3
CS Elective 2 - Lists available for each Specialization [RRC5]		3
Free 1 - Lists available for each Specialization [RRC6]		3-4
Free 2 - Lists available for each Specialization		3-4
Total Hours		**154-156**

RRC1 RCC Polytech Equivalent Course: CIVL 1013 Statics and Strength of Materials 1 AND CIVL 2025 Statics and Strength of Materials 2

RRC2 RCC Polytech Equivalent Course: CIVL 2001 Calculus & Statistics

RRC3 RCC Polytech Equivalent Course: CIVL 1016 Technical Communication 1 AND CIVL 2027 Technical Communication 2 (corresponds to UM ENG 2040 Engineering Communication)

RRC4 RCC Polytech Equivalent Course: CIVL 3026 Engineering Economics

RRC5 RCC Polytech Equivalent Course: CIVL 1020 Professional Ethics (corresponds to UM PHIL 2XXX)

RRC Polytech Equivalent Course: CIVL 1014 Surveying 1, CIVL 2026 Surveying 2 AND CIVL 2009 Fundamentals of GIS (corresponds to UM CIVL 2840 Civil Engineering Geomatics)

Concentrations

Specializations in Biosystems Engineering

Students wishing to pursue more focused studies in a Biosystems Engineering subject area have the choice of completing one of three specializations:

1. Biomedical,
2. Bioresource, or
3. Environmental.

To complete a specialization, you will be required to complete two science courses, two Biosystems Engineering design courses, and one complementary studies course. Completing a specialization does not require any additional coursework.

Biomedical Specialization

The biomedical specialization provides engineers with knowledge of human anatomy and physiology to enhance the understanding of the role to be played by engineers in specific areas within biomedical engineering such as rehabilitation engineering, clinical engineering, medical imaging, and orthopedics.

Students who obtain a grade of "C" or better in the courses listed below will receive a notation of "Biomedical Specialization" on their transcript at the time of graduation.

Course	Title	Hours
Science Courses		
Both of the following:		
BIOL 1410	Anatomy of the Human Body	3
BIOL 1412	Physiology of the Human Body	3
Biosystems Engineering Design Courses		
Both of the following:		
BIOE 4640	Bioengineering Applications in Medicine	4
BIOE 4650	Textiles in Healthcare and Medical Applications	4
Complementary Studies Courses		
One of the following: [1]		3
ENVR 3400	Introduction to Environment and Health	
HNSC 1210	Nutrition for Health and Changing Lifestyles	
KPER 1200	Physical Activity, Health and Wellness	
PHIL 2740	Ethics and Biomedicine	
or PHIL 2741	Éthique et biomédicine	
Total Hours		**17**

[1] Special permission may be granted by the Head of Department for courses not appearing on the list of Complementary Studies Courses.

Bioresource Specialization

Challenges remain in the production of food and renewable resources for a world of ever-increasing population. The Bioresource Specialization provides the educational background to enable engineers to devise strategies and technologies for producing food, fibre, bio-based products, and renewable energy efficiently and sustainably.

Students who obtain a grade of "C" or better in the courses listed below will receive a notation of "Bioresource Specialization" on their transcript at the time of graduation.

Course	Title	Hours
Science Courses		
SOIL 4060	Physical Properties of Soils	3
And one of the following:		3
ANSC 3530	The Animal and Its Environment	
PLNT 2510	Fundamentals of Horticulture	
Biosystems Engineering Design Courses		
Both of the following:		8
BIOE 4440	Bioprocessing for Biorefining	
BIOE 4600	Design of Water Management Systems	
Complementary Studies Courses		
One of the following: [1]		3
ABIZ 1000	Introduction to Agribusiness Management	
ABIZ 1010	Economics of World Food Issues and Policies	
ABIZ 3530	Farm Management	
FOOD 1000	Food Safety Today and Tomorrow	
GEOG 2520	Geography of Natural Resources (HS)	
Total Hours		**17**

[1] Special permission may be granted by the Head of Department for courses not appearing on the list of Complementary Studies courses.

Environmental Specialization

There are numerous environmental issues faced by society. The environmental specialization provides engineers with the knowledge to predict environmental impacts due to human developments and to solve problems associated with the environment (soil contamination, pollution of rivers and lakes, air pollution, wastewater treatment).

Students who obtain a grade of "C" or better in the courses listed below will receive a notation of "Environmental Specialization" on their transcript at the time of graduation.

Course	Title	Hours
Science Courses		
SOIL 4060	Physical Properties of Soils	3
And one of the following:		3
AGEC 2370	Principles of Ecology	
BIOL 2300	Principles of Ecology	
Biosystems Engineering Design Courses		
Both of the following:		8
BIOE 4460	Air Pollution Assessment and Management	
BIOE 4620	Remediation Engineering	
Complementary Studies Courses		
One of the following: [1]		3
ENVR 3750	Green Building and Planning	
ENVR 3850	Sustainable Manitoba - Linking Local and Global Sustainability	
ENVR 4050	Ecosystem Management	
GEOG 2520	Geography of Natural Resources (HS)	

PHIL 2750	Ethics and the Environment	
Total Hours		**17**

[1] Special permission may be granted b the Head of Department for courses not appearing on the list for Complementary Studies courses.

Preliminary Engineering Program

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Telephone: (204) 474 9167
Email Address: eng.info@umanitoba.ca (eng_info@umanitoba.ca)
Website: umanitoba.ca/engineering (https://umanitoba.ca/engineering/)

The Preliminary Engineering Program is common to all programs in engineering. Students must complete a minimum of eight (**excluding CHEM 1122**) to be eligible to apply to one of the five degree granting engineering programs. A student must complete the following list of 13 courses as part of their engineering program in order to graduate with a BSc degree in engineering.

Course	Title	Hours
CHEM 1100	Introductory Chemistry 1: Atomic and Molecular Structure and Energetics [1]	3
CHEM 1122	Introduction to Chemistry Techniques for Engineering 1 [1]	1.5
COMP 1012	Computer Programming for Scientists and Engineers	3
ENG 1430	Design in Engineering	3
ENG 1440	Introduction to Statics	3
ENG 1450	Introduction to Electrical and Computer Engineering	3
ENG 1460	Introduction to Thermal Sciences	3
MATH 1210	Techniques of Classical and Linear Algebra [2]	3
MATH 1510	Applied Calculus 1 [3]	3
MATH 1710	Applied Calculus 2 [3]	3
PHIL 1290	Critical Thinking [4]	3
PHYS 1050	Physics 1: Mechanics	3
Written English Course [5,6]		3
Total Hours		**37.5**

[1] The former CHEM 1300 may be used in lieu of the combination of CHEM 1100 and CHEM 1122.
[2] MATH 1300 is not an acceptable equivalent to MATH 1210.
[3] Students intending to obtain a degree in Engineering are strongly advised to complete MATH 1510 and MATH 1710. However, MATH 1500 or MATH 1230 may be taken in lieu of MATH 1510; MATH 1700 or MATH 1232 may be taken in lieu of MATH 1710. MATH 1524 is not an acceptable equivalent to MATH 1510.
[4] PHIL 1290 is the recommended complementary studies elective. Students may; however, select any course from the Faculties of Arts or Management (Asper School of Business) at the 1000 level or above, except for ARTS 1110.
[5] Course selected from the list of approved Written English Courses for Engineering students.
[6] Three credit hours are required to satisfy the Written English course requirement. Should a student complete a six credit hour course, the additional three credit hours may be used to satisfy general complementary studies requirements within a student's program.
[7] Equivalent courses offered through Université de Saint-Boniface may be used to satisfy program requirements.

Co-operative Education and Industrial Internship Programs

Contact and Program Information

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Tel. 204 474 8948
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Cooperative Education Administrator: Megan Johnson
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The Price Faculty of Engineering offers a Co-operative education and Industrial Internship Program (Co-op/IIP) designed to complement and enrich the academic program with work experience. The work terms provide students with practical experience, assistance in financing their education, and guidance for future career specialization.

Applications are accepted for Co-op/IIP every fall. Co-op/IIP supports the application and participation of all students who meet the requirements and wish to apply. Application to Co-op/IIP is a process. The Co-op/IIP Office will work with you. Please connect with our staff via email: engineeringcoop@umanitoba.ca and refer to the web site (https://umanitoba.ca/engineering/co-operative-education) for the benefits of Co-op/IIP.

Successful applicants to Co-op/IIP have:

- Attended an information session.
- Been accepted as an undergraduate student into an Engineering Department.
- Completed all 13 Preliminary Engineering Program courses before their first work term.
- Completed 42 credit hours towards your degree by the end of the Fall term. Students must return for at least one academic term following the completion of their final work term placement. (Application early in a student's degree program will support the completion of 3 work terms.)
- Been assessed as in Good Academic standing (GPA above 2.0). I.E. not on Probation or Academic Warning.
- Agree to follow all rules and regulations of the program as detailed in the Rules and Regulations

Work placements must be confirmed to be appropriate by the Co-op/IIP office in order be credited as a Co-op/IIP work term.

Upon securing a job placement, Engineering students enroll in the course ENG 4800 and subsequently the specific work term of employment ENG 4810, ENG 4820, ENG 4830, ENG 4840.

Students who are unable to maintain the standards of the Co-op/IIP will be transferred back into the regular program.

The course and grade requirements for completion of the Co-op/IIP are the same as those required for the regular program. However, in order to satisfy course prerequisite requirements, timetables may differ from the regular program. Co-op/IIP students are evaluated in the same manner as regular students and all rules and regulations of the Price Faculty of Engineering apply.

Students who are placed on Academic Probation may either be removed from Co-op/IIP or have their acceptance deferred until they have completed two consecutive terms with an Academic Standing of "Satisfactory".

Students who are Required to Withdraw will immediately become ineligible for Co-op/IIP and will remain ineligible after re-instatement to the Price Faculty of Engineering.

Written reports must be completed at the end of each four-month work term. Each successfully completed four-month work term and its corresponding report receives a Pass/Fail grade and is rated at one credit hour. Graduates who successfully complete at least three work terms and the required work term reports will have the Co-operative Education Option acknowledged on their B.Sc. graduation parchment.

For more information regarding the Co-op/IIP rules, benefits, regulations and requirements, please refer to the web site (https://umanitoba.ca/engineering/co-operative-education).