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 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: CIVL 2066 Hydromatics

RRC5 Polytech Equivalent Courses: CIVL 3026 Engineering Economics

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

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

RRC8 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 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: CIVC 1044 Project Administration AND CIVL 3005 Applied Research Project

RRC5 RRC Polytech Equivalent Course: CIVL 3026 Engineering Economics

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

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

RRC8 RRC 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 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: CIVC 1044 Project Administration AND CIVL 3005 Applied Research Project
RRC5 RRC Polytech Equivalent Course: CIVL 3026 Engineering Economics
RRC6 RRC Polytech Equivalent Course: CIVL 1020 Professional Ethics (corresponds to UM PHIL 2XXX)
RRC7 RRC Polytech Equivalent Course: CIVL 3016 Hydrology (corresponds to UM CIVL 3750 Hydrology)
RRC8 RRC 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 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 3026 Engineering Economics
RRC5 RRC Polytech Equivalent Course: CIVL 1020 Professional Ethics (corresponds to UM PHIL 2XXX)
RRC6 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)