Health Sciences

Math and Science (ASMSAS)

Associate in Science Degree

Program Effective Term: Fall 2021

High Demand Occupation High Skill Occupation High Wage Occupation

This program prepares students to transfer to a four-year college or university to complete a bachelor's degree in actuarial science, biology, chemistry, math, or pharmacy. The program will give students a solid foundation in math and science. Students should obtain program requirements and transfer equivalencies from the college to which they are transferring.

Complete the requirements for one of the following concentrations. These concentrations may also list courses used to meet General Education requirements.

Biology/Pre-Medicine (BMED) CEM 111 General Chemistry I CEM 122 General Chemistry II CEM 211 Organic Chemistry I CEM 222 Organic Chemistry II Elective: BIO 111, BIO 208, BIO 215, BIO 227 or BIO 237

Chemistry/Pre-Medicine (CMED) CEM 111 General Chemistry I CEM 122 General Chemistry II CEM 211 Organic Chemistry I CEM 222 Organic Chemistry II MTH 197 Linear Algebra

Mathematics (MATH) MTH 160 Basic Statistics MTH 191 Calculus I MTH 192 Calculus II MTH 197 Linear Algebra MTH 293 Calculus III MTH 295 Differential Equations

Pre-Actuarial Science (PPAS) ECO 211 Principles of Economics I ECO 222 Principles of Economics II MTH 191 Calculus I MTH 192 Calculus II MTH 197 Linear Algebra MTH 293 Calculus III

Pre-Pharmacy (PPHA) Two Restricted Electives in Biology (see below) CEM 211 Organic Chemistry I CEM 222 Organic Chemistry II PHY 111 General Physics I PHY 122 General Physics II Biology Restricted Electives for Pre-Pharmacy (PPHA): BIO 111, BIO 161, BIO 162, BIO 208, BIO 237, BIO 215 or BIO 227 Optional Transfer Courses for Pre-Pharmacy (PPHA): MTH 160, MTH 192, along with other Biology restricted electives. See a program advisor to select appropriate Biology courses.

Articulation:

This program will fulfill the Michigan Transfer Agreement (MTA) requirements provided the student takes two science courses from two different disciplines. One course must have a lab component. Students must have MTA posted on their transcripts by the WCC Student Records Office.

Program Admission Requirements:

- Students must have an Academic Math Level of 7 to begin the math sequence. Two years of high school algebra and one year of

Monday, August 30, 2021 3:5:40 p.m.

Program Information Report

	e-calculus are recommended to prepare for this program. and chemistry concentrations require one year of high school chemistry or CEM 101 with a "C" or b	etter to enroll in
	centration Credits Required for the Program: ntration for requirements and total credits required for program.	60
	ence Concentrations	
Biology/Pre-l	Medicine (BMED)	(60 credits)
First Semeste	er de la companya de	(17 credits)
BIO 162	General Biology II Cells and Molecules	4
CEM 111	General Chemistry I	4
MTH 176 or	College Algebra	4
MTH 191 Elective	Calculus I* Elective(s) to reach minimum 60 credits	4 5
Second Seme	ster	(16 credits)
BIO 161	General Biology I Ecology and Evolution	4
CEM 122	General Chemistry II	4
ENG 111	Composition I	4
MTH 160 or	Basic Statistics**	4
MTH 192	Calculus II	4
Third Semest		(14 credits)
CEM 211	Organic Chemistry I	4
Elective Elective	Speech/Comp. Elective(s) Soc. Sci. Elective(s) 1	3
Elective	Select one course from the following: BIO 111, BIO 208***, BIO 215, BIO 227 or BIO 237	4
Fourth Semes	ster	(13 credits)
CEM 222	Organic Chemistry II	4
Elective	Arts/Human. Elective(s) 1	3
Elective	Soc. Sci. Elective(s) 2	3
Elective	Arts/Human. Elective(s) 2	3
Minimum Cre	dits Required for the Concentration or Option: 60	
Chemistry/Pr	e-Medicine (CMED)	(60 credits)
First Semeste	ur de la constance de la const	(16 credits)
CEM 111	General Chemistry I	4
MTH 191	Calculus I	5
PHY 111	General Physics I	4
Elective	Elective(s) to reach minimum 60 credits	3
Second Seme		(16 credits)
CEM 122 ENG 111	General Chemistry II Composition I	4
MTH 192	Calculus II	4
PHY 122	General Physics II	4
Third Semest		(14 credits)
CEM 211	Organic Chemistry I	4
Elective	Speech/Comp. Elective(s)	3
MTH 197 Elective	Linear Algebra Soc. Sci. Elective(s) 1	4
		-
Fourth Semes Elective		(14 credits)
CEM 222	Elective(s) to reach minimum 60 credits Organic Chemistry II	1
Elective	Arts/Human. Elective(s) 1	3
Elective	Soc. Sci. Elective(s) 2	3
Elective	Arts/Human. Elective(s) 2	3

Minimum Credits Required for the Concentration or Option: 60

Mathematic	cs (MATH)	(60 credits
First Semes	ster	(15 credits
lective	Nat. Sci. Elective(s)	
1TH 191	Calculus I	
lective	Select one course from the following: CPS 120, CPS 141, CPS 161 or CPS 171	
NG 111	Composition I	
Second Sen	nester	(14 credit
lective	Nat. Sci. Lab Elective(s)	
MTH 160	Basic Statistics	
MTH 192	Calculus II	
Elective	Soc. Sci. Elective(s) 1	
Third Seme	ster	(17 credit
lective	Speech/Comp. Elective(s)	
Elective	Elective(s) to reach minimum 60 credits	
MTH 197	Linear Algebra	
MTH 293	Calculus III	
Elective	Soc. Sci. Elective(s) 2	
Fourth Sem	ester	(14 credit
MTH 295	Differential Equations	
Elective	Arts/Human. Elective(s) 1	
-lective	Arts/Human Elective(s) /	
Elective Minimum C	Arts/Human. Elective(s) 2 Elective(s) to reach a minimum of 60 credits. redits Required for the Concentration or Option: 60	
Elective Minimum C	Elective(s) to reach a minimum of 60 credits.	(60 credit
Elective Minimum C Pre-Actuari	Elective(s) to reach a minimum of 60 credits. redits Required for the Concentration or Option: 60 al Science (PPAS)-also available online	
Elective <i>Minimum C</i> Pre-Actuari First Semes	Elective(s) to reach a minimum of 60 credits. redits Required for the Concentration or Option: 60 al Science (PPAS)-also available online ster	
Elective Minimum C Pre-Actuari First Semes ACC 111	Elective(s) to reach a minimum of 60 credits. redits Required for the Concentration or Option: 60 al Science (PPAS)-also available online ster Principles of Accounting I	
Pre-Actuari First Semes ACC 111 CPS 161	Elective(s) to reach a minimum of 60 credits. redits Required for the Concentration or Option: 60 al Science (PPAS)-also available online ster Principles of Accounting I An Introduction to Programming with Java	
Elective Minimum C Pre-Actuari First Semes ACC 111 CPS 161 ENG 111	Elective(s) to reach a minimum of 60 credits. redits Required for the Concentration or Option: 60 al Science (PPAS)-also available online ster Principles of Accounting I An Introduction to Programming with Java Composition I	
Elective Minimum C Pre-Actuari First Semes ACC 111 CPS 161 ENG 111 MTH 191	Elective(s) to reach a minimum of 60 credits. redits Required for the Concentration or Option: 60 al Science (PPAS)-also available online ster Principles of Accounting I An Introduction to Programming with Java Composition I Calculus I	(16 credit
Elective Minimum C Pre-Actuari First Semes ACC 111 CPS 161 ENG 111 MTH 191 Second Sen	Elective(s) to reach a minimum of 60 credits. redits Required for the Concentration or Option: 60 al Science (PPAS)-also available online ster Principles of Accounting I An Introduction to Programming with Java Composition I Calculus I nester	(16 credit
Elective Minimum C Pre-Actuari First Semes ACC 111 CPS 161 ENG 111 MTH 191 Second Sen ACC 122	Elective(s) to reach a minimum of 60 credits. redits Required for the Concentration or Option: 60 al Science (PPAS)-also available online ster Principles of Accounting I An Introduction to Programming with Java Composition I Calculus I nester Principles of Accounting II	(16 credit
Elective Minimum C Pre-Actuari First Semes ACC 111 CPS 161 ENG 111 MTH 191 Second Sen ACC 122 ECO 211	Elective(s) to reach a minimum of 60 credits. redits Required for the Concentration or Option: 60 al Science (PPAS)-also available online ster Principles of Accounting I An Introduction to Programming with Java Composition I Calculus I nester Principles of Accounting II Principles of Accounting II Principles of Economics I	(16 credit
Elective Minimum C Pre-Actuari First Semes ACC 111 CPS 161 ENG 111 MTH 191 Second Sen ACC 122 ECO 211	Elective(s) to reach a minimum of 60 credits. redits Required for the Concentration or Option: 60 al Science (PPAS)-also available online ster Principles of Accounting I An Introduction to Programming with Java Composition I Calculus I nester Principles of Accounting II Principles of Accounting II Principles of Economics I Nat. Sci. Elective(s)	(16 credit
Elective Minimum C Pre-Actuari First Semes ACC 111 CPS 161 ENG 111 MTH 191 Second Sen ACC 122 ECO 211 Elective	Elective(s) to reach a minimum of 60 credits. redits Required for the Concentration or Option: 60 al Science (PPAS)-also available online ster Principles of Accounting I An Introduction to Programming with Java Composition I Calculus I nester Principles of Accounting II Principles of Accounting II Principles of Economics I	(16 credit
Elective Minimum C Pre-Actuari First Semes ACC 111 CPS 161 ENG 111 MTH 191 Second Sen ACC 122 ECO 211 Elective MTH 192	Elective(s) to reach a minimum of 60 credits. redits Required for the Concentration or Option: 60 al Science (PPAS)-also available online ster Principles of Accounting I An Introduction to Programming with Java Composition I Calculus I nester Principles of Accounting II Principles of Accounting II Principles of Economics I Nat. Sci. Elective(s)	(16 credit
Elective Minimum C Pre-Actual First Semes ACC 111 ENG 111 MTH 191 Second Sen ACC 122 ECO 211 Elective MTH 192 Elective Fird Seme	Elective(s) to reach a minimum of 60 credits. redits Required for the Concentration or Option: 60 al Science (PPAS)-also available online ster Principles of Accounting I An Introduction to Programming with Java Composition I Calculus I nester Principles of Accounting II Principles of Accounting II Principles of Economics I Nat. Sci. Elective(s) Calculus II Arts/Human. Elective(s) 1 ster	(16 credit (16 credit
Elective Minimum C Pre-Actuari First Semes ACC 111 CPS 161 ENG 111 MTH 191 Second Sem ACC 122 ECO 211 Elective MTH 192 Elective Third Seme ECO 222	Elective(s) to reach a minimum of 60 credits. redits Required for the Concentration or Option: 60 al Science (PPAS)-also available online ster Principles of Accounting I An Introduction to Programming with Java Composition I Calculus I nester Principles of Accounting II Principles of Accounting II Principles of Economics I Nat. Sci. Elective(s) Calculus II Arts/Human. Elective(s) 1 ster Principles of Economics II	(16 credit (16 credit
Elective Minimum C Pre-Actuari First Semes ACC 111 CPS 161 ENG 111 MTH 191 Second Sem ACC 122 ECO 211 Elective MTH 192 Elective Third Seme ECO 222 MTH 197	Elective(s) to reach a minimum of 60 credits. redits Required for the Concentration or Option: 60 al Science (PPAS)-also available online ster Principles of Accounting I An Introduction to Programming with Java Composition I Calculus I nester Principles of Accounting II Principles of Accounting II Principles of Economics I Nat. Sci. Elective(s) Calculus II Arts/Human. Elective(s) 1 ster Principles of Economics II Linear Algebra	(60 credit (16 credit (16 credit
Elective Minimum C Pre-Actuari First Semes ACC 111 CPS 161 ENG 111 MTH 191 Second Sem ACC 122 ECO 211 Elective MTH 192 Elective Third Seme ECO 222 MTH 197	Elective(s) to reach a minimum of 60 credits. redits Required for the Concentration or Option: 60 al Science (PPAS)-also available online ster Principles of Accounting I An Introduction to Programming with Java Composition I Calculus I nester Principles of Accounting II Principles of Accounting II Nat. Sci. Elective(s) Calculus II Arts/Human. Elective(s) 1 ster Principles of Economics II Linear Algebra Nat. Sci. Lab Elective(s)	(16 credit (16 credit
ACC 111 CPS 161 CPS 16	Elective(s) to reach a minimum of 60 credits. redits Required for the Concentration or Option: 60 al Science (PPAS)-also available online ster Principles of Accounting I An Introduction to Programming with Java Composition I Calculus I nester Principles of Accounting II Principles of Accounting II Principles of Economics I Nat. Sci. Elective(s) Calculus II Arts/Human. Elective(s) 1 ster Principles of Economics II Linear Algebra	(16 credit (16 credit
Elective Minimum C Pre-Actual First Semes ACC 111 CPS 161 ENG 111 ATH 191 Second Sem ACC 122 ECO 211 Elective ATH 192 Elective Third Seme ECO 222 ATH 197 Elective Elect	Elective(s) to reach a minimum of 60 credits. redits Required for the Concentration or Option: 60 al Science (PPAS)-also available online ster Principles of Accounting I An Introduction to Programming with Java Composition I Calculus I nester Principles of Accounting II Principles of Economics I Nat. Sci. Elective(s) Calculus II Arts/Human. Elective(s) 1 ster Principles of Economics II Linear Algebra Nat. Sci. Lab Elective(s) 2+ mester	(16 credit (16 credit (13 credit
Elective Minimum C Pre-Actual First Semes ACC 111 CPS 161 ENG 111 MTH 191 Second Sem ACC 122 ECO 211 Elective MTH 192 Elective Fhird Seme Elective Elective Elective Fourth Sem MTH 293	Elective(s) to reach a minimum of 60 credits. redits Required for the Concentration or Option: 60 al Science (PPAS)-also available online ster Principles of Accounting I An Introduction to Programming with Java Composition I Calculus I nester Principles of Accounting II Principles of Economics I Nat. Sci. Elective(s) Calculus II Arts/Human. Elective(s) 1 ster Principles of Economics II Linear Algebra Nat. Sci. Lab Elective(s) 2+ rester Calculus II	(16 credit (16 credit (13 credit
Elective Minimum C Pre-Actual First Semes ACC 111 CPS 161 ENG 111 MTH 191 Second Sem ACC 122 ECO 211 Elective MTH 192 Elective Fhird Seme Elective Elective Elective Fourth Sem MTH 293	Elective(s) to reach a minimum of 60 credits. redits Required for the Concentration or Option: 60 al Science (PPAS)-also available online ster Principles of Accounting I An Introduction to Programming with Java Composition I Calculus I nester Principles of Accounting II Principles of Economics I Nat. Sci. Elective(s) Calculus II Arts/Human. Elective(s) 1 ster Principles of Economics II Linear Algebra Nat. Sci. Lab Elective(s) 2+ mester	(16 credit (16 credit (13 credit
Elective Minimum C Pre-Actuari First Semes ACC 111 CPS 161 ENG 111 MTH 191 Second Sem ACC 122 ECO 211 Elective MTH 192 Elective Third Seme ECO 222	Elective(s) to reach a minimum of 60 credits. redits Required for the Concentration or Option: 60 al Science (PPAS)-also available online ster Principles of Accounting I An Introduction to Programming with Java Composition I Calculus I nester Principles of Accounting II Principles of Economics I Nat. Sci. Elective(s) Calculus II Arts/Human. Elective(s) 1 ster Principles of Economics II Linear Algebra Nat. Sci. Lab Elective(s) 2+ rester Calculus II	(16 credit (16 credit

Pre-Pharmacy	r (PPHA)	(60 credits)
First Semeste	r	(16 credits)
Elective	Biology Restricted Elective	4
CEM 111	General Chemistry I	4
MTH 191	Calculus I	5
Elective	Arts/Human. Elective(s)	3

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Second Semes	iter	(15 credits)
Elective	Restricted Biology Elective	4
CEM 122	General Chemistry II	4
ENG 111	Composition I	4
Elective	Elective(s) to reach minimum 60 credits	3
Third Semeste	r	(17 credits)
CEM 211	Organic Chemistry I	4
Elective	Speech/Comp. Elective(s)	3
PHY 111	General Physics I	4
Elective	Arts/Human. Elective(s) 2	3
Elective	Soc. Sci. Elective(s) 1	3
Fourth Semes	ter	(12 credits)
CEM 222	Organic Chemistry II	4
PHY 122	General Physics II	4
Elective	Elective(s) to reach minimum 60 credits	1
Elective	Soc. Sci. Elective(s) 2	3
Minimum Crea	lits Required for the Concentration or Option: 60	

Minimum Credits Required for the Program:

Notes:

*Students transferring to EMU as a biology major may substitute MTH 176 or any higher 4-credit hour math course for MTH 191. **Students transferring to EMU as a biology major may substitute MTH 160 or higher for MTH 192.

***Students transferring to EMU as a biology major may consider completing BIO 208 at WCC prior to transfer.

+See the MTA list to make course selections from any discipline except ECO.

++Transfer students should consider a course from the the EMU Diverse Word Requirements list.

60

Science, Computer Technology, Engineering & Math

Math and Science (ASMSAS)

Associate in Science Degree

Program Effective Term: Fall 2021

High Demand Occupation High Skill Occupation High Wage Occupation

This program prepares students to transfer to a four-year college or university to complete a bachelor's degree in actuarial science, biology, chemistry, math, or pharmacy. The program will give students a solid foundation in math and science. Students should obtain program requirements and transfer equivalencies from the college to which they are transferring.

Complete the requirements for one of the following concentrations. These concentrations may also list courses used to meet General Education requirements.

Biology/Pre-Medicine (BMED) CEM 111 General Chemistry I CEM 122 General Chemistry II CEM 211 Organic Chemistry I CEM 222 Organic Chemistry II Elective: BIO 111, BIO 208, BIO 215, BIO 227 or BIO 237

Chemistry/Pre-Medicine (CMED) CEM 111 General Chemistry I CEM 122 General Chemistry II CEM 211 Organic Chemistry I CEM 222 Organic Chemistry II MTH 197 Linear Algebra

Mathematics (MATH) MTH 160 Basic Statistics MTH 191 Calculus I MTH 192 Calculus II MTH 197 Linear Algebra MTH 293 Calculus III MTH 295 Differential Equations

Pre-Actuarial Science (PPAS) ECO 211 Principles of Economics I ECO 222 Principles of Economics II MTH 191 Calculus I MTH 192 Calculus II MTH 197 Linear Algebra MTH 293 Calculus III

Pre-Pharmacy (PPHA) Two Restricted Electives in Biology (see below) CEM 211 Organic Chemistry I CEM 222 Organic Chemistry II PHY 111 General Physics I PHY 122 General Physics II Biology Restricted Electives for Pre-Pharmacy (PPHA): BIO 111, BIO 161, BIO 162, BIO 208, BIO 237, BIO 215 or BIO 227 Optional Transfer Courses for Pre-Pharmacy (PPHA): MTH 160, MTH 192, along with other Biology restricted electives. See a program advisor to select appropriate Biology courses.

Articulation:

This program will fulfill the Michigan Transfer Agreement (MTA) requirements provided the student takes two science courses from two different disciplines. One course must have a lab component. Students must have MTA posted on their transcripts by the WCC Student Records Office.

Program Admission Requirements:

- Students must have an Academic Math Level of 7 to begin the math sequence. Two years of high school algebra and one year of

Monday, August 30, 2021 3:5:40 p.m.

high school pre-calculus are recommended to prepare for this program.

Program Information Report

	ncentration Credits Required for the Program:	60
	entration for requirements and total credits required for program.	
	-Medicine (BMED)	(60 credits)
First Semest BIO 162		(17 credits)
CEM 111	General Biology II Cells and Molecules General Chemistry I	4
MTH 176 or	College Algebra	
MTH 191	Calculus I*	4
Elective	Elective(s) to reach minimum 60 credits	5
Second Sem		(16 credits)
BIO 161	General Biology I Ecology and Evolution	4
CEM 122	General Chemistry II	4
ENG 111	Composition I	4
MTH 160 or MTH 192	Basic Statistics** Calculus II	4
-		
Third Semes CEM 211	ter Organic Chemistry I	(14 credits) 4
Elective	Speech/Comp. Elective(s)	3
Elective	Soc. Sci. Elective(s) 1	3
Elective	Select one course from the following: BIO 111, BIO 208***, BIO 215, BIO 227 or BIO 237	4
	-	
Fourth Seme	Organic Chemistry II	(13 credits) 4
		4
		З
Elective	Arts/Human. Elective(s) 1	3
		3 3 3
Elective Elective Elective	Arts/Human. Elective(s) 1 Soc. Sci. Elective(s) 2	3
Elective Elective Elective Minimum Cr	Arts/Human. Elective(s) 1 Soc. Sci. Elective(s) 2 Arts/Human. Elective(s) 2	3
Elective Elective Elective Minimum Cr Chemistry/f	Arts/Human. Elective(s) 1 Soc. Sci. Elective(s) 2 Arts/Human. Elective(s) 2 edits Required for the Concentration or Option: 60 Pre-Medicine (CMED)	3 3 (60 credits)
Elective Elective Elective Minimum Cr Chemistry/F First Semest	Arts/Human. Elective(s) 1 Soc. Sci. Elective(s) 2 Arts/Human. Elective(s) 2 edits Required for the Concentration or Option: 60 Pre-Medicine (CMED)	3 3 (60 credits) (16 credits)
Elective Elective Elective Minimum Cr Chemistry/f	Arts/Human. Elective(s) 1 Soc. Sci. Elective(s) 2 Arts/Human. Elective(s) 2 edits Required for the Concentration or Option: 60 Pre-Medicine (CMED)	3 3 (60 credits) (16 credits) 4
Elective Elective Minimum Cr Chemistry/F First Semest CEM 111	Arts/Human. Elective(s) 1 Soc. Sci. Elective(s) 2 Arts/Human. Elective(s) 2 edits Required for the Concentration or Option: 60 Tre-Medicine (CMED)	3 3 (60 credits) (16 credits) 4
Elective Elective Minimum Cr Chemistry/F First Semest CEM 111 MTH 191	Arts/Human. Elective(s) 1 Soc. Sci. Elective(s) 2 Arts/Human. Elective(s) 2 edits Required for the Concentration or Option: 60 Pre-Medicine (CMED) Fer General Chemistry I Calculus I	3 3 (60 credits) (16 credits) 4 5 4
Elective Elective Minimum Cr Chemistry/F First Semest CEM 111 MTH 191 PHY 111	Arts/Human. Elective(s) 1 Soc. Sci. Elective(s) 2 Arts/Human. Elective(s) 2 edits Required for the Concentration or Option: 60 Tre-Medicine (CMED) fer General Chemistry I Calculus I General Physics I Elective(s) to reach minimum 60 credits	3 3 (60 credits) (16 credits) 4 5 4
Elective Elective Elective Minimum Cr Chemistry/F First Semest CEM 111 MTH 191 PHY 111 Elective Second Sem CEM 122	Arts/Human. Elective(s) 1 Soc. Sci. Elective(s) 2 Arts/Human. Elective(s) 2 edits Required for the Concentration or Option: 60 Tre-Medicine (CMED) Tre-Medicine (CMED)	3 3 (60 credits) (16 credits) 4 5 4 3 (16 credits) 4
Elective Elective Elective Minimum Cr Chemistry/f First Semest CEM 111 MTH 191 PHY 111 Elective Second Sem CEM 122 ENG 111	Arts/Human. Elective(s) 1 Soc. Sci. Elective(s) 2 Arts/Human. Elective(s) 2 edits Required for the Concentration or Option: 60 Tre-Medicine (CMED) Tre-Medicine (CMED)	3 3 (60 credits) (16 credits) 4 5 4 3 (16 credits) 4 4 4
Elective Elective Elective Minimum Cr Chemistry/f First Semest CEM 111 MTH 191 PHY 111 Elective Second Sem CEM 122 ENG 111 MTH 192	Arts/Human. Elective(s) 1 Soc. Sci. Elective(s) 2 Arts/Human. Elective(s) 2 edits Required for the Concentration or Option: 60 re-Medicine (CMED) cer General Chemistry I Calculus I General Physics I Elective(s) to reach minimum 60 credits ester General Chemistry II Composition I Calculus II	3 3 (60 credits) (16 credits) 4 5 4 3 (16 credits) 4 4 4 4 4
Elective Elective Elective Minimum Cr Chemistry/f First Semest CEM 111 MTH 191 PHY 111 Elective Second Sem CEM 122 ENG 111	Arts/Human. Elective(s) 1 Soc. Sci. Elective(s) 2 Arts/Human. Elective(s) 2 edits Required for the Concentration or Option: 60 Tre-Medicine (CMED) Tre-Medicine (CMED)	3 3 (60 credits) (16 credits) 4 5 4 3
Elective Elective Elective Minimum Cr Chemistry/F First Semest CEM 111 MTH 191 PHY 111 Elective Second Sem CEM 122 ENG 111 MTH 192 PHY 122 Third Semes	Arts/Human. Elective(s) 1 Soc. Sci. Elective(s) 2 Arts/Human. Elective(s) 2 edits Required for the Concentration or Option: 60 Inc-Medicine (CMED) eer General Chemistry I Calculus I General Physics I Elective(s) to reach minimum 60 credits ester General Chemistry II Composition I Calculus II General Physics II Electure II Cancelus II General Physics II	3 3 (60 credits) (16 credits) 4 5 4 3 (16 credits) 4 4 4 4 4 4 4 4 4 4 4 4
Elective Elective Elective Minimum Cr Chemistry/R First Semest CEM 111 MTH 191 PHY 111 Elective Second Sem CEM 122 ENG 111 MTH 192 PHY 122 Third Semes CEM 211	Arts/Human. Elective(s) 1 Soc. Sci. Elective(s) 2 Arts/Human. Elective(s) 2 edits Required for the Concentration or Option: 60 Tre-Medicine (CMED) fer General Chemistry I Calculus I General Physics I Elective(s) to reach minimum 60 credits ester General Chemistry II Composition I Calculus II General Physics II ter Organic Chemistry I	3 3 (60 credits) (16 credits) 4 5 4 3 (16 credits) 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4
Elective Elective Elective Minimum Cr Chemistry/I First Semest CEM 111 MTH 191 PHY 111 Elective Second Sem CEM 122 ENG 111 MTH 192 PHY 122 Third Semes CEM 211 Elective	Arts/Human. Elective(s) 1 Soc. Sci. Elective(s) 2 Arts/Human. Elective(s) 2 edits Required for the Concentration or Option: 60 re-Medicine (CMED) eer General Chemistry I Calculus I General Physics I Elective(s) to reach minimum 60 credits ester General Chemistry II Composition I Calculus II General Physics II ter Organic Chemistry I Speech/Comp. Elective(s)	3 3 (60 credits) (16 credits) 4 5 4 3 (16 credits) 4 4 4 4 4 4 4 4 4 3
Elective Elective Elective Minimum Cr Chemistry/R First Semest CEM 111 MTH 191 PHY 111 Elective Second Sem CEM 122 ENG 111 MTH 192 PHY 122 Third Semes CEM 211	Arts/Human. Elective(s) 1 Soc. Sci. Elective(s) 2 Arts/Human. Elective(s) 2 edits Required for the Concentration or Option: 60 re-Medicine (CMED) eer General Chemistry I Calculus I General Chemistry I Elective(s) to reach minimum 60 credits ester General Chemistry II Composition I Calculus II General Physics II ter Organic Chemistry I Speech/Comp. Elective(s) Linear Algebra	3 3 (60 credits) (16 credits) 4 5 4 3 (16 credits) 4 4 4 4 4 4 4 4 4 4 4 4 3 4 4 4 4 4 4
Elective Elective Elective Minimum Cr Chemistry//F First Semest CEM 111 MTH 191 PHY 111 Elective Second Sem CEM 122 ENG 111 MTH 192 PHY 122 Third Semes CEM 211 Elective MTH 197 Elective	Arts/Human. Elective(s) 1 Soc. Sci. Elective(s) 2 Arts/Human. Elective(s) 2 edits Required for the Concentration or Option: 60 re-Medicine (CMED) er General Chemistry I Calculus I General Physics I Elective(s) to reach minimum 60 credits ester General Chemistry II Composition I Calculus II General Physics II ter Organic Chemistry I Speech/Comp. Elective(s) Linear Algebra Soc. Sci. Elective(s) 1	3 3 (60 credits) (16 credits) 4 5 4 3 (16 credits) 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4
Elective Elective Elective Minimum Cr Chemistry//F First Semest CEM 111 MTH 191 PHY 111 Elective Second Sem CEM 122 ENG 111 MTH 192 PHY 122 Third Semes CEM 211 Elective MTH 197 Elective Fourth Semes	Arts/Human. Elective(s) 1 Soc. Sci. Elective(s) 2 Arts/Human. Elective(s) 2 edits Required for the Concentration or Option: 60 Tre-Medicine (CMED) rer General Chemistry I Calculus I General Chemistry I Calculus I Elective(s) to reach minimum 60 credits ester General Chemistry II Composition I Calculus II General Physics II ter Organic Chemistry I Speech/Comp. Elective(s) Linear Algebra Soc. Sci. Elective(s) 1	3 3 (60 credits) (16 credits) 4 3 (16 credits) 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4
Elective Elective Elective Minimum Cr Chemistry// First Semest CEM 111 MTH 191 PHY 111 Elective Second Sem CEM 122 ENG 111 MTH 192 PHY 122 Third Semes CEM 211 Elective MTH 197 Elective Fourth Seme Elective	Arts/Human. Elective(s) 1 Soc. Sci. Elective(s) 2 Arts/Human. Elective(s) 2 edits Required for the Concentration or Option: 60 Tre-Medicine (CMED) ter General Chemistry I Calculus I General Physics I Elective(s) to reach minimum 60 credits ester General Chemistry II Composition I Calculus II General Physics II ter Organic Chemistry I Speech/Comp. Elective(s) Linear Algebra Soc. Sci. Elective(s) 1 ester Elective(s) to reach minimum 60 credits	3 3 (60 credits) (16 credits) 4 3 (16 credits) 4 4 4 4 4 4 4 4 4 4 3 (14 credits) 4 3 4 3 1 1
Elective Elective Elective Minimum Cr Chemistry//F First Semest CEM 111 MTH 191 PHY 111 Elective Second Sem CEM 122 ENG 111 MTH 192 PHY 122 Third Semest CEM 211 Elective MTH 197 Elective Fourth Semest Elective CEM 222	Arts/Human. Elective(s) 1 Soc. Sci. Elective(s) 2 Arts/Human. Elective(s) 2 edits Required for the Concentration or Option: 60 Te: Medicine (CMED) Ser General Chemistry I Calculus I General Physics I Elective(s) to reach minimum 60 credits ester General Chemistry II Composition I Calculus II General Physics II ter Organic Chemistry I Speech/Comp. Elective(s) Linear Algebra Soc. Sci. Elective(s) 1 ester Elective(s) to reach minimum 60 credits Organic Chemistry II	3 3 (60 credits) (16 credits) 4 3 (16 credits) 4 4 4 4 4 4 4 4 4 4 4 3 (14 credits) 4 3 (14 credits) 1 4
Elective Elective Elective Minimum Cr Chemistry// First Semest CEM 111 MTH 191 PHY 111 Elective Second Sem CEM 122 ENG 111 MTH 192 PHY 122 Third Semes CEM 211 Elective MTH 197 Elective Fourth Seme Elective	Arts/Human. Elective(s) 1 Soc. Sci. Elective(s) 2 Arts/Human. Elective(s) 2 edits Required for the Concentration or Option: 60 Tre-Medicine (CMED) ter General Chemistry I Calculus I General Physics I Elective(s) to reach minimum 60 credits ester General Chemistry II Composition I Calculus II General Physics II ter Organic Chemistry I Speech/Comp. Elective(s) Linear Algebra Soc. Sci. Elective(s) 1 ester Elective(s) to reach minimum 60 credits	3 3 (60 credits) (16 credits) 4 5 4 3 (16 credits) 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4

Minimum Credits Required for the Concentration or Option: 60

Mathematic	cs (MATH)	(60 credits
First Semes	ster	(15 credits
lective	Nat. Sci. Elective(s)	
1TH 191	Calculus I	
lective	Select one course from the following: CPS 120, CPS 141, CPS 161 or CPS 171	
ENG 111	Composition I	
Second Sen	nester	(14 credit
lective	Nat. Sci. Lab Elective(s)	
MTH 160	Basic Statistics	
MTH 192	Calculus II	
Elective	Soc. Sci. Elective(s) 1	
Third Seme	ster	(17 credit
lective	Speech/Comp. Elective(s)	
Elective	Elective(s) to reach minimum 60 credits	
MTH 197	Linear Algebra	
MTH 293	Calculus III	
Elective	Soc. Sci. Elective(s) 2	
Fourth Sem	ester	(14 credit
MTH 295	Differential Equations	
Elective	Arts/Human. Elective(s) 1	
-lective	Arts/Human Elective(s) /	
Elective Minimum C	Arts/Human. Elective(s) 2 Elective(s) to reach a minimum of 60 credits. redits Required for the Concentration or Option: 60	
Elective Minimum C	Elective(s) to reach a minimum of 60 credits.	(60 credit
Elective Minimum C Pre-Actuari	Elective(s) to reach a minimum of 60 credits. redits Required for the Concentration or Option: 60 al Science (PPAS)-also available online	
Elective <i>Minimum C</i> Pre-Actuari First Semes	Elective(s) to reach a minimum of 60 credits. redits Required for the Concentration or Option: 60 al Science (PPAS)-also available online ster	
Elective Minimum C Pre-Actuari First Semes ACC 111	Elective(s) to reach a minimum of 60 credits. redits Required for the Concentration or Option: 60 al Science (PPAS)-also available online ster Principles of Accounting I	
Pre-Actuari First Semes ACC 111 CPS 161	Elective(s) to reach a minimum of 60 credits. redits Required for the Concentration or Option: 60 al Science (PPAS)-also available online ster Principles of Accounting I An Introduction to Programming with Java	
Elective Minimum C Pre-Actuari First Semes ACC 111 CPS 161 ENG 111	Elective(s) to reach a minimum of 60 credits. redits Required for the Concentration or Option: 60 al Science (PPAS)-also available online ster Principles of Accounting I An Introduction to Programming with Java Composition I	
Elective Minimum C Pre-Actuari First Semes ACC 111 CPS 161 ENG 111 MTH 191	Elective(s) to reach a minimum of 60 credits. redits Required for the Concentration or Option: 60 al Science (PPAS)-also available online ster Principles of Accounting I An Introduction to Programming with Java Composition I Calculus I	(16 credit
Elective Minimum C Pre-Actuari First Semes ACC 111 CPS 161 ENG 111 MTH 191 Second Sen	Elective(s) to reach a minimum of 60 credits. redits Required for the Concentration or Option: 60 al Science (PPAS)-also available online ster Principles of Accounting I An Introduction to Programming with Java Composition I Calculus I nester	(16 credit
Elective Minimum C Pre-Actuari First Semes ACC 111 CPS 161 ENG 111 MTH 191 Second Sen ACC 122	Elective(s) to reach a minimum of 60 credits. redits Required for the Concentration or Option: 60 al Science (PPAS)-also available online ster Principles of Accounting I An Introduction to Programming with Java Composition I Calculus I nester Principles of Accounting II	(16 credit
Elective Minimum C Pre-Actuari First Semes ACC 111 CPS 161 ENG 111 MTH 191 Second Sen ACC 122 ECO 211	Elective(s) to reach a minimum of 60 credits. redits Required for the Concentration or Option: 60 al Science (PPAS)-also available online ster Principles of Accounting I An Introduction to Programming with Java Composition I Calculus I nester Principles of Accounting II Principles of Accounting II Principles of Economics I	(16 credit
Elective Minimum C Pre-Actuari First Semes ACC 111 CPS 161 ENG 111 MTH 191 Second Sen ACC 122 ECO 211	Elective(s) to reach a minimum of 60 credits. redits Required for the Concentration or Option: 60 al Science (PPAS)-also available online ster Principles of Accounting I An Introduction to Programming with Java Composition I Calculus I nester Principles of Accounting II Principles of Accounting II Principles of Economics I Nat. Sci. Elective(s)	(16 credit
Elective Minimum C Pre-Actuari First Semes ACC 111 CPS 161 ENG 111 MTH 191 Second Sen ACC 122 ECO 211 Elective	Elective(s) to reach a minimum of 60 credits. redits Required for the Concentration or Option: 60 al Science (PPAS)-also available online ster Principles of Accounting I An Introduction to Programming with Java Composition I Calculus I nester Principles of Accounting II Principles of Accounting II Principles of Economics I	(16 credit
Elective Minimum C Pre-Actuari First Semes ACC 111 CPS 161 ENG 111 MTH 191 Second Sen ACC 122 ECO 211 Elective MTH 192	Elective(s) to reach a minimum of 60 credits. redits Required for the Concentration or Option: 60 al Science (PPAS)-also available online ster Principles of Accounting I An Introduction to Programming with Java Composition I Calculus I nester Principles of Accounting II Principles of Accounting II Principles of Economics I Nat. Sci. Elective(s)	(16 credit
Elective Minimum C Pre-Actual First Semes ACC 111 ENG 111 MTH 191 Second Sen ACC 122 ECO 211 Elective MTH 192 Elective Fird Seme	Elective(s) to reach a minimum of 60 credits. redits Required for the Concentration or Option: 60 al Science (PPAS)-also available online ster Principles of Accounting I An Introduction to Programming with Java Composition I Calculus I nester Principles of Accounting II Principles of Accounting II Nat. Sci. Elective(s) Calculus II Arts/Human. Elective(s) 1 ster	(16 credit (16 credit
Elective Minimum C Pre-Actuari First Semes ACC 111 CPS 161 ENG 111 MTH 191 Second Sem ACC 122 ECO 211 Elective MTH 192 Elective Third Seme ECO 222	Elective(s) to reach a minimum of 60 credits. redits Required for the Concentration or Option: 60 al Science (PPAS)-also available online ster Principles of Accounting I An Introduction to Programming with Java Composition I Calculus I nester Principles of Accounting II Principles of Accounting II Principles of Economics I Nat. Sci. Elective(s) Calculus II Arts/Human. Elective(s) 1 ster Principles of Economics II	(16 credit (16 credit
Elective Minimum C Pre-Actuari First Semes ACC 111 CPS 161 ENG 111 MTH 191 Second Sem ACC 122 ECO 211 Elective MTH 192 Elective Third Seme ECO 222 MTH 197	Elective(s) to reach a minimum of 60 credits. redits Required for the Concentration or Option: 60 al Science (PPAS)-also available online ster Principles of Accounting I An Introduction to Programming with Java Composition I Calculus I nester Principles of Accounting II Principles of Accounting II Principles of Economics I Nat. Sci. Elective(s) Calculus II Arts/Human. Elective(s) 1 ster Principles of Economics II Linear Algebra	(60 credit (16 credit (16 credit
Elective Minimum C Pre-Actuari First Semes ACC 111 CPS 161 ENG 111 MTH 191 Second Sem ACC 122 ECO 211 Elective MTH 192 Elective Third Seme ECO 222 MTH 197	Elective(s) to reach a minimum of 60 credits. redits Required for the Concentration or Option: 60 al Science (PPAS)-also available online ster Principles of Accounting I An Introduction to Programming with Java Composition I Calculus I nester Principles of Accounting II Principles of Accounting II Nat. Sci. Elective(s) Calculus II Arts/Human. Elective(s) 1 ster Principles of Economics II Linear Algebra Nat. Sci. Lab Elective(s)	(16 credit (16 credit
Acc 111 CPS 161 CPS	Elective(s) to reach a minimum of 60 credits. redits Required for the Concentration or Option: 60 al Science (PPAS)-also available online ster Principles of Accounting I An Introduction to Programming with Java Composition I Calculus I nester Principles of Accounting II Principles of Accounting II Principles of Economics I Nat. Sci. Elective(s) Calculus II Arts/Human. Elective(s) 1 ster Principles of Economics II Linear Algebra	(16 credit (16 credit
Elective Minimum C Pre-Actual First Semes ACC 111 CPS 161 ENG 111 ATH 191 Second Sem ACC 122 ECO 211 Elective ATH 192 Elective Third Seme ECO 222 ATH 197 Elective Elect	Elective(s) to reach a minimum of 60 credits. redits Required for the Concentration or Option: 60 al Science (PPAS)-also available online ster Principles of Accounting I An Introduction to Programming with Java Composition I Calculus I nester Principles of Accounting II Principles of Economics I Nat. Sci. Elective(s) Calculus II Arts/Human. Elective(s) 1 ster Principles of Economics II Linear Algebra Nat. Sci. Lab Elective(s) 2+ mester	(16 credit (16 credit (13 credit
Elective Minimum C Pre-Actual First Semes ACC 111 CPS 161 ENG 111 MTH 191 Second Sem ACC 122 ECO 211 Elective MTH 192 Elective Fhird Seme Elective Elective Elective Fourth Sem MTH 293	Elective(s) to reach a minimum of 60 credits. redits Required for the Concentration or Option: 60 al Science (PPAS)-also available online ster Principles of Accounting I An Introduction to Programming with Java Composition I Calculus I nester Principles of Accounting II Principles of Economics I Nat. Sci. Elective(s) Calculus II Arts/Human. Elective(s) 1 ster Principles of Economics II Linear Algebra Nat. Sci. Lab Elective(s) 2+ rester Calculus II	(16 credit (16 credit (13 credit
Elective Minimum C Pre-Actual First Semes ACC 111 CPS 161 ENG 111 MTH 191 Second Sem ACC 122 ECO 211 Elective MTH 192 Elective Fhird Seme Elective Elective Elective Fourth Sem MTH 293	Elective(s) to reach a minimum of 60 credits. redits Required for the Concentration or Option: 60 al Science (PPAS)-also available online ster Principles of Accounting I An Introduction to Programming with Java Composition I Calculus I nester Principles of Accounting II Principles of Economics I Nat. Sci. Elective(s) Calculus II Arts/Human. Elective(s) 1 ster Principles of Economics II Linear Algebra Nat. Sci. Lab Elective(s) 2+ mester	(16 credit (16 credit (13 credit
Elective Minimum C Pre-Actuari First Semes ACC 111 CPS 161 ENG 111 MTH 191 Second Sem ACC 122 ECO 211 Elective MTH 192 Elective Third Seme ECO 222	Elective(s) to reach a minimum of 60 credits. redits Required for the Concentration or Option: 60 al Science (PPAS)-also available online ster Principles of Accounting I An Introduction to Programming with Java Composition I Calculus I nester Principles of Accounting II Principles of Economics I Nat. Sci. Elective(s) Calculus II Arts/Human. Elective(s) 1 ster Principles of Economics II Linear Algebra Nat. Sci. Lab Elective(s) 2+ rester Calculus II	(16 credit (16 credit

Pre-Pharmacy	r (PPHA)	(60 credits)
First Semeste	r	(16 credits)
Elective	Biology Restricted Elective	4
CEM 111	General Chemistry I	4
MTH 191	Calculus I	5
Elective	Arts/Human. Elective(s)	3

Second Semes	ter	(15 credits)
Elective	Restricted Biology Elective	
CEM 122	General Chemistry II	4
ENG 111	,	4
-	Composition I	4
Elective	Elective(s) to reach minimum 60 credits	3
Third Semeste	r	(17 credits)
CEM 211	Organic Chemistry I	4
Elective	Speech/Comp. Elective(s)	3
PHY 111	General Physics I	4
Elective	Arts/Human. Elective(s) 2	3
Elective	Soc. Sci. Elective(s) 1	3
Fourth Semes	ter	(12 credits)
CEM 222	Organic Chemistry II	4
PHY 122	General Physics II	4
Elective	Elective(s) to reach minimum 60 credits	1
Elective	Soc. Sci. Élective(s) 2	3
Minimum Crea	lits Required for the Concentration or Option: 60	

Minimum Credits Required for the Program:

Notes:

*Students transferring to EMU as a biology major may substitute MTH 176 or any higher 4-credit hour math course for MTH 191. **Students transferring to EMU as a biology major may substitute MTH 160 or higher for MTH 192.

***Students transferring to EMU as a biology major may consider completing BIO 208 at WCC prior to transfer.

+See the MTA list to make course selections from any discipline except ECO.

++Transfer students should consider a course from the the EMU Diverse Word Requirements list.

60

Transfer

Math and Science (ASMSAS)

Associate in Science Degree Program Effective Term: Fall 2021

High Demand Occupation High Skill Occupation High Wage Occupation

This program prepares students to transfer to a four-year college or university to complete a bachelor's degree in actuarial science. biology, chemistry, math, or pharmacy. The program will give students a solid foundation in math and science. Students should obtain program requirements and transfer equivalencies from the college to which they are transferring.

Complete the requirements for one of the following concentrations. These concentrations may also list courses used to meet General Education requirements.

Biology/Pre-Medicine (BMED) CEM 111 General Chemistry I CEM 122 General Chemistry II CEM 211 Organic Chemistry I CEM 222 Organic Chemistry II Elective: BIO 111, BIO 208, BIO 215, BIO 227 or BIO 237

Chemistry/Pre-Medicine (CMED) CEM 111 General Chemistry I CEM 122 General Chemistry II CEM 211 Organic Chemistry I CEM 222 Organic Chemistry II MTH 197 Linear Algebra

Mathematics (MATH) MTH 160 Basic Statistics MTH 191 Calculus I MTH 192 Calculus II MTH 197 Linear Algebra MTH 293 Calculus III MTH 295 Differential Equations

Pre-Actuarial Science (PPAS) ECO 211 Principles of Economics I ECO 222 Principles of Economics II MTH 191 Calculus I MTH 192 Calculus II MTH 197 Linear Algebra MTH 293 Calculus III

Pre-Pharmacy (PPHA) Two Restricted Electives in Biology (see below) CEM 211 Organic Chemistry I CEM 222 Organic Chemistry II PHY 111 General Physics I PHY 122 General Physics II Biology Restricted Electives for Pre-Pharmacy (PPHA): BIO 111, BIO 161, BIO 162, BIO 208, BIO 237, BIO 215 or BIO 227 Optional Transfer Courses for Pre-Pharmacy (PPHA): MTH 160, MTH 192, along with other Biology restricted electives. See a program advisor to select appropriate Biology courses.

Articulation:

This program will fulfill the Michigan Transfer Agreement (MTA) requirements provided the student takes two science courses from two different disciplines. One course must have a lab component. Students must have MTA posted on their transcripts by the WCC Student Records Office.

Program Admission Requirements:

- Students must have an Academic Math Level of 7 to begin the math sequence. Two years of high school algebra and one year of

Monday, August 30, 2021 3:5:40 p.m.

high school pre-calculus are recommended to prepare for this program.

Program Information Report

	ncentration Credits Required for the Program: entration for requirements and total credits required for program.	60
	ence Concentrations	
Biology/Pre	Medicine (BMED)	(60 credits)
First Semes	er	(17 credits)
BIO 162	General Biology II Cells and Molecules	4
CEM 111	General Chemistry I	4
MTH 176 or	College Algebra	
MTH 191	Calculus I*	4
Elective	Elective(s) to reach minimum 60 credits	5
Second Sem	ester	(16 credits)
BIO 161	General Biology I Ecology and Evolution	4
CEM 122	General Chemistry II	4
ENG 111	Composition I	4
MTH 160 or	Basic Statistics**	
MTH 192	Calculus II	4
Third Semes	tor	(14 credits)
CEM 211	Organic Chemistry I	(14 creats)
Elective	Speech/Comp. Elective(s)	3
Elective	Soc. Sci. Elective(s) 1	3
Elective	Select one course from the following: BIO 111, BIO 208***, BIO 215, BIO 227 or BIO 237	4
Fourth Seme		(13 credits)
CEM 222	Organic Chemistry II	4
Elective	Arts/Human. Elective(s) 1	
Elective Elective	Soc. Sci. Elective(s) 2	3
Elective		
Elective Elective Elective	Soc. Sci. Elective(s) 2	3
Elective Elective Elective Minimum Cr	Soc. Sci. Elective(s) 2 Arts/Human. Elective(s) 2	3
Elective Elective Elective Minimum Cr Chemistry/f	Soc. Sci. Elective(s) 2 Arts/Human. Elective(s) 2 Edits Required for the Concentration or Option: 60 re-Medicine (CMED)	3 3 (60 credits)
Elective Elective Elective Minimum Cr	Soc. Sci. Elective(s) 2 Arts/Human. Elective(s) 2 edits Required for the Concentration or Option: 60 re-Medicine (CMED) er	3 3 (60 credits) (16 credits)
Elective Elective Elective <i>Minimum Cr</i> Chemistry/F First Semest	Soc. Sci. Elective(s) 2 Arts/Human. Elective(s) 2 Edits Required for the Concentration or Option: 60 re-Medicine (CMED)	3 3 (60 credits) (16 credits) 4
Elective Elective Minimum Cr Chemistry/f First Semest CEM 111	Soc. Sci. Elective(s) 2 Arts/Human. Elective(s) 2 edits Required for the Concentration or Option: 60 re-Medicine (CMED) er General Chemistry I	3 3 (60 credits) (16 credits) 4
Elective Elective Minimum Cr Chemistry/F First Semest CEM 111 MTH 191	Soc. Sci. Elective(s) 2 Arts/Human. Elective(s) 2 Edits Required for the Concentration or Option: 60 re-Medicine (CMED) er General Chemistry I Calculus I	3 3 (60 credits) (16 credits) 4 5 4
Elective Elective Minimum Cr Chemistry / F First Semest CEM 111 MTH 191 PHY 111 Elective	Soc. Sci. Elective(s) 2 Arts/Human. Elective(s) 2 edits Required for the Concentration or Option: 60 re-Medicine (CMED) er General Chemistry I Calculus I General Physics I Elective(s) to reach minimum 60 credits	3 3 (60 credits) (16 credits) 4 5 4 3
Elective Elective Minimum Cr Chemistry/F First Semest CEM 111 MTH 191 PHY 111 Elective Second Sem	Soc. Sci. Elective(s) 2 Arts/Human. Elective(s) 2 edits Required for the Concentration or Option: 60 re-Medicine (CMED) er General Chemistry I Calculus I General Physics I Elective(s) to reach minimum 60 credits ester	3 3 (60 credits) (16 credits) 4 5 4 3 (16 credits)
Elective Elective Minimum Cr Chemistry/F First Semest CEM 111 MTH 191 PHY 111 Elective Second Sem CEM 122	Soc. Sci. Elective(s) 2 Arts/Human. Elective(s) 2 edits Required for the Concentration or Option: 60 re-Medicine (CMED) er General Chemistry I Calculus I General Physics I Elective(s) to reach minimum 60 credits ester General Chemistry II	3 3 (60 credits) (16 credits) 4 5 4 3 (16 credits) 4
Elective Elective Elective Minimum Cr Chemistry/f First Semest CEM 111 MTH 191 PHY 111 Elective Second Sem CEM 122 ENG 111	Soc. Sci. Elective(s) 2 Arts/Human. Elective(s) 2 edits Required for the Concentration or Option: 60 re-Medicine (CMED) er General Chemistry I Calculus I General Physics I Elective(s) to reach minimum 60 credits ester General Chemistry II Composition I	3 3 (60 credits) (16 credits) 4 5 4 3 (16 credits) 4 4 4
Elective Elective Minimum Cr Chemistry/F First Semest CEM 111 MTH 191 PHY 111 Elective Second Sem CEM 122	Soc. Sci. Elective(s) 2 Arts/Human. Elective(s) 2 edits Required for the Concentration or Option: 60 re-Medicine (CMED) er General Chemistry I Calculus I General Physics I Elective(s) to reach minimum 60 credits ester General Chemistry II Composition I Calculus II	3 3 (60 credits) (16 credits) 4 5 4 3
Elective Elective Elective Minimum Cr Chemistry/F First Semest CEM 111 MTH 191 PHY 111 Elective Second Sem CEM 122 ENG 111 MTH 192 PHY 122	Soc. Sci. Elective(s) 2 Arts/Human. Elective(s) 2 edits Required for the Concentration or Option: 60 re-Medicine (CMED) er General Chemistry I Calculus I General Physics I Elective(s) to reach minimum 60 credits ester General Chemistry II Composition I Calculus II General Physics II	3 3 (60 credits) (16 credits) 4 3 (16 credits) 4 4 4 4 4 4 4 4
Elective Elective Elective Minimum Cr Chemistry/F First Semest CEM 111 MTH 191 PHY 111 Elective Second Sem CEM 122 ENG 111 MTH 192 PHY 122 Third Semes	Soc. Sci. Elective(s) 2 Arts/Human. Elective(s) 2 edits Required for the Concentration or Option: 60 re-Medicine (CMED) er General Chemistry I Calculus I General Physics I Elective(s) to reach minimum 60 credits ester General Chemistry II Composition I Calculus II General Physics II Electure II Composition I	3 3 (60 credits) (16 credits) 4 5 4 3 (16 credits) 4 4 4 4 4 4 4 4 4 4 4 4
Elective Elective Elective Minimum Cr Chemistry/F First Semest CEM 111 MTH 191 PHY 111 Elective Second Sem CEM 122 ENG 111 MTH 192 PHY 122 Third Semes CEM 211	Soc. Sci. Elective(s) 2 Arts/Human. Elective(s) 2 edits Required for the Concentration or Option: 60 re-Medicine (CMED) er General Chemistry I Calculus I General Physics I Elective(s) to reach minimum 60 credits ester General Chemistry II Composition I Calculus II General Physics II ter Organic Chemistry I	3 3 (60 credits) (16 credits) 4 5 4 3 (16 credits) 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4
Elective Elective Elective Minimum Cr Chemistry/I First Semest CEM 111 MTH 191 PHY 111 Elective Second Sem CEM 122 ENG 111 MTH 192 PHY 122 Third Semes CEM 211 Elective	Soc. Sci. Elective(s) 2 Arts/Human. Elective(s) 2 edits Required for the Concentration or Option: 60 re-Medicine (CMED) er General Chemistry I Calculus I General Physics I Elective(s) to reach minimum 60 credits ester General Chemistry II Composition I Calculus II General Physics II ter Organic Chemistry I Speech/Comp. Elective(s)	3 3 (60 credits) (16 credits) 4 5 4 3 (16 credits) 4 4 4 4 4 4 4 4 4 3
Elective Elective Elective Minimum Cr Chemistry/F First Semest CEM 111 MTH 191 PHY 111 Elective Second Sem CEM 122 ENG 111 MTH 192 PHY 122 Third Semes CEM 211 Elective MTH 197	Soc. Sci. Elective(s) 2 Arts/Human. Elective(s) 2 edits Required for the Concentration or Option: 60 re-Medicine (CMED) er General Chemistry I Calculus I General Physics I Elective(s) to reach minimum 60 credits ester General Chemistry II Composition I Calculus II General Physics II ter Organic Chemistry I Speech/Comp. Elective(s) Linear Algebra	3 3 (60 credits) (16 credits) 4 5 4 3 (16 credits) 4 4 4 4 4 4 4 4 4 4 4 4 3 4 4 4 4 4 4
Elective Elective Elective Minimum Cr Chemistry/I First Semest CEM 111 MTH 191 PHY 111 Elective Second Sem CEM 122 ENG 111 MTH 192 PHY 122 Third Semes CEM 211 Elective	Soc. Sci. Elective(s) 2 Arts/Human. Elective(s) 2 edits Required for the Concentration or Option: 60 re-Medicine (CMED) er General Chemistry I Calculus I General Physics I Elective(s) to reach minimum 60 credits ester General Chemistry II Composition I Calculus II General Physics II ter Organic Chemistry I Speech/Comp. Elective(s)	3 3 (60 credits) (16 credits) 4 5 4 3 (16 credits) 4 4 4 4 4 4 4 4 4 3
Elective Elective Elective Minimum Cr Chemistry//F First Semest CEM 111 MTH 191 PHY 111 Elective Second Sem CEM 122 ENG 111 MTH 192 PHY 122 Third Semes CEM 211 Elective MTH 197 Elective	Soc. Sci. Elective(s) 2 Arts/Human. Elective(s) 2 edits Required for the Concentration or Option: 60 re-Medicine (CMED) er General Chemistry I Calculus I General Physics I Elective(s) to reach minimum 60 credits ester General Chemistry II Composition I Calculus II General Physics II ter Organic Chemistry I Speech/Comp. Elective(s) Linear Algebra Soc. Sci. Elective(s) 1	3 3 (60 credits) (16 credits) 4 5 4 3 (16 credits) 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4
Elective Elective Elective Minimum Cr Chemistry/F First Semest CEM 111 MTH 191 PHY 111 Elective Second Sem CEM 122 ENG 111 MTH 192 PHY 122 Third Semes CEM 211 Elective MTH 197	Soc. Sci. Elective(s) 2 Arts/Human. Elective(s) 2 edits Required for the Concentration or Option: 60 re-Medicine (CMED) er General Chemistry I Calculus I General Physics I Elective(s) to reach minimum 60 credits ester General Chemistry II Composition I Calculus II General Physics II ter Organic Chemistry I Speech/Comp. Elective(s) Linear Algebra Soc. Sci. Elective(s) 1	3 3 (60 credits) (16 credits) 4 5 4 3 (16 credits) 4 4 4 4 4 4 4 4 4 4 4 4 3 4 4 4 4 4 4
Elective Elective Elective Minimum Cr Chemistry/I First Semest CEM 111 MTH 191 PHY 111 Elective Second Sem CEM 122 ENG 111 MTH 192 PHY 122 Third Semes CEM 211 Elective MTH 197 Elective Fourth Seme	Soc. Sci. Elective(s) 2 Arts/Human. Elective(s) 2 edits Required for the Concentration or Option: 60 re-Medicine (CMED) er General Chemistry I Calculus I General Physics I Elective(s) to reach minimum 60 credits ester General Chemistry II Composition I Calculus II General Physics II ter Organic Chemistry I Speech/Comp. Elective(s) Linear Algebra Soc. Sci. Elective(s) 1	3 3 (60 credits) (16 credits) 4 3 (16 credits) 4 4 4 4 4 4 4 4 4 3 (14 credits) 4 3 (14 credits) 1
Elective Elective Elective Minimum Cr Chemistry//F First Semest CEM 111 MTH 191 PHY 111 Elective Second Sem CEM 122 ENG 111 MTH 192 PHY 122 Third Semest CEM 211 Elective MTH 197 Elective Fourth Semest Elective	Soc. Sci. Elective(s) 2 Arts/Human. Elective(s) 2 edits Required for the Concentration or Option: 60 re-Medicine (CMED) er General Chemistry I Calculus I General Physics I Elective(s) to reach minimum 60 credits ester General Chemistry II Composition I Calculus II General Physics II Calculus II General Physics II Calculus II General Physics II Elective(s) I Speech/Comp. Elective(s) Linear Algebra Soc. Sci. Elective(s) 1	3 3 (60 credits) (16 credits) 4 3 (16 credits) 4 4 4 4 4 4 4 4 4 4 4 4 5 (16 credits) 4 3 (14 credits) 4 3 (14 credits) 1 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 4 3 3 4 4 3 4 4 4 4 4 5 5 4 5 4
Elective Elective Elective Minimum Cr Chemistry//F First Semest CEM 111 MTH 191 PHY 111 Elective Second Sem CEM 122 ENG 111 MTH 192 PHY 122 Third Semes CEM 211 Elective MTH 197 Elective Fourth Seme Elective CEM 222	Soc. Sci. Elective(s) 2 Arts/Human. Elective(s) 2 edits Required for the Concentration or Option: 60 re-Medicine (CMED) er General Chemistry I Calculus I General Physics I Elective(s) to reach minimum 60 credits ester General Chemistry II Composition I Calculus II General Physics II ter Organic Chemistry I Speech/Comp. Elective(s) Linear Algebra Soc. Sci. Elective(s) 1 ester Elective(s) to reach minimum 60 credits Organic Chemistry II	3 3 (60 credits) (16 credits) 4 5 4 3 (16 credits) 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4

Minimum Credits Required for the Concentration or Option: 60

	rs (MATH)	(60 credite
First Semes	ter	(15 credits
lective	Nat. Sci. Elective(s)	(10 0 0 0 0 0
1TH 191	Calculus I	
lective	Select one course from the following: CPS 120, CPS 141, CPS 161 or CPS 171	
NG 111	Composition I	
Second Sen	nester	(14 credit
lective	Nat. Sci. Lab Elective(s)	
1TH 160	Basic Statistics	
1TH 192	Calculus II	
lective	Soc. Sci. Elective(s) 1	
hird Seme	ster	(17 credit
lective	Speech/Comp. Elective(s)	
lective	Elective(s) to reach minimum 60 credits	
1TH 197	Linear Algebra	
1TH 293	Calculus III	
lective	Soc. Sci. Elective(s) 2	
ourth Sem		(14 credit
1TH 295	Differential Equations	
lective	Arts/Human. Elective(s) 1	
lective	Arts/Human. Elective(s) 2	
lective	Elective(s) to reach a minimum of 60 credits.	
Minimum C	redits Required for the Concentration or Option: 60	
	al Science (PPAS)-also available online	(60 credit
Pre-Actuari First Semes	al Science (PPAS)-also available online	(60 credit (16 credit
Pre-Actuari First Semes	al Science (PPAS)-also available online ster Principles of Accounting I	
	al Science (PPAS)-also available online	
Pre-Actuari First Semes	al Science (PPAS)-also available online ster Principles of Accounting I	
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irst Semes CC 111 PS 161 NG 111 TH 191 CC 122 CO 211 lective TH 192 lective	Al Science (PPAS)-also available online	(16 credit (16 credit
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irst Semes CC 111 PS 161 NG 111 ITH 191 CC 122 CC 211 iective ITH 192 iective CO 222 ITH 197 iective iective	al Science (PPAS)-also available online ter Principles of Accounting I An Introduction to Programming with Java Composition I Calculus I nester Principles of Accounting II Principles of Economics I Nat. Sci. Elective(s) Calculus II Arts/Human. Elective(s) 1 ster Principles of Economics II Linear Algebra Nat. Sci. Lab Elective(s) Soc. Sci. Elective(s) 2+	(16 credit (16 credit (13 credit
irst Semes CC 111 PS 161 NG 111 ITH 191 CC 122 CC 211 ilective ITH 192 ilective CO 222 ITH 197 ilective ilective ilective ilective	al Science (PPAS)-also available online ter Principles of Accounting I An Introduction to Programming with Java Composition I Calculus I nester Principles of Accounting II Principles of Economics I Nat. Sci. Elective(s) Calculus II Arts/Human. Elective(s) 1 ster Principles of Economics II Linear Algebra Nat. Sci. Lab Elective(s) Soc. Sci. Elective(s) 2+ ester	(16 credit (16 credit (13 credit
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Pre-Pharmacy	(PPHA)	(60 credits)
First Semester	r	(16 credits)
Elective	Biology Restricted Elective	4
CEM 111	General Chemistry I	4
MTH 191	Calculus I	5
Elective	Arts/Human. Elective(s)	3

Second Semes	ter	(15 credits)
Elective	Restricted Biology Elective	4
CEM 122	General Chemistry II	4
ENG 111	Composition I	4
Elective	Elective(s) to reach minimum 60 credits	3
Third Semeste	r	(17 credits)
CEM 211	Organic Chemistry I	4
Elective	Speech/Comp. Elective(s)	3
PHY 111	General Physics I	4
Elective	Arts/Human. Elective(s) 2	3
Elective	Soc. Sci. Elective(s) 1	3
		(4 B 11)
Fourth Semest		(12 credits)
CEM 222	Organic Chemistry II	4
PHY 122	General Physics II	4
Elective	Elective(s) to reach minimum 60 credits	1
Elective	Soc. Sci. Elective(s) 2	3
Minimum Cred	its Required for the Concentration or Option: 60	

Minimum Credits Required for the Program:

Notes:

*Students transferring to EMU as a biology major may substitute MTH 176 or any higher 4-credit hour math course for MTH 191.

**Students transferring to EMU as a biology major may substitute MTH 160 or higher for MTH 192.

***Students transferring to EMU as a biology major may consider completing BIO 208 at WCC prior to transfer.

+See the MTA list to make course selections from any discipline except ECO.

++Transfer students should consider a course from the the EMU Diverse Word Requirements list.

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WCC General Education Requirements Effective Fall 2018

Associate degree programs were updated to meet the revised WCC general education requirements below.

Course Distribution Requirements

Associate degree students must complete courses from each of six General Education content areas. The requirements vary, depending on which degree is being earned. The number of general education credit hours required for each degree is as follows.

	AA	AS	AAS
Writing/Composition	3-4 credits	3-4 credits	3-4 credits
2nd Writing/Composition or Communication	3-4 credits	3 credits	3 credits
Mathematics	3-4 credits	3-4 credits	3-4 credits
Natural Sciences ¹	7-8 credits	7-8 credits	3-4 credits
Social & Behavioral Science ²	6 credits	6 credits	3 credits
Arts and Humanities ³	6 credits	6 credits	3 credits
General Education Electives to reach 30 credits	0-2 credits	0-2 credits	N/A
Minimum	30 credits	30 credits	18 credits

¹ Two courses in Natural Science including one with laboratory experience (from two disciplines)

² From two disciplines

³ From two disciplines

Transfer and University Parallel Programs

If your goal is to continue your education toward a baccalaureate degree, then transfer and university parallel programs is the track for you. Complete the first two years of study in a supportive environment with small classes and personal attention.

Before beginning any transfer program, a student should consult with an academic advisor or counselor to obtain a program articulation agreement or a transfer guide. Early in the program, the student should contact an undergraduate advisor at the transfer college for specific admission and curriculum requirements and, if available, an unofficial transfer-credit evaluation.

Copies of articulation agreements and transfer guides are available in the Counseling Office on the second floor of the Student Center Building. Computers with access to the Internet Web sites of four-year colleges and universities are also available there.

Math and Science

Learn more about math or science through this associate degree program.

Math and Science (ASMSAS)

Associate in Science Degree

Program Effective Term: Fall 2018

High Demand Occupation High Skill Occupation High Wage Occupation

This program prepares students to transfer to a four-year college or university to complete a bachelor's degree in actuarial science, biology, chemistry, math, or pharmacy. The program will give students a solid foundation in math and science. Students should obtain program requirements and transfer equivalencies from the college to which they are transferring.

Complete the requirements for one of the following concentrations. These concentrations may also list courses used to meet General Education requirements.

Biology/Pre-Medicine (BMED) CEM 111 General Chemistry I CEM 122 General Chemistry II CEM 211 Organic Chemistry I CEM 222 Organic Chemistry II Elective: BIO 111, BIO 208, BIO 215, BIO 227, BIO 228 or BIO 237 Chemistry/Pre-Medicine (CMED) CEM 111 General Chemistry I CEM 122 General Chemistry II CEM 211 Organic Chemistry I CEM 222 Organic Chemistry II MTH 197 Linear Algebra Mathematics (MATH) MTH 160 Basic Statistics MTH 191 Calculus I MTH 192 Calculus II MTH 197 Linear Algebra MTH 293 Calculus III MTH 295 Differential Equations Pre-Actuarial Science (PPAS) ECO 211 Principles of Economics I ECO 222 Principles of Economics II MTH 191 Calculus I

MTH 192 Calculus II MTH 197 Linear Algebra MTH 293 Calculus III

Pre-Pharmacy (PPHA) Two Restricted Electives in Biology (see below) CEM 211 Organic Chemistry I CEM 222 Organic Chemistry II PHY 111 General Physics I PHY 122 General Physics II

Monday, June 25, 2018 11:7:50 a.m.

Biology Restricted Electives for Pre-Pharmacy (PPHA): BIO 111, BIO 161, BIO 162, BIO 208, BIO 237, BIO 215, BIO 227 or BIO 228 Optional Transfer Courses for Pre-Pharmacy (PPHA): MTH 160, MTH 192, along with other Biology restricted electives. See a program advisor to select appropriate Biology courses.

Articulation:

This program will fulfill the Michigan Transfer Agreement (MTA) requirements provided the student takes two science courses from two different disciplines. One course must have a lab component. Students must have MTA posted on their transcripts by the WCC Student Records Office.

This program will fulfill MACRAO requirements if, in addition to the courses completed to meet General Education requirements, students complete one additional course in Social and Behavioral Science. Students must have MACRAO posted on their transcripts by the WCC Student Records Office.

Program Admission Requirements:

- Students must have an Academic Math Level of 7 to begin the math sequence. Two years of high school algebra and one year of high school pre-calculus are recommended to prepare for this program.

- The biology and chemistry concentrations require one year of high school chemistry or CEM 101 with a "C" or better to enroll in CEM 111.

Minimum Concentration Credits Required for the Program:

Select a concentration for requirements and total credits required for program.

Math and Science Concentrations

Biology/Pre-Medicine (BMED) (60 credits) First Semester (17 credits) **BIO 162** General Biology II Cells and Molecules 4 4 CEM 111 General Chemistry I MTH 176 or College Algebra 4 MTH 191 Calculus I* Elective(s) to reach minimum 60 credits 5 Elective Second Semester (16 credits) General Biology I Ecology and Evolution BIO 161 4 **CEM 122** General Chemistry II 4 ENG 111 Composition I 4 Basic Statistics** MTH 160 or Calculus II MTH 192 4 Third Semester 14 credits) CEM 211 Organic Chemistry I 4 Elective Speech/Comp. Elective(s) 3 3 Elective Soc. Sci. Elective(s) 1 Select one course from the following: BIO 111, BIO 208***, BIO 215, BIO 227, BIO 228 or BIO 237 Elective 4 (13 credits) Fourth Semester **CEM 222** Organic Chemistry II 4 Elective 3 Arts/Human. Elective(s) 1 Elective Soc. Sci. Elective(s) 2 3 Elective 3 Arts/Human, Elective(s) 2 Minimum Credits Required for the Concentration or Option: 60 Chemistry/Pre-Medicine (CMED) (60 credits) First Semester (16 credits) **CEM 111** General Chemistry I 4 MTH 191 5 Calculus I PHY 111 General Physics I 4 Elective Elective(s) to reach minimum 60 credits 3

Second SemesterCEM 122General Chemistry IIENG 111Composition IMTH 192Calculus IIPHY 122General Physics II

Monday, June 25, 2018 11:7:50 a.m.

(16 credits)

4

4 4

4

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Third Seme	ster	(14 credits)
CEM 211	Organic Chemistry I	4
Elective	Speech/Comp. Elective(s)	3
MTH 197	Linear Algebra	4
Elective	Soc. Sci. Elective(s) 1	3
Fourth Sem	ester	(14 credits)
Elective	Elective(s) to reach minimum 60 credits	1
CEM 222	Organic Chemistry II	4
Elective	Arts/Human. Elective(s) 1	3
Elective	Soc. Sci. Elective(s) 2	3
Elective	Arts/Human, Elective(s) 2	2

Mathematics (MATH) (60 credits) **First Semester** (15 credits) Elective Nat. Sci. Elective(s) 3 MTH 191 Calculus I 5 Select one course from the following: CPS 120, CPS 141, CPS 161 or CPS 171 3 Elective ENG 111 Composition I 4 Second Semester (14 credits) Nat. Sci. Lab Elective(s) Elective 3 MTH 160 **Basic Statistics** 4 MTH 192 Calculus II 4 Elective Soc. Sci. Elective(s) 1 3 Third Semester (17 credits) Elective Speech/Comp. Elective(s) 3 Elective 3 Elective(s) to reach minimum 60 credits MTH 197 Linear Algebra 4 MTH 293 Calculus III 4 Elective Soc. Sci. Elective(s) 2 3 Fourth Semester (14 credits) MTH 295 **Differential Equations** 4 3 Elective Arts/Human. Elective(s) 1 Elective Arts/Human. Elective(s) 2 3 Elective(s) to reach a minimum of 60 credits. Elective 4 Minimum Credits Required for the Concentration or Option: 60 Pre-Actuarial Science (PPAS) (60 credits)

(16 credit	ter	First Semest
	Principles of Accounting I	ACC 111
	An Introduction to Programming with Java	CPS 161
	Composition I	ENG 111
	Calculus I	MTH 191
(16 credit	ester	Second Sem
	Principles of Accounting II	ACC 122
	Principles of Economics I	ECO 211
	Nat. Sci. Elective(s)	Elective
	Calculus II	MTH 192
	Arts/Human. Elective(s) 1	Elective
(13 credit	ter	Third Semes
	Principles of Economics II	ECO 222
	Linear Algebra	MTH 197
	Nat. Sci. Lab Elective(s)	Elective
	Soc. Sci. Elective(s) 2+	Elective

Monday, June 25, 2018 11:7:50 a.m.

ester	(15 credits)
Calculus III	4
Arts/Human. Elective(s) 2++	3
Speech/Comp. Elective(s)	
Elective(s) to reach minimum 60 credits	5
edits Required for the Concentration or Option: 60	
icy (PPHA)	(60 credits)
	(16 credits)
	4
	4
	5
Arts/Human. Elective(s)	3
iester	(15 credits)
Restricted Biology Elective	4
General Chemistry II	4
Composition I	4
Elective(s) to reach minimum 60 credits	3
ster	(17 credits)
Organic Chemistry I	4
Speech/Comp. Elective(s)	3
General Physics I	4
Arts/Human. Elective(s) 2	3
Soc. Sci. Elective(s) 1	3
ester	(12 credits)
Organic Chemistry II	4
General Physics II	4
Elective(s) to reach minimum 60 credits	1
Soc. Sci. Elective(s) 2	3
edits Required for the Concentration or Option: 60	
	Calculus III: Arts/Human. Elective(s) 2++ Speech/Comp. Elective(s) Elective(s) to reach minimum 60 credits redits Required for the Concentration or Option: 60 (cy (PPHA)) ter Biology Restricted Elective General Chemistry I Calculus I Arts/Human. Elective(s) rester Restricted Biology Elective General Chemistry II Composition I Elective(s) to reach minimum 60 credits ster Organic Chemistry I Speech/Comp. Elective(s) General Physics I Arts/Human. Elective(s) 1 ester Organic Chemistry II General Physics II Elective(s) to reach minimum 60 credits

Minimum Credits Required for the Program:

Notes:

*Students transferring to EMU as a biology major may substitute MTH 176 or any higher 4-credit hour math course for MTH 191.

**Students transferring to EMU as a biology major may substitute MTH 160 or higher for MTH 192.

***Students transferring to EMU as a biology major may consider completing BIO 208 at WCC prior to transfer.

+See the MTA list to make course selections from any discipline except ECO.

++Transfer students should consider a course from the the EMU Diverse Word Requirements list.

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WASHTENAW COMMUNITY COLLEGE GENERAL EDUCATION REVISION PROGRAM CHANGE FORM FOR AA AND AS PROGRAMS 2018-2019

Program Code: ASMSAS	Program Name: Math ~ Science	
Division Code: AVS MSE	Department:	

This form is to be used only for General Education Revision Program Changes for Associate in Arts (AA) and Associate in Science (AS) programs. Any other program changes should be submitted separately using a standard Program Change Form.

Directions:

- 1. Review each general education area under Requested Changes below and respond as needed.
- 2. Attach the semester program layout showing the current program listing from the WCC catalog.
 - a. Indicate any changes to be made on the semester layout.
 - b. Draw a line through any courses that should be removed on the semester layout.
 - c. Write in any courses that need to be added on the semester layout.
- 3. Submit this form and semester program layout to the Office of Curriculum and Assessment (SC 257).

Current General Education Requirements AA and AS		Revised General Education Requirements 2018-2019 AA and AS	
Writing	6 - 7 credits	English Composition	3 - 4 credits
Speech Mathematics	3 credits 3 - 4 credits	2 nd Course in English Composition or one course in Communication	3 - 4 credits
Natural Sciences	3 - 4 credits	Mathematics	3 - 4 credits
Social & Behavioral Sciences Arts & Humanities	6 credits 6 credits	Natural Sciences from 2 disciplines including one lab course	7 - 9 credits
Critical Thinking	0 credits	Social & Behavioral Sciences from 2 disciplines	6 credits
Computer & Information	ocicuits	Arts & Humanities from 2 disciplines	6 credits
Literacy Total	3 credits 30 - 33 credits	Elective Credits to reach a minimum of 30 credit hours	0 - 3 credits
		Total	30 credits

Please review each General Education Area in the chart below, and record the needed changes in the chart and on the attached semester layout.

a Veak	REQUESTED CHANGES
Ge	neral Education Area
	glish Composition – The requirement for one writing/English composition course remains the same. No anges will be made unless specifically requested below. (Use Writing Elective or ENG 111)
Op	tional Change:
2 nd	Course in English Composition or one course in Communication
W	CC previously required both a second composition/writing course and a communication course. Your tions are:
5	1. Allow students to select any course that meets composition/writing or communication (recommended).
	2. Require students to take a specific composition course (identify course below and on semester layout
	3. Require students to take a specific communication course (identify course below and on semester layout).

Done 1/29/18

NWLB

Requested Change:

Re	viewer Print Name Signature Date
	Elective Credits to reach a minimum of 30 credit hours – A course titled "General Education Credit(s) to Reach a Minimum of 30 Credit Hours" will be created and then added as needed to the program.
	 Computer and Information Literacy The requirement for computer and information literacy has been removed. Your options are: Continue to require a specific computer course. If a specific course is required in your program, we will leave it there. If you previously used "Computer and Information Literacy Course," you will need to specify either a specific course or a list of courses from which to choose. Remove the computer and information literacy course if the program will still meet the minimum of 60 credit hours. Remove the computer and information literacy course and replace the course with elective or other credits as needed to meet the minimum of 60 credit hours. Required Change:
	Arts & Humanities from 2 disciplines – The requirement for two arts and humanities courses remains the same. No changes will be made unless specifically requested below. (Note: A department can designate a COM course as a requirement here. The same course cannot be counted in two areas.) Optional Change:
	Social & Behavioral Sciences from 2 disciplines – The requirement for two social and behavioral science courses remains the same. No changes will be made unless specifically requested below. Optional Change:
	 Natural Sciences from 2 disciplines including one lab course WCC previously required one natural science course. Your options are: No change needed – a second natural science course is already included in my program. Add a second natural science course in the semester shown on the semester layout attached. Unless specific courses are required, include one course identified as a lab science course. Requested Change:
No. of Street, of Street, of Street, or Stre	Mathematics – The requirement for one mathematics course remains the same. However, the courses that meet the MTA requirement have changed slightly. MTH 148, 149 and 167 do not meet the general education requirement for AA or AS degrees. Please identify an alternate course or list "Math elective". Optional Change:
	 2nd Course in English Composition or one course in Communication Credit Hours Because of this change, an extra 3 – 4 credit hours may be available in the program. Please specify how you would like to use those credit hours. Your options are: Reduce the number of credit hours if the program total is over 60 (recommended). Replace the course with elective credits as needed to reach a minimum of 60 credit hours. Add a specific program-related course (please add the course in the semester it should be taken on the semester layout).

Reviewer	Print Name	Signature	Date
Initiator		0	
Department Chair	1	emails	
Division Dean/ Administrator	Xill.	All	
Vice President for Instruction			

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Transfer and University Parallel Programs

If your goal is to continue your education toward a baccalaureate degree, then transfer and university parallel programs is the track for you. Complete the first two years of study in a supportive environment with small classes and personal attention.

Business (AABAS)

Computer Science: Programming in Java (ASCSPJ) See School of Information Technology Criminal Justice (AACJ) Education, Early Childhood (AAECE) Education, Elementary (AAELEM) Education, Secondary (AASECO) Environmental Science (ASENVS) 1. Environmental Science (ENV1) 2. Environmental Science and Society (ENV2) Exercise Science (ASESCI) General Studies in Math and Natural Sciences (ASGSMS) Honors in the Liberal Arts (AAHLA) Human Services (AAHUST) Information Systems: Programming in C++ (ASISPC) See School of Information Technology Liberal Arts Transfer (AALAT) Math and Science (ASMSAS) 1. Pre-Medicine Concentration (BMED or CMED) 2. Mathematics Concentration (MATH) 3. Physics/Pre-Engineering Concentration (PHYS) 4. Pre-Actuarial Science Concentration (PPAS) 5. Pre-Pharmacy Concentration (PPHA)

Before beginning any transfer program, a student should consult with an academic advisor or counselor to obtain a program articulation agreement, or a transfer guide. Early in the program, the student should contact an undergraduate advisor at the transfer college for specific admission and curriculum requirements and, if available, an unofficial transfer-credit evaluation.

Copies of articulation agreements and transfer guides are available in the Counseling Office on the second floor of the Student Center Building. Computers with access to the Internet Web sites of four-year colleges and universities are also available there.

Math and Science

Learn more about math or science through this associate degree program.

Math and Science (ASMSAS) Associate in Science Degree Program Effective Term: Fall 2015

High Demand Occupation High Skill Occupation High Wage Occupation

This program prepares students to transfer to a four-year college or university to complete a bachelor's degree in actuarial science, biology, chemistry, math, pharmacy, or physics. The program will give students a solid foundation in math and science. Students should obtain program requirements and transfer equivalencies from the college to which they are transferring.

Complete the requirements for one of the following concentrations.

Biology/Pre-Medicine (BMED) CEM 111 General Chemistry I CEM 122 General Chemistry II CEM 211 Organic Chemistry I CEM 222 Organic Chemistry II Elective: BIO 111, BIO 208, BIO 215, BIO 227, BIO 228 or BIO 237 Chemistry/Pre-Medicine (CMED) CEM 111 General Chemistry I CEM 122 General Chemistry II CEM 211 Organic Chemistry I CEM 222 Organic Chemistry II MTH 197 Linear Algebra Mathematics (MATH) MTH 160 Basic Statistics MTH 197 Linear Algebra MTH 293 Calculus III MTH 295 Differential Equations Elective: Take an additional three credits in the MTH discipline Physics/Pre-Engineering (PENG) CEM 111 General Chemistry I MTH 197 Linear Algebra MTH 293 Calculus III MTH 295 Differential Equations PHY 211 Analytical Physics I PHY 222 Analytical Physics II Pre-Actuarial Science (PPAS) ECO 211 Principles of Economics I ECO 222 Principles of Economics II MTH 191 Calculus I MTH 192 Calculus II MTH 197 Linear Algebra MTH 293 Calculus III Pre-Pharmacy (PPHA) Two Restricted Electives in Biology (see below) CEM 211 Organic Chemistry I CEM 222 Organic Chemistry II PHY 111 General Physics I PHY 122 General Physics II Biology Restricted Electives for Pre-Pharmacy (PPHA): BIO 111, BIO 161, BIO 162, BIO 208, BIO 237, BIO 215, BIO 227 or BIO 228 Optional Transfer Courses for Pre-Pharmacy (PPHA): MTH 160, MTH 192, along with other Biology restricted electives. See a program advisor to select appropriate Biology courses. Articulation:

This program will fulfill the Michigan Transfer Agreement (MTA) requirements provided the student takes two science courses from two different disciplines. One course must have a lab component. Students must have MTA posted on their transcripts by the WCC Student Records Office.

This program will fulfill MACRAO requirements if, in addition to the courses completed to meet General Education requirements,

Monday, March 23, 2015 11:43:38 a.m.

students complete one additional course in Social and Behavioral Science. Students must have MACRAO posted on their transcripts by the WCC Student Records Office.

Program Admission Requirements:

- Students must have an Academic Math Level of 7 to begin the math sequence. Two years of high school algebra and one year of high school pre-calculus are recommended to prepare for this program.

The physics concentration requires one semester of high school physics or PHY 111 with a "C" or better to enroll in PHY 211.
The biology, chemistry, and physics concentrations require one year of high school chemistry or CEM 101 with a "C" or better to

enroll in CEM 111.

Minimum Concentration Credits Required for the Program:

60

(61 credits)

Math and Science Concentrations

Biology/Pre-Medicine (BMED)

biology/Pre-Me		
BIO 162 CEM 111 MTH 176 or MTH 191 Elective	College Algebra Calculus I*	4 4 4 3
BIO 161 CEM 122 ENG 111 MTH 160 or MTH 192	General Biology I Ecology and Evolution General Chemistry II Composition I Basic Statistics**	4 4 4 4
CEM 211 ENG 226 Elective Elective	Organic Chemistry I Composition II Soc. Sci. Elective(s) Select one course from the following: BIO 111, BIO 208***, BIO 215, BIO 227, BIO 228 or BIO 237	4 3 3 4
CEM 222 COM 101 Elective Elective Elective	Organic Chemistry II Fundamentals of Speaking Arts/Human. Elective(s) Soc. Sci. Elective(s) Arts/Human. Elective(s)	4 3 3 3 3
Minimum Credit	ts Required for the Concentration or Option: 61	
Chemistry/Pre-	Medicine (CMED) (62 credits	5)
First Semester CEM 111 MTH 191	General Chemistry I Calculus I	4 5

MTH 191	Calculus I	5
PHY 111	General Physics I	4
Elective	Computer Lit. Elective(s)	3
September		336.43
CEM 122	General Chemistry II	4
ENG 111	Composition I	4
MTH 192	Calculus II	4
PHY 122	General Physics II	4
	,	
Third Semante		(3)
CEM 211	Organic Chemistry I	4
ENG 226	Composition II	3
MTH 197	Linear Algebra	4
Elective	Soc. Sci. Elective(s)	3

Fourth Sames		th g
COM 101	Fundamentals of Speaking	3
CEM 222	Organic Chemistry II	4

Elective Elective Elective	Arts/Human. Elective(s) Soc. Sci. Elective(s) Arts/Human. Elective(s)	3 3 3
	edits Required for the Concentration or Option: 62	-
Mathematics	(MATH)	(60 credits)
BIO 162 or	General Biology II Cells and Molecules	
CEM 111 or	General Chemistry I	
PHY 111	General Physics I	4
MTH 191	Calculus I	5
Elective	Computer Lit. Elective(s)	3
ENG 111	Composition I	4
Secondariem		
BIO 161 or	General Biology I Ecology and Evolution	
CEM 122 or	General Chemistry II	4
PHY 122 MTH 160	General Physics II Basic Statistics	4
MTH 192	Calculus II	4
Elective	Soc. Sci. Elective(s)	3
COM 101	Fundamentals of Speaking	3
ENG 226	Composition II	3
MTH 197	Linear Algebra	4
MTH 293	Calculus III	4
Elective	Soc. Sci. Elective(s)	3
Fourth Seme		
MTH 295	Differential Equations	4
Elective	Arts/Human. 2 Elective(s)	3
Elective	Arts/Human. Elective(s) Elective(s) to reach a minimum of 60 credits.	
Elective		23
Minimum Cre	edits Required for the Concentration or Option: 60	
Physics/Pre-	Engineering (PENG)	(68 credits)
First Sernesk		
CEM 111	General Chemistry I	4
MTH 191	Calculus I	5
PHY 111 Elective	General Physics I Computer Lit. Elective(s)	3
Elective		2 19 19 19 19 19 19 19 19 19 19 19 19 19
Second Servi		4
ENG 111 MTH 192	Composition I Calculus II	4
PHY 122	General Physics II	4
Elective	Arts/Human. Elective(s)	3
ENG 226	Composition II	3
MTH 197	Linear Algebra	4
PHY 211	Analytical Physics I	5
Elective	Soc. Sci. Elective(s)	3
Fourth Seme		
COM 101	Fundamentals of Speaking	3
MTH 293	Calculus III	4 5
PHY 222 Elective	Analytical Physics II Arts/Human. Elective(s)	3
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		Page 4 of 6

Monday, March 23, 2015 11:43:38 a.m.

Page 4 of 6

		and the second secon
MTH 295	Differential Equations	4
Elective	Soc. Sci. Elective(s)	3
Minimum Cro	edits Required for the Concentration or Option: 68	
Pre-Actuaria	al Science (PPAS)	(60 credits)
ACC 111	Principles of Accounting I	3
CPS 161	An Introduction to Programming with Java	4
ENG 111	Composition I	4 5
MTH 191	Calculus I	
Second Sem		
ACC 122 ECO 211	Principles of Accounting II Principles of Economics I	3
ENG 226	Composition II	3
MTH 192	Calculus II	4
Elective	Arts/Human. Elective(s)	3
MARIA		
ECO 222	Principles of Economics II	3
MTH 197 Elective	Linear Algebra Nat. Sci. Elective(s)	4
Elective	Soc. Sci. Elective(s)+	3
Fourth Seme		
MTH 293	Calculus III	4
Elective	Arts/Human, Elective(s)++	3
Elective	Nat. Sci. Elective(s)+++	4
Elective	Speech Elective(s)	5
Minimum Cro	edits Required for the Concentration or Option: 60	
<i>Minimum Cro</i> Pre-Pharma		(62 credits)
	icy (PPHA)	(62 credits)
Pre-Pharman Firststemen Elective	рсу (РРНА) Biology Restricted Elective	4
Pre-Pharma Elective CEM 111	Biology Restricted Elective General Chemistry I	4 4
Pre-Pharmac Elective CEM 111 MTH 191	Biology Restricted Elective General Chemistry I Calculus I	4
Pre-Pharmat Elective CEM 111 MTH 191 Elective	Biology Restricted Elective General Chemistry I Calculus I Arts/Human. Elective(s)	4 4 5 3
Pre-Pharmat Elective CEM 111 MTH 191 Elective Sacond Sem	Biology Restricted Elective General Chemistry I Calculus I Arts/Human. Elective(s)	4 4 5 3
Pre-Pharmat Elective CEM 111 MTH 191 Elective Second Sem Elective	Biology Restricted Elective General Chemistry I Calculus I Arts/Human. Elective(s) Restricted Biology Elective	4 4 5 3
Pre-Pharmat Elective CEM 111 MTH 191 Elective Sacond Sem	Biology Restricted Elective General Chemistry I Calculus I Arts/Human. Elective(s)	4 4 5 3 3 4 4 4 4
Pre-Pharmat Elective CEM 111 MTH 191 Elective Second Sem Elective CEM 122	Acy (PPHA) Biology Restricted Elective General Chemistry I Calculus I Arts/Human. Elective(s)	4 4 5 3 3 4 4 4
Pre-Pharmac Elective CEM 111 MTH 191 Elective Second Sem Elective CEM 122 ENG 111 Elective	Biology Restricted Elective General Chemistry I Calculus I Arts/Human. Elective(s) Restricted Biology Elective General Chemistry II Composition I Speech Elective(s)	4 4 5 3 3 4 4 4 4 3
Pre-Pharmac Elective CEM 111 MTH 191 Elective Second Sem Elective CEM 122 ENG 111 Elective	Biology Restricted Elective General Chemistry I Calculus I Arts/Human. Elective(s) Calculus I Calculus I Composition I Speech Elective(s) Corganic Chemistry I	4 4 5 3 3 4 4 4 3 3
Pre-Pharmat Elective CEM 111 MTH 191 Elective CEM 122 ENG 111 Elective CEM 211 Elective	Biology Restricted Elective General Chemistry I Calculus I Arts/Human. Elective(s) Restricted Biology Elective General Chemistry II Composition I Speech Elective(s) Organic Chemistry I Composition II	4 4 5 3 4 4 4 4 3 3
Pre-Pharmat Elective CEM 111 MTH 191 Elective Second Sem Elective CEM 122 ENG 111 Elective CEM 211 Elective CEM 211 ENG 226 PHY 111	Biology Restricted Elective General Chemistry I Calculus I Arts/Human. Elective(s) Restricted Biology Elective General Chemistry II Composition I Speech Elective(s) Organic Chemistry I Composition II General Physics I	4 4 5 3 4 4 4 4 3 3
Pre-Pharmat Elective CEM 111 MTH 191 Elective CEM 122 ENG 111 Elective CEM 211 Elective	Biology Restricted Elective General Chemistry I Calculus I Arts/Human. Elective(s) Restricted Biology Elective General Chemistry II Composition I Speech Elective(s) Organic Chemistry I Composition II	4 4 5 3 4 4 4 4 3 3
Pre-Pharmat Elective CEM 111 MTH 191 Elective Second Sem Elective CEM 122 ENG 111 Elective CEM 211 Elective CEM 211 ENG 226 PHY 111 Elective Elective Elective	Biology Restricted Elective General Chemistry I Calculus I Arts/Human. Elective(s) Restricted Biology Elective General Chemistry II Composition I Speech Elective(s) Organic Chemistry I Composition II General Physics I Arts/Human. Elective(s)	4 4 5 3 4 4 4 4 3 3 4 3 3 3
Pre-Pharmac Elective CEM 111 MTH 191 Elective Second Sem Elective CEM 122 ENG 111 Elective CEM 211 ENG 226 PHY 111 Elective Elective Elective	Biology Restricted Elective General Chemistry I Calculus I Arts/Human. Elective(s)	4 4 5 3 4 4 4 4 3 3 4 3 3 4 4 3 3 4 4 3 3 4
Pre-Pharmac Elective CEM 111 MTH 191 Elective Second Sem Elective CEM 122 ENG 111 Elective CEM 211 Elective CEM 211 ENG 226 PHY 111 Elective Elective Elective	Biology Restricted Elective General Chemistry I Calculus I Arts/Human. Elective(s) Composition I Speech Elective(s) Organic Chemistry I Composition II General Physics I Arts/Human. Elective(s) Soc. Sci. Elective(s)	4 4 5 3 4 4 4 4 3 3 4 3 3 3
Pre-Pharmat Elective CEM 111 MTH 191 Elective CEM 122 ENG 111 Elective CEM 212 ENG 111 Elective CEM 211 ENG 226 PHY 111 Elective Elective Elective Elective Elective Elective	Icy (PPHA) Biology Restricted Elective General Chemistry I Calculus I Arts/Human. Elective(s) Restricted Biology Elective General Chemistry II Composition I Speech Elective(s) Organic Chemistry I Composition II General Physics I Arts/Human. Elective(s) Soc. Sci. Elective(s) Organic Chemistry II General Physics I Arts/Human. Elective(s)	4 4 5 3 4 4 4 4 3 3 4 3 3 4 4 3 3 4 4 3 3 4
Pre-Pharmat Elective CEM 111 MTH 191 Elective CEM 122 ENG 111 Elective CEM 211 Elective CEM 211 Elective Elective Elective Elective Elective Elective Elective Elective Elective Elective	Biology Restricted Elective General Chemistry I Calculus I Arts/Human. Elective(s) Composition I Speech Elective(s) Organic Chemistry II Composition II General Physics I Arts/Human. Elective(s) Soc. Sci. Elective(s) Corganic Chemistry II General Physics I Arts/Human. Elective(s) Soc. Sci. Elective(s) Soc. Sci. Elective(s)	4 4 5 3 4 4 4 4 3 3 4 3 3 3
Pre-Pharman Elective CEM 111 MTH 191 Elective Second Sem Elective CEM 122 ENG 111 Elective CEM 211 ENG 226 PHY 111 Elective Elective Elective Elective Elective Elective Elective Elective Elective Elective	Icy (PPHA) Biology Restricted Elective General Chemistry I Calculus I Arts/Human. Elective(s) Restricted Biology Elective General Chemistry II Composition I Speech Elective(s) Organic Chemistry I Composition II General Physics I Arts/Human. Elective(s) Soc. Sci. Elective(s) Organic Chemistry II General Physics I Arts/Human. Elective(s)	4 4 5 3 4 4 4 4 3 3 4 3 3 3

Monday, March 23, 2015 11:43:38 a.m.

Page 5 of 6

Notes:

*Students transferring to EMU as a biology major may substitute MTH 176 or any higher 4-credit hour math course for MTH 191.

**Students transferring to EMU as a biology major may substitute MTH 160 or higher for MTH 192.

***Students transferring to EMU as a biology major may consider completing BIO 208 at WCC prior to transfer.

+See the MTA list to make course selections from any discipline except ECO.

++Transfer students should consider a course from the the EMU Diverse Word Requirements list.

+++Students may take 3 credits of a MTA approved natural science course as the second Natural Science elective but may need an elective to bring the total number of credits back up to 60 if necessary.

Math and Science (ASMSAS) Associate in Science Degree

• <u>2015 - 2016</u>

Description

This program prepares students to transfer to a four-year college or university to complete a bachelor's degree in actuarial science, biology, chemistry, math, pharmacy, or physics. The program will give students a solid foundation in math and science. Students should obtain program requirements and transfer equivalencies from the college to which they are transferring.

Complete the requirements for one of the following concentrations.

Biology/Pre-Medicine (BMED) CEM 111 General Chemistry I CEM 122 General Chemistry II CEM 211 Organic Chemistry I CEM 222 Organic Chemistry II Elective: BIO 111, BIO 208, BIO 215, BIO 227, BIO 228, or BIO 237

Chemistry/Pre-Medicine (CMED) CEM 111 General Chemistry I CEM 122 General Chemistry II CEM 211 Organic Chemistry I CEM 222 Organic Chemistry II MTH 197 Linear Algebra

Mathematics (MATH) MTH 160 Basic Statistics MTH 197 Linear Algebra MTH 293 Calculus III MTH 295 Differential Equations Elective: Take an additional three credits in the MTH discipline

Physics/Pre-Engineering (PENG) CEM 111 General Chemistry I MTH 197 Linear Algebra MTH 293 Calculus III MTH 295 Differential Equations PHY 211 Analytical Physics I PHY 222 Analytical Physics II

Pre-Actuarial Science (PPAS) ECO 211 Principles of Economics I ECO 222 Principles of Economics II MTH 191 Calculus I MTH 192 Calculus II MTH 197 Linear Algebra MTH 293 Calculus III

Pre-Pharmacy (PPHA) BIO 161 General Biology I Ecology and Evolution BIO 162 General Biology II Cells and Molecules 2 Restricted Electives in Biology below CEM 211 Organic Chemistry I CEM 222 Organic Chemistry II PHY 111 General Physics I PHY 122 General Physics II MTH 191 Calculus I Biology Restricted Electives: BIO 111, BIO 161, BIO 162, BIO 208, BIO 237, BIO 215, BIO 227 or BIO 228

Optional Transfer Courses for Pre-Pharmacy (PPHA): MTH 192 Calculus II, MTH 160 Basic Statistics along with other Biology restricted electives. See a program advisor to select appropriate Biology courses.

Articulation

This program will fulfill the Michigan Transfer Agreement (MTA) requirements provided the student takes two science courses from two different disciplines. One course must have a lab component. Students must have MTA posted on their transcripts by the WCC Student Records Office.

This program will fulfill MACRAO requirements if, in addition to the courses completed to meet General Education requirements, students complete one additional course in Social and Behavioral Science. Students must have MACRAO posted on their transcripts by the WCC Student Records Office.

Admissions Requirements

- Students must have an Academic Math Level of 7 to begin the math sequence. Two years of high school algebra and one year of high school pre-calculus are recommended to prepare for this program.

- The physics concentration requires one semester of high school physics or PHY 111 with a "C" or better to enroll in PHY 211.

- The biology, chemistry, and physics concentrations require one year of high school chemistry or CEM 101 with a "C" or better to enroll in CEM 111.

Contact Information

Division Math, Science & Health

Department Physical Sciences Dept Advisors Jerrell McCowin

Requirements

Select a concentration for requirements and total credits required for program.

Biology/Pre-Medicine (BMED)

First Semester

Class	Title	Credits
<u>BIO 162</u>	General Biology II Cells and Molecules	4
<u>CEM 111</u>	General Chemistry I	4
<u>MTH 176</u> o	r College Algebra	
<u>MTH 191</u>	Calculus I *	4
Elective(s)	Computer and Information Literacy	3
Total		15

Second Semester

Class	Title	Credits
<u>BIO 161</u>	General Biology I Ecology and Evolution	4
<u>CEM 122</u>	General Chemistry II	4
<u>ENG 111</u>	Composition I	4
<u>MTH 160</u> o	r Basic Statistics **	
<u>MTH 192</u>	Calculus II	4
Total		16

Third Semester

Class	Title	Credits
<u>CEM 211</u>	Organic Chemistry I	4
ENG 226	Composition II	3
Elective(s)	Social and Behavioral Science	3
	Select one course from the following: BIO 111, BIO 208***, BIO 215, BIO 227, BIO 228 or BIO 237	4
Total		14

Class	Title	Credits
<u>CEM 222</u>	Organic Chemistry II	4
<u>COM 101</u>	Fundamentals of Speaking	3
Elective(s)	Arts and Humanities	3
Elective(s)	Social and Behavioral Science	3
Elective(s)	Arts and Humanities	3
Total		16
Total Cred	ts Required	61

Chemistry/Pre-Medicine (CMED)

First Semester

Class	Title	Credits
<u>CEM 111</u>	General Chemistry I	4
<u>MTH 191</u>	Calculus I	5
<u>PHY 111</u>	General Physics I	4
Elective(s)	Computer and Information Literacy	3
Total		16

Second Semester

Class	Title	Credits
<u>CEM 122</u>	General Chemistry II	4
<u>ENG 111</u>	Composition I	4
<u>MTH 192</u>	Calculus II	4
<u>PHY 122</u>	General Physics II	4
Total		16

Third Semester

Class	Title	Credits
<u>CEM 211</u>	Organic Chemistry I	4
<u>ENG 226</u>	Composition II	3
<u>MTH 197</u>	Linear Algebra	4
Elective(s)	Social and Behavioral Science	3
Total		14

Class	Title	Credits
<u>COM 101</u>	Fundamentals of Speaking	3

<u>CEM 222</u>	Organic Chemistry II		4
Elective(s)	Arts and Humanities		3
Elective(s)	Social and Behavioral Science		3
Elective(s)	Arts and Humanities		3
Total			16
Total Credi	ts Required	62	

Mathematics (MATH)

First Semester

Class	Title	Credits
<u>BIO 162</u>	or General Biology II Cells and Molecules	
<u>CEM 111</u>	or General Chemistry I	
<u>PHY 111</u>	General Physics I	4
<u>MTH 191</u>	Calculus I	5
Elective(s)	Computer and Information Literacy	3
<u>ENG 111</u>	Composition I	4
Total		16

Second Semester

Class	Title	Credits
<u>BIO 161</u>	or General Biology I Ecology and Evolution	
<u>CEM 122</u>	or General Chemistry II	
<u>PHY 122</u>	General Physics II	4
<u>MTH 160</u>	Basic Statistics	4
<u>MTH 192</u>	Calculus II	4
Elective(s)	Social and Behavioral Science	3
Total		15

Third Semester

Class	Title	Credits
<u>COM 101</u>	Fundamentals of Speaking	3
<u>ENG 226</u>	Composition II	3
<u>MTH 197</u>	Linear Algebra	4
<u>MTH 293</u>	Calculus III	4
Elective(s)	Social and Behavioral Science	3
Total		17

Class	Title	Credits
<u>MTH 295</u>	Differential Equations	4
Elective(s)	Arts and Humanities 2	3
Elective(s)	Arts and Humanities	3
	Elective(s) to reach a minimum of 60 credits.	2 - 3
Total		12 - 13
Total Credits Required		60 - 61

Physics/Pre-Engineering (PENG)

First Semester

Class	Title	Credits
<u>CEM 111</u>	General Chemistry I	4
<u>MTH 191</u>	Calculus I	5
<u>PHY 111</u>	General Physics I	4
Elective(s)	Computer and Information Literacy	3
Total		16

Second Semester

Class	Title	Credits
<u>ENG 111</u>	Composition I	4
<u>MTH 192</u>	Calculus II	4
<u>PHY 122</u>	General Physics II	4
Elective(s)	Arts and Humanities	3
Total		15

Third Semester

Class	Title	Credits
<u>ENG 226</u>	Composition II	3
<u>MTH 197</u>	Linear Algebra	4
<u>PHY 211</u>	Analytical Physics I	5
Elective(s)	Social and Behavioral Science	3
Total		15

Class	Title	Credits
<u>COM 101</u>	Fundamentals of Speaking	3
<u>MTH 293</u>	Calculus III	4

<u>PHY 222</u>	Analytical Physics II	5
Elective(s)	Arts and Humanities	3
Total		15

Fifth Semester

Class	Title	Credits
<u>MTH 295</u>	Differential Equations	4
Elective(s)	Social and Behavioral Science	3
Total		7
Total Cred	ts Required	68

Pre-Actuarial Science (PPAS)

First Semester

Class	Title	Credits
<u>ACC 111</u>	Principles of Accounting I	3
<u>CPS 161</u>	An Introduction to Programming with Java	4
<u>ENG 111</u>	Composition I	4
<u>MTH 191</u>	Calculus I	5
Total		16

Second Semester

Class	Title	Credits
<u>ACC 122</u>	Principles of Accounting II	3
<u>ECO 211</u>	Principles of Economics I	3
<u>ENG 226</u>	Composition II	3
<u>MTH 192</u>	Calculus II	4
Elective(s)	Arts and Humanities	3
Total		16

Third Semester

Class	Title	Credits
<u>ECO 222</u>	Principles of Economics II	3
<u>MTH 197</u>	Linear Algebra	4
Elective(s)	Natural Sciences	4
Elective(s)	Social and Behavioral Science +	3
Total		14

Fourth Semester

Class Ti	le Credits
MTH 293 Calculus III	4
Elective(s) Arts and Humanities ++	3
Elective(s) Natural Sciences +++	4
Elective(s) Speech	3
Total	14
Total Credits Required	

60

Pre-Pharmacy (PPHA)

First Semester

	Class	Title	Credits
1	J <u>Elective</u>	Biology Restricted Elective	· ·
, 3/22/15,	<u>CEM 111</u>	General Chemistry I	4
Per Joy	<u>(MTH 191</u>)	Calculus I	5 /
this should	Elective(s)	Arts and Humanities	3
stay and	Total		16
included o	n description.		
Tricitat	Second Semester		

Class	Title	Credits
^J <u>Elective</u>	Biology Restricted Elective	4
<u>CEM 122</u>	General Chemistry II	4
<u>ENG 111</u>	Composition I	4
Elective(s)	Speech	3
Total		15

Third Semester

Class	Title	Credits
<u>CEM 211</u>	Organic Chemistry I	4
<u>ENG 226</u>	Composition II	3
<u>PHY 111</u>	General Physics I	4
Elective(s)	Arts and Humanities	3
Elective(s)	Social and Behavioral Science	3
Total		17

Class	Title	Credits
<u>CEM 222</u>	Organic Chemistry II	4
<u>PHY 122</u>	General Physics II	4
Elective(s)	Computer and Information Literacy	3
Elective(s)	Social and Behavioral Science	3
Total		14
Total Credits Required		

Footnotes

*Students transferring to EMU as a biology major may substitute MTH 176 or any higher 4-credit hour math course for MTH 191.

**Students transferring to EMU as a biology major may substitute MTH 160 or higher for MTH 192.

***Students transferring to EMU as a biology major may consider completing BIO 208 at WCC prior to transfer.

+See the MTA list to make course selections from any discipline except ECO.

++Transfer students should consider a course from the EMU Diverse Word Requirements list.

J+++Students may take a-3 credits of a MTA approved natural science course as the second Natural Science elective but may need an elective to bring the total number of credits back up to 60 if necessary.

Transfer and University Parallel Programs

If your goal is to continue your education toward a baccalaureate degree, then transfer and university parallel programs is the track for you. Complete the first two years of study in a supportive environment with small classes and personal attention.

Business (AABAS)

Computer Science: Programming in Java (ASCSPJ) See School of Information Technology Criminal Justice (AACJ) Education, Early Childhood (AAECE) Education, Elementary (AAELEM) Education, Secondary (AASECO) Environmental Science (ASENVS) 1. Environmental Science (ENV1) 2. Environmental Science and Society (ENV2) Exercise Science (ASESCI) General Studies in Math and Natural Sciences (ASGSMS) Honors in the Liberal Arts (AAHLA) Human Services (AAHUST) Information Systems: Programming in C++ (ASISPC) See School of Information Technology Liberal Arts Transfer (AALAT) Math and Science (ASMSAS) 1. Pre-Medicine Concentration (BMED or CMED) 2. Mathematics Concentration (MATH) 3. Physics/Pre-Engineering Concentration (PHYS) 4. Pre-Actuarial Science Concentration (PPAS) 5. Pre-Pharmacy Concentration (PPHA)

Before beginning any transfer program, a student should consult with an academic advisor or counselor to obtain a program articulation agreement, or a transfer guide. Early in the program, the student should contact an undergraduate advisor at the transfer college for specific admission and curriculum requirements and, if available, an unofficial transfer-credit evaluation.

Copies of articulation agreements and transfer guides are available in the Counseling Office on the second floor of the Student Center Building. Computers with access to the Internet Web sites of four-year colleges and universities are also available there.

Math and Science

Learn more about math or science through this associate degree program.

Math and Science (ASMSAS) Associate in Science Degree Program Effective Term: Fall 2015

High Demand Occupation High Skill Occupation High Wage Occupation

This program prepares students to transfer to a four-year college or university to complete a bachelor's degree in actuarial science, biology, chemistry, math, pharmacy, or physics. The program will give students a solid foundation in math and science. Students should obtain program requirements and transfer equivalencies from the college to which they are transferring.

Complete the requirements for one of the following concentrations.

Biology/Pre-Medicine (BMED) CEM 111 General Chemistry I CEM 122 General Chemistry II CEM 211 Organic Chemistry I CEM 222 Organic Chemistry II Elective: BIO 111, BIO 208, BIO 215, BIO 227, BIO 228, or BIO 237 Chemistry/Pre-Medicine (CMED) CEM 111 General Chemistry I CEM 122 General Chemistry II CEM 211 Organic Chemistry I CEM 222 Organic Chemistry II MTH 197 Linear Algebra Mathematics (MATH) MTH 160 Basic Statistics MTH 197 Linear Algebra MTH 293 Calculus III MTH 295 Differential Equations Elective: Take an additional three credits in the MTH discipline Physics/Pre-Engineering (PENG) CEM 111 General Chemistry I MTH 197 Linear Algebra MTH 293 Calculus III MTH 295 Differential Equations PHY 211 Analytical Physics I PHY 222 Analytical Physics II Pre-Actuarial Science (PPAS) ECO 211 Principles of Economics I ECO 222 Principles of Economics II MTH 191 Calculus I MTH 192 Calculus II MTH 197 Linear Algebra MTH 293 Calculus III Pre-Pharmacy (PPHA) BIO 161 General Biology I Ecology and Evolution BIO 162 General Biology II Cells and Molecules CEM 211 Organic Chemistry I CEM 222 Organic Chemistry II PHY 111 General Physics I PHY 122 General Physics II MTH 191 Calculus I Optional Transfer Courses for Pre-Pharmacy (PPHA): MTH 192 Calculus II, BIO 111 Anatomy and Physiology - Normal structure and Function, BIO 208 Genetics, BIO 237 Microbiology, BIO 215 Cell and Molecular Biology, BIO 227 Biology of Animals or BIO 228 Biology of Plants, MTH 160 Basic Statistics

Articulation:

This program will fulfill the Michigan Transfer Agreement (MTA) requirements provided the student takes two science courses from two different disciplines. One course must have a lab component. Students must have MTA posted on their transcripts by the WCC Student Records Office.

Thursday, March 5, 2015 9:29:14 a.m.

This program will fulfill MACRAO requirements if, in addition to the courses completed to meet General Education requirements,

students complete one additional course in Social and Behavioral Science. Students must have MACRAO posted on their transcripts by the WCC Student Records Office.

Program Admission Requirements:

- Students must have an Academic Math Level of 7 to begin the math sequence. Two years of high school algebra and one year of high school pre-calculus are recommended to prepare for this program.

- The physics concentration requires one semester of high school physics or PHY 111 with a "C" or better to enroll in PHY 211.

- The biology, chemistry, and physics concentrations require one year of high school chemistry or CEM 101 with a "C" or better to enroll in CEM 111.

Minimum Concentration Credits Required for the Program:

Math and Science Concentrations

Biology/Pre-Medicine (BMED)

Elective

Elective

First Semester BIO 162 CEM 111 MTH 176 or MTH 191	r General Biology II Cells and Molecules General Chemistry I College Algebra Calculus I*	edits) 4 4
Elective	Computer Lit. Elective(s)	3
Second Semes BIO 161 CEM 122 ENG 111 MTH 160 or MTH 192	iter General Biology I Ecology and Evolution General Chemistry II Composition I Basic Statistics** Calculus II	edits) 4 4 4
	(14 cr Organic Chemistry I Composition II Soc. Sci. Elective(s) Select one course from the following: BIO 111, BIO 208***, BIO 215, BIO 227, BIO 228 or BIO 237	-
Fourth Semest CEM 222 COM 101 Elective	ter Organic Chemistry II Fundamentals of Speaking Arts/Human. Elective(s)	sdits) 4 3 3

Minimum Credits Required for the Concentration or Option: 61

Soc. Sci. Elective(s)

Arts/Human. Elective(s)

Chemistry/P	Pre-Medicine (CMED)	(62 credits)
First Semest	iter	(16 credits)
CEM 111	General Chemistry I	4
MTH 191	Calculus I	5
PHY 111	General Physics I	4
Elective	Computer Lit. Elective(s)	3
Second Sem CEM 122 ENG 111 MTH 192 PHY 122	nester General Chemistry II Composition I Calculus II General Physics II	(16 credits) 4 4 4 4 4 4
Third Semes	ster	(14 credits)
CEM 211	Organic Chemistry I	4
ENG 226	Composition II	3
MTH 197	Linear Algebra	4
Elective	Soc. Sci. Elective(s)	3
Fourth Seme	ester	(16 credits)
COM 101	Fundamentals of Speaking	3

Thursday, March 5, 2015 9:29:14 a.m.

(61 credits)

60

3 3

Program Information Report

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CEM 222 Elective	Organic Chemistry II Arts/Human. Elective(s)	4
Elective	Soc. Sci. Elective(s)	3 3
Elective	Arts/Human. Elective(s)	3
Minimum Cr	redits Required for the Concentration or Option: 62	
Mathematic	s (MATH) (60 c	credits)
First Semes		redits)
BIO 162 or	General Biology II Cells and Molecules	
CEM 111 or PHY 111	General Chemistry I	
MTH 191	General Physics I Calculus I	4
Elective	Computer Lit. Elective(s)	5 3
ENG 111	Composition I	4
Second Sem	nester	redits)
BIO 161 or	General Biology I Ecology and Evolution	
CEM 122 or	General Chemistry II	
PHY 122	General Physics II	4
MTH 160 MTH 192	Basic Statistics Calculus II	4
Elective	Soc. Sci. Elective(s)	4 3
Third Semes	ttor	redits)
COM 101	Fundamentals of Speaking	а сына) З
ENG 226	Composition II	3
MTH 197	Linear Algebra	4
MTH 293	Calculus III	4
Elective	Soc. Sci. Elective(s)	3
Fourth Seme	ester	redits)
MTH 295	Differential Equations	4
Elective	Arts/Human. 2 Elective(s)	3
Elective	Arts/Human, Elective(s)	3
Elective	Elective(s) to reach a minimum of 60 credits.	2-3
Minimum Cro	redits Required for the Concentration or Option: 60	
Physics/Pre	-Engineering (PENG) (68 c	redits)
First Semest	(16 c	redits)
CEM 111	General Chemistry I	4
MTH 191	Calculus I	5
PHY 111	General Physics I	4
Elective	Computer Lit. Elective(s)	3
Second Sem	ester	redits)
ENG 111	Composition I	4
MTH 192	Calculus II	4
PHY 122	General Physics II	4
Elective	Arts/Human. Elective(s)	3
C. C. S. G. S. C. S.		redits)
ENG 226 MTH 197	Composition II Linear Algebra	3 4
PHY 211	Analytical Physics I	4 5
Elective	Soc. Sci. Elective(s)	3
rourth Seme	ester (15ic	redits)

Fourth Semes	ster	credits)
COM 101	Fundamentals of Speaking	3
MTH 293	Calculus III	4
PHY 222	Analytical Physics II	5
Elective	Arts/Human. Elective(s)	3

Thursday, March 5, 2015 9:29:14 a.m.

Page 4 of 6

MTH 295 Elective	ter Differential Equations Soc. Sci. Elective(s)	redits) 4 3
Minimum Cr	redits Required for the Concentration or Option: 68	
Pre-Actuaria	al Science (PPAS) (60 c	redits)
First Semes		redits)
ACC 111	Principles of Accounting I	3
CPS 161	An Introduction to Programming with Java	2
ENG 111	Composition I	4
MTH 191	Calculus I	
Second Sem	ester	redits
ACC 122	Principles of Accounting II	
ECO 211	Principles of Economics I	3
ENG 226	Composition II	
MTH 192	Calculus II	4
Elective	Arts/Human. Elective(s)	3
Third Semes	ther the second se	redits
ECO 222	Principles of Economics II	
MTH 197	Linear Algebra	
Elective	Nat. Sci. Elective(s)	4
Elective	Soc. Sci. Elective(s)+	3
Fourth Seme		redits
MTH 293	Calculus III	Guiro
Elective	Arts/Human. Elective(s)++	
	Alls/numan, Elective(s)++	
		4
Elective Elective	Nat. Sci. Elective(s)+++ Speech Elective(s)	
Elective Elective Minimum Cr	Nat. Sci. Elective(s)+++ Speech Elective(s) edits Required for the Concentration or Option: 60	3
Elective Elective	Nat. Sci. Elective(s)+++ Speech Elective(s) edits Required for the Concentration or Option: 60	4 3 redits)
Elective Elective Minimum Cr	Nat. Sci. Elective(s)+++ Speech Elective(s) edits Required for the Concentration or Option: 60 Cy (PPHA) (62 C	redits
Elective Elective <i>Minimum Cr</i> Pre-Pharma	Nat. Sci. Elective(s)+++ Speech Elective(s) edits Required for the Concentration or Option: 60 Cy (PPHA) (62 C)	: redits) redits) 2
Elective Elective Minimum Cr Pre-Pharma First Semesi	Nat. Sci. Elective(s)+++ Speech Elective(s) edits Required for the Concentration or Option: 60 Cy (PPHA) (62 C	a redits) redits) 2 2
Elective Elective Minimum Cr Pre-Pharmar First Semest BIO 162	Nat. Sci. Elective(s)+++ Speech Elective(s) edits Required for the Concentration or Option: 60 Cy (PPHA) (62 C ter General Biology II Cells and Molecules	redits redits
Elective Elective Minimum Cr Pre-Pharmar First Semest BIO 162 CEM 111 MTH 191	Nat. Sci. Elective(s)+++ Speech Elective(s) edits Required for the Concentration or Option: 60 (62 c) (62 c) ter General Biology II Cells and Molecules General Chemistry I	redits redits
Elective Elective Minimum Cr Pre-Pharman First Semest BIO 162 CEM 111 MTH 191 Elective	Nat. Sci. Elective(s)+++ Speech Elective(s) edits Required for the Concentration or Option: 60 (62 c) (99) (16 c) General Biology II Cells and Molecules General Chemistry I Calculus I Arts/Human. Elective(s)	redits
Elective Elective Minimum Cro Pre-Pharman First Semest BIO 162 CEM 111 MTH 191 Elective Second Sem	Nat. Sci. Elective(s)+++ Speech Elective(s) edits Required for the Concentration or Option: 60 (62 c (62 c (15 c General Biology II Cells and Molecules General Chemistry I Calculus I Arts/Human. Elective(s) ester (15 c	redits redits
Elective Elective Minimum Cr Pre-Pharmat First Semest BIO 162 CEM 111 MTH 191 Elective	Nat. Sci. Elective(s) edits Required for the Concentration or Option: 60 (62 c (15 c General Biology II Cells and Molecules General Chemistry I Calculus I Arts/Human. Elective(s) ester General Biology I Ecology and Evolution	redits redits
Elective Elective Minimum Cro- Pre-Pharmar First Semest BIO 162 CEM 111 MTH 191 Elective Second Sem BIO 161 CEM 122	Nat. Sci. Elective(s)+++ Speech Elective(s) edits Required for the Concentration or Option: 60 (62 c (62 c (15 c General Biology II Cells and Molecules General Chemistry I Calculus I Arts/Human. Elective(s) ester (15 c	redits redits
Elective Elective Minimum Cro Pre-Dharman First Semest BIO 162 CEM 111 MTH 191 Elective Second Sem BIO 161	Nat. Sci. Elective(s) edits Required for the Concentration or Option: 60 (62 c (15 c General Biology II Cells and Molecules General Chemistry I Calculus I Arts/Human. Elective(s) ester General Biology I Ecology and Evolution General Chemistry II	redits redits 2 2 3
Elective Elective Minimum Cro Pre-Dharman First Semest BIO 162 CEM 111 MTH 191 Elective Second Sem BIO 161 CEM 122 ENG 111 Elective	Nat. Sci. Elective(s) edits Required for the Concentration or Option: 60 (62 c (15 c General Biology II Cells and Molecules General Chemistry I Calculus I Arts/Human. Elective(s) ester General Biology I Ecology and Evolution General Chemistry II Composition I Speech Elective(s)	redits redits
Elective Elective Minimum Cro Pre-District BIO 162 CEM 111 MTH 191 Elective Second Sem BIO 161 CEM 122 ENG 111 Elective Third Semes	Nat. Sci. Elective(s) +++ Speech Elective(s) edits Required for the Concentration or Option: 60 (62 c (15 c General Biology II Cells and Molecules General Chemistry I Calculus I Arts/Human. Elective(s) ester General Biology I Ecology and Evolution General Chemistry II Composition I Speech Elective(s) (15 c (15 c) (15	redits redits redits
Elective Elective Minimum Cro Pre-Pharmer First Semest BIO 162 CEM 111 MTH 191 Elective Second Sem BIO 161 CEM 122 ENG 111 Elective Third Semes CEM 211	Nat. Sci. Elective(s) +++ Speech Elective(s) edits Required for the Concentration or Option: 60 (62 c (16 c General Biology II Cells and Molecules General Chemistry I Calculus I Arts/Human. Elective(s) ester General Biology I Ecology and Evolution General Chemistry II Composition I Speech Elective(s) (17 c (17 c	redits redits redits
Elective Elective Minimum Cr Pre-Pharman First Semest BIO 162 CEM 111 MTH 191 Elective Second Sem BIO 161 CEM 122 ENG 111 Elective Third Semes CEM 211 ENG 226	Nat. Sci. Elective(s)+++ Speech Elective(s) edits Required for the Concentration or Option: 60 (62 cf (7) (9) (15 cf General Biology II Cells and Molecules General Chemistry I Calculus I Arts/Human. Elective(s) ester General Biology I Ecology and Evolution General Chemistry II Composition I Speech Elective(s) (15 cf	redits redits redits
Elective Elective Minimum Cr Pre-Pharman First Semest BIO 162 CEM 111 MTH 191 Elective Second Sem BIO 161 CEM 122 ENG 111 Elective Third Semes CEM 211 ENG 226 PHY 111	Nat. Sci. Elective(s) edits Required for the Concentration or Option: 60 (62 c (15 c General Biology II Cells and Molecules General Chemistry I Calculus I Arts/Human. Elective(s) ester General Biology I Ecology and Evolution General Chemistry II Composition I Speech Elective(s) (15 c (15	redits redits
Elective Elective Minimum Cr Pre-Pharman First Semest BIO 162 CEM 111 MTH 191 Elective Second Sem BIO 161 CEM 122 ENG 111 Elective Third Semes CEM 211 ENG 226 PHY 111 Elective	Nat. Sci. Elective(s)+++ Speech Elective(s) edits Required for the Concentration or Option: 60 (62 cf (7) (9) (15 cf General Biology II Cells and Molecules General Chemistry I Calculus I Arts/Human. Elective(s) ester General Biology I Ecology and Evolution General Chemistry II Composition I Speech Elective(s) (15 cf	redits redits redits 2 2 2 2 2 2 2 2 3 3 3 3 3 3 3 3 3 3 3
Elective Elective Minimum Cr Pre-Dharmer First Semest BIO 162 CEM 111 MTH 191 Elective Second Sem BIO 161 CEM 122 ENG 111 Elective Third Semes CEM 211 ENG 226 PHY 111 Elective Elective Elective	Nat. Sci. Elective(s) +++ Speech Elective(s) edits Required for the Concentration or Option: 60 cy (PPHA) (62 c (15 c General Biology II Cells and Molecules General Chemistry I Calculus I Arts/Human. Elective(s) ester (15 c General Biology I Ecology and Evolution General Chemistry II Composition I Speech Elective(s) ster (17 c Organic Chemistry I Composition I Speech Elective(s) soc. Sci. Elective(s)	redits redits
Elective Elective Minimum Cr Pre-District First Semest BIO 162 CEM 111 MTH 191 Elective Second Sem BIO 161 CEM 122 ENG 111 Elective Third Semes CEM 211 Elective Third Semes CEM 211 Elective Elective Elective Elective	Nat. Sci. Elective(s) +++ Speech Elective(s) edits Required for the Concentration or Option: 60 (62 c (16 c General Biology II Cells and Molecules General Chemistry I Calculus I Arts/Human. Elective(s) ester General Biology 1 Ecology and Evolution General Chemistry II Composition I Speech Elective(s) (17 c Organic Chemistry I Composition I General Physics I Arts/Human. Elective(s) Soc. Sci. Elective(s) (14 c	redits redits redits
Elective Elective Elective Minimum Cro Pre-Distance BIO 162 CEM 111 MTH 191 Elective Second Sem BIO 161 CEM 122 ENG 111 Elective Third Semes CEM 211 Elective Elective Elective Elective Fourth Seme	Nat. Sci. Elective(s) +++ Speech Elective(s) edits Required for the Concentration or Option: 60 (62 c (16 c General Biology II Cells and Molecules General Chemistry I Calculus I Arts/Human. Elective(s) ester (15 c General Biology I Ecology and Evolution General Chemistry II Composition I Speech Elective(s) (17 c Organic Chemistry I Composition II General Physics I Arts/Human. Elective(s) soc. Sci. Elective(s) (14 c Organic Chemistry II	redits redits redits
Elective Elective Minimum Cr Pre-Dharmer First Semest BIO 162 CEM 111 MTH 191 Elective Second Sem BIO 161 CEM 122 ENG 111 Elective Third Semes CEM 211 ENG 226 PHY 111 Elective Elective Elective	Nat. Sci. Elective(s) +++ Speech Elective(s) edits Required for the Concentration or Option: 60 (62 c (16 c General Biology II Cells and Molecules General Chemistry I Calculus I Arts/Human. Elective(s) ester General Biology 1 Ecology and Evolution General Chemistry II Composition I Speech Elective(s) (17 c Organic Chemistry I Composition I General Physics I Arts/Human. Elective(s) Soc. Sci. Elective(s) (14 c	redits redits redits

Minimum Credits Required for the Concentration or Option: 62

Minimum Credits Required for the Program:

Thursday, March 5, 2015 9:29:14 a.m.

60

Notes:

*Students transferring to EMU as a biology major may substitute MTH 176 or any higher 4-credit hour math course for MTH 191.

**Students transferring to EMU as a biology major may substitute MTH 160 or higher for MTH 192.

***Students transferring to EMU as a biology major may consider completing BIO 208 at WCC prior to transfer.

+See the MTA list to make course selections from any discipline except ECO.

++Transfer students should consider a course from the the EMU Diverse Word Requirements list.

+++Students may take a 3 credit natural science course as the second Natural Science elective but may need an elective to bring the total number of credits back up to 60 if necessary.

PROGRAM CHANGE OF DISCONTINUATION FORM

	DISCONTINUATION FORM	
Program Code: ASMSAS	Program Name: Math and Science	Effective Term: Fall 2015
Division Code: MSN	Department: Math/Allied Health	
Directions:		
1. Attach the current prog	gram listing from the WCC catalog or W	eb site and indicate any changes to be made.
2. Draw lines through any a separate sheet.	text that should be deleted and write in	additions. Extensive narrative changes can be included on
new courses as part of t		l. Changes to courses, discontinuing a course, or adding approved separately using a Master Syllabus form, but rm.
Requested Changes:		
Review Remove <u>course(s)</u> : <u>C</u> Add course(s): <u>See</u> Program title (title was Description Type of award Advisors Articulation information Show all changes on the <u>attac</u>	on	 Program admission requirements Continuing eligibility requirements Program outcomes Accreditation information Discontinuation (attach program discontinuation plan that includes transition of students and timetable for phasing out courses) Other Add concentrations for Pre-Pharmacy and Pre-Actuarial Science - Remove Comp Science
 Pre-Pharmacy: The current math. Advanced studies in a comprehensive interdiscip Pre-Actuarial Science: A employment in this area be 	pharmacy, beyond the associate level, requir plinary degree will benefit our students trans ctuarial Science is a growing field of study. I tween 2012 and 2022. The 2012 median sala	and physics concentrations but none require all 3 disciplines with e that a rigorous foundation be built in these disciplines. Offering ferring into pharmacy and /or other pre-med programs. The Occupational Outlook handbook predicts a 26% increase in ry for an actuary was \$93,680 or \$45.04 per hour. This new of mathematics and economics needed in this field of study.
Financial/staffing/equ	ipment/space implications:	
	rograms already exist and are used in other p n existing resource for these students.	programs. The advisor for Math and Science and the advisor for

List departments that have been consulted regarding their use of this program. Pharmacy Technology, Math and Science

Signatures:

Signatures:			
Reviewer	Print Name	Signature	Date
Department Chair	Lisa Rombes	ana kont	2-4-15
Division Dean/Administrator	Kristin Brandemuehl	- Htiste Brandenuch	2.4.45
Vice President for Instruction	William Abernethy	545-4	2-9-15
President			

Do not write in shaded area. Entered in: Banner 24me C&A Database 2/11 5 We og File 215 mo Board Approval AP

Please submit completed form to the Office of Curriculum and Assessment and email an electronic copy to sjohn@wccnet.edu for posting on the website.



Math and Science (ASMSAS) Associate in Science Degree

High Demand Occupation High Skill Occupation High Wage Occupation

This program prepares students to transfer to a four-year college or university to complete a bachelor's degree in biology, chemistry, computer science, math, or physics. The program will give students a solid foundation in math and science. Students should obtain program requirements and transfer equivalencies from the college to which they are transferring.

Complete the requirements for one of the following concentrations.

Biology/Pre-Medicine (BMED)

CEM 111 General Chemistry I CEM 122 General Chemistry II CEM 211 Organic Chemistry I CEM 222 Organic Chemistry II Elective: BIO 111, BIO 208, BIO 215, BIO 227, BIO 228, or BIO 237

Chemistry/Pre-Medicine (CMED)

CEM 111 General Chemistry I CEM 122 General Chemistry II CEM 211 Organic Chemistry I CEM 222 Organic Chemistry II MTH 197 Linear Algebra MTH 293 Calculus III

Computer Science (COMS)

CPS 171 Introduction to Programming with C++ CPS 271 Object Features of C++ CPS 272 Data Structures with C++ MTH 197 Linear Algebra MTH 293 Calculus III Elective: Take an additional six credits in the CPS discipline

Mathematics (MATH)

MTH 160 Basic Statistics MTH 197 Linear Algebra MTH 293 Calculus III MTH 295 Differential Equations Elective: Take an additional three credits in the MTH discipline

Physics/Pre-Engineering (PENG)

CEM 111 General Chemistry I MTH 197 Linear Algebra MTH 293 Calculus III MTH 295 Differential Equations PHY 211 Analytical Physics I PHY 222 Analytical Physics II

Articulation:

This program will fulfill the Michigan Transfer Agreement (MTA) requirements provided the student takes two science courses from two different disciplines. One course must have a lab component. Students must have MTA posted on their transcripts by the WCC Student Records Office.

This program will fulfill MACRAO requirements if, in addition to the courses completed to meet General Education requirements, students complete one additional course in Social and Behavioral Science. Students must have MACRAO posted on their transcripts by the WCC Student Records Office.

Program Admission Requirements:

- Students must have an Academic Math Level of 7 to begin the math sequence. Two years of high school algebra and one year of high school pre-calculus are recommended to prepare for this program.

- The physics concentration requires one semester of high school physics or PHY 111 with a "C" or better to enroll in PHY 211.

- The biology, chemistry, and physics concentrations require one year of high school chemistry or CEM 090 with a "C" or better to enroll in CEM 111.

MTH 197 MTH 293

MTH

ECO 211

ECO 222

MTH 191

192

Au-Pharmacy (PPHA) BIO 161 BIO 162 (EM 211 CEM 222 PHY III PHY 122 MTH 191

Pre-Actuarial Science (PAS)

Ø

Recommended Course Sequences Ru-Pharmacy (PPHA)

. .

	Semester	_x_Fall	Winter	Spring/Summer	Any	
	Course #	Course Title				Credit Hours
-27	MTH 191	Calculus 1			사람은 다양	5
1	CEM 111	General Chemistry 1				4
١	BIO 162	General Biology Il Cells and Molecules o	r BIO 111, BIO 20	8, or BIO 237		4
4	Elective(s)	Arts and Humanities l				3
,				Total Semes	ter Credits	16

	Semester 2	2 Fall	_x	Winter	Spring/Summer	Any	
	Course #	Course Title					Credit Hours
2	CEM 122	General Chemistry II					4
١	BIO 161	General Biology 1 Ecology	and Evolution or BI	O 111, BIO 2	208, or BIO 237		4
3	ENG 111	Composition 1					4
ú	Elective (s)	Speech					3
			明治法院にあるが	375231936 Jan 31	Total Seme	ster Credits	. 15

	Semester 3	x_Fall	Winter	Spring/Summer	Any	
	Course #	Course Title				Credit Hours
1	CEM 211	Organic Chemistry 1				4
7,	PHY 111	General Physics 1 (or PHY 211)				4
r	ENG 266 224	Composition ll				3
υ	Elective(s)	Arts and Humanities 2				3
Ś	Elective(s)	Social and Behavioral Science 1	a de la compañía de l			3
				Total Sem	ester Credits	17

	Semester 4	Fall	_x_Winter	Spring/Summer	Any	
	Course #	Course Title				Credit Hours
١	CEM 222	Organic Chemistry ll				4
7.	PHY 122	General Physics Il (or PHY 222)				4
1	Elective(s)	Social and Behavioral Science 2				3
z,	Elective(s)	Computer and Information				3
¢.	10-10-27 A-53			Total Ser	nester Credits	14
	· · · · · · · · · · · · · · · · · · ·			Total Pre	ogram Credits	62

Optional Transfer Courses

[Course #	Course Title	Credit Hours
4	MTH 192	Calculus 2 11	4
1	BIO 111	Anatomy and Physiology – Normal Structure and Function	5
2	BIO 208	Genetics	4
3	BIO 237	Microbiology	4
		Total Semester Credits	17

Optional Transfer Courses Credit Hours Course # Course Title BIO 215 Cell and Molecular Biology 4 ł BIO 227 Zoology Binlony of Annhalt r or BIO 228 Bidation of Flinks 4 Botany 4 MTH 160 3 3 Elective đ 15 **Total Semester Credits** Total Transferrable Credits 94 1. 1. 1. 1. T.

Biochemistry (400 level course at U of M) Physiology

Section IX. Recommended Course Sequences



First Semester

Class	Title	Credits
ACC 111	Principles of Accounting I	3
MTH 191	Calculus I	5
ENG 111	Composition I	4
د <u>CPS 161</u>	An Introduction to Programming with Java	4
Total		16

Second Semester

Class	Title	Credits
ю <u>Elective(s)</u>	Arts and Humanities	3
<u>з ENG 226</u>	Composition II	3
۵ <u>MTH 192</u>	Calculus II	4
∲ <u>ECO 211</u>	Principles of Economics I	3
ACC 122	Principles of Accounting II	3
Total		16

Third Semester

Class	Title	Credits
• <u>ECO 222</u>	Principles of Economics II	3
۶ <u>MTH 197</u>	Linear Algebra	4
⁷ /Elective(s)	Natural Sciences*	4
λ Elective(s)	Social and Behavioral Science** +	3
Total		14

Fourth Semester

Class	Title	Credits
۵ <u>Elective(s)</u>	Speech	3
<u>MTH 293</u>	Calculus III	4
3 Elective(s)	Natural Sciences**** +#	4
¹ Elective(s)	Arts and Humanities 2*** ++	3
Total		14
Total Credits	s Required	60

*Students transferring to a four-year institution should choose a lab-based, MTA-approved science course.

***See the EMU Diverse World Requirement list

**** Can take a 3 credit hour science course as the second Natural Science elective, but may need an elective to bring the total ++1 number of credits back up to 60 if necessary.



Transfer and University Parallel Programs

If your goal is to continue your education toward a baccalaureate degree, then transfer and university parallel programs is the track for you. Complete the first two years of study in a supportive environment with small classes and personal attention.

Business (AABAS)

Computer Science: Programming in Java (ASCSPJ) See School of Information Technology Criminal Justice (AACJ) Education, Early Childhood (AAECE) Education, Elementary (AAELEM) Education, Secondary (AASECO) Environmental Science (ASENVS) Exercise Science (ASESCI) General Studies in Math and Natural Sciences (ASGSMS) Human Services (AAHUST) Information Systems: Programming in C++ (ASISPC) See School of Information Technology Liberal Arts Transfer (AALAT) Math and Science (ASMSAS)

1. Pre-Medicine Concentration (BMED or CMED)

- 2. Computer Science Concentration (COMS)
- 3. Mathematics Concentration (MATH)
- 4. Physics/Pre-Engineering Concentration (PHYS)

Before beginning any transfer program, a student should consult with an academic advisor or counselor to obtain a program articulation agreement, or a transfer guide. Early in the program, the student should contact an undergraduate advisor at the transfer college for specific admission and curriculum requirements and, if available, an unofficial transfer-credit evaluation.

Copies of articulation agreements and transfer guides are available in the Counseling Office on the second floor of the Student Center Building. Computers with access to the Internet Web sites of four-year colleges and universities are also available there.

Computer Science and Information Systems

Interested in a bachelor's degree in computer science or (business) information systems? This area provides the foundation you need to be successful.

Math and Science (ASMSAS) Associate in Science Degree Program Effective Term: Fall 2013

This program prepares students to transfer to a four-year college or university to complete a bachelor's degree in biology, chemistry, computer science, math, or physics. The program will give students a solid foundation in math and science. Students should obtain program requirements and transfer equivalencies from the college to which they are transferring.

Complete the requirements for one of the following concentrations.

Biology/Pre-Medicine (BMED) CEM 111 General Chemistry I CEM 122 General Chemistry II CEM 211 Organic Chemistry II CEM 222 Organic Chemistry II Elective: BIO 111, BIO 208, BIO 215, BIO 227, BIO 228, or BIO 237

Chemistry/Pre-Medicine (CMED) CEM 111 General Chemistry I CEM 122 General Chemistry II CEM 211 Organic Chemistry I CEM 222 Organic Chemistry II MTH 197 Linear Algebra MTH 293 Calculus III

Computer Science (COMS) CPS 171 Introduction to Programming with C++ CPS 271 Object Features of C++ CPS 272 Data Structures with C++ MTH 197 Linear Algebra MTH 293 Calculus III Elective: Take an additional six credits in the CPS discipline

Mathematics (MATH) MTH 160 Basic Statistics MTH 197 Linear Algebra MTH 293 Calculus III MTH 295 Differential Equations Elective: Take an additional three credits in the MTH discipline

Physics/Pre-Engineering (PENG) CEM 111 General Chemistry I MTH 197 Linear Algebra MTH 293 Calculus III MTH 295 Differential Equations PHY 211 Analytical Physics I PHY 222 Analytical Physics II

Articulation:

This program will fulfill MACRAO requirements if, in addition to the courses completed to meet General Education requirements, students complete one additional course in Social and Behavioral Science. Students must have their transcripts certified for MACRAO completion by the WCC Student Records Office.

Program Admission Requirements:

- Students must have an Academic Math Level of 7 to begin the math sequence. Two years of high school algebra and one year of high school pre-calculus are recommended to prepare for this program.

- The physics concentration requires one semester of high school physics or PHY 111 with a "C" or better to enroll in PHY 211. - The biology, chemistry, and physics concentrations require one year of high school chemistry or CEM 090 with a "C" or better to enroll in CEM 111.

Minimum Concentration Credits Required for the Program:

Math and Science Concentrations

Biology/Pre-	-Medicine (BMED)	61 credits)
First Semest	er	15 credits)
BIO 162	General Biology II Cells and Molecules	1993-000 1993-000 1993-000 1993-000 1993-000 2
CEM 111	General Chemistry I	4
MTH 176 or	College Algebra	
MTH 191	Calculus I*	4
Elective	Computer Lit. Elective(s)	3
Second Seme	ester	16 credits
BIO 161	General Biology I Ecology and Evolution	4
CEM 122	General Chemistry II	4
ENG 111	Composition I	4
MTH 160 or	Basic Statistics**	
MTH 192	Calculus II	4
Third Semest	ter	14 credits
CEM 211	Organic Chemistry I	۷
ENG 226	Composition II	3
Elective	Soc. Sci. Elective(s)	3
Elective	Select one course from the following: BIO 111, BIO 208***, BIO 215, BIO 227, BIO 228 or BIO 237	4
Fourth Seme	ster Community College	16 credits
CEM 222	Organic Chemistry II	4
COM 101	Fundamentals of Speaking	3
Elective	Arts/Human, Elective(s)	333
Elective	Soc. Sci. Elective(s)	3
Elective	Arts/Human. Elective(s)	3
Minimum Cre	edits Required for the Concentration or Option: 61	
		66 credits)
Chemistry/P	re-Medicine (CMED)	
Chemistry/P	re-Medicine (CMED)	16 cradits) 4
Chemistry/P First Semeste CEM 111	re-Medicine (CMED)	16 cradits) 4
Chemistry/P First Semeste CEM 111 MTH 191	er General Chemistry I Calculus I	1 6 cradits) 4 5
Chemistry/P First Semeste CEM 111 MTH 191 PHY 111	rre-Medicine (CMED)	16 cradits) 4 5 4
Chemistry/P First Semeste CEM 111 MTH 191 PHY 111 Elective	er General Chemistry I Calculus I General Physics I Computer Lit. Elective(s)	16 cradits 4 5 4 3
Chemistry/P First Semeste CEM 111 MTH 191 PHY 111 Elective Second Seme	re-Medicine (CMED) er General Chemistry I Calculus I General Physics I Computer Lit. Elective(s) ester	16 credits 4 5 4 3 1 6 credits
Chemistry/P First Semeste CEM 111 MTH 191 PHY 111 Elective Second Seme CEM 122	re-Medicine (CMED) er General Chemistry I Calculus I General Physics I Computer Lit. Elective(s) ester General Chemistry II	16 credits
Chemistry/P First Semeste CEM 111 MTH 191 PHY 111 Elective Second Seme CEM 122 ENG 111	re-Medicine (CMED) er General Chemistry I Calculus I General Physics I Computer Lit. Elective(s) ester	16 gredits
Chemistry/P First Semeste CEM 111 MTH 191 PHY 111 Elective Second Seme CEM 122 ENG 111 MTH 192	er General Chemistry I Calculus I General Physics I Computer Lit. Elective(s) ester General Chemistry II Composition I	16 credits
Chemistry/P First Semeste CEM 111 MTH 191 PHY 111 Elective Second Seme CEM 122 ENG 111 MTH 192 PHY 122	re-Medicine (CMED) er General Chemistry I Calculus I General Physics I Computer Lit. Elective(s) ester General Chemistry II Composition I Calculus II General Physics II	16 credits 2 3 16 credits 2 2 3
Chemistry/P First Semeste CEM 111 MTH 191 PHY 111 Elective Second Seme CEM 122 ENG 111 MTH 192 PHY 122 Third Semest	re-Medicine (CMED) er General Chemistry I Calculus I General Physics I Computer Lit. Elective(s) ester General Chemistry II Composition I Calculus II General Physics II ter	16 credits
Chemistry/P First Semeste CEM 111 MTH 191 PHY 111 Elective Second Seme CEM 122 ENG 111 MTH 192 PHY 122 Third Semest CEM 211	re-Medicine (CMED) er General Chemistry I Calculus I General Physics I Computer Lit. Elective(s) ester General Chemistry II Composition I Calculus II General Physics II	16 credits 4 3 16 credits 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4
Chemistry/P First Semeste CEM 111 MTH 191 PHY 111 Elective Second Seme CEM 122 ENG 111 MTH 192 PHY 122 Third Semest CEM 211 ENG 226	re-Medicine (CMED) er General Chemistry I Calculus I General Physics I Computer Lit. Elective(s) ester General Chemistry II Composition I Calculus II General Physics II ter Organic Chemistry I Composition II	16 credits) 4 5 4 3 16 credits) 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4
Chemistry/P First Semeste CEM 111 MTH 191 PHY 111 Elective Second Seme CEM 122 ENG 111 MTH 192 PHY 122 Third Semest CEM 211 ENG 226 MTH 197	re-Medicine (CMED) er General Chemistry I Calculus I General Physics I Computer Lit. Elective(s) ester General Chemistry II Composition I Calculus II General Physics II ter Organic Chemistry I	66 credits) 4 5 4 3 16 credits) 4 4 4 4 4 4 4 4 4 3 4 3 4 3 4 3
Chemistry/P First Semeste CEM 111 MTH 191 PHY 111 Elective	re-Medicine (CMED) (General Chemistry I Calculus I General Physics I Computer Lit. Elective(s) ester General Chemistry II Composition I Calculus II General Physics II ter Organic Chemistry I Composition II Linear Algebra Soc. Sci. Elective(s)	16 credits 4 3 16 credits 4 4 4 4 14 credits 4 3 4 3
Chemistry/P First Semestr CEM 111 MTH 191 PHY 111 Elective Second Seme CEM 122 ENG 111 MTH 192 PHY 122 Third Semest CEM 211 ENG 226 MTH 197 Elective Fourth Seme	re-Medicine (CMED) (General Chemistry I Calculus I General Physics I Computer Lit. Elective(s) ester General Chemistry II Composition I Calculus II General Physics II ter Organic Chemistry I Composition II Linear Algebra Soc. Sci. Elective(s)	16 credits 4 3 16 credits 4 4 4 4 14 credits 3 19 credits 3
Chemistry/P First Semestr CEM 111 MTH 191 PHY 111 Elective Second Seme CEM 122 ENG 111 MTH 192 PHY 122 Third Semest CEM 211 ENG 226 MTH 197 Elective Fourth Seme COM 101	re-Medicine (CMED) General Chemistry I Calculus I General Physics I Computer Lit. Elective(s) ester General Chemistry II Composition I Calculus II General Physics II ter Organic Chemistry I Composition II Linear Algebra Soc. Sci. Elective(s) ester	16 credits 4 3 16 credits 4 4 4 4 14 credits 3 19 credits 3 4
Chemistry/P First Semestr CEM 111 MTH 191 PHY 111 Elective Second Seme CEM 122 ENG 111 MTH 192 PHY 122 Third Semest CEM 211 ENG 226 MTH 197 Elective	re-Medicine (CMED) (Composition I Composition I Calculus I Composition I Calculus II Composition I Camposition I Composition I Camposition I Composition I Compositi	16 credits) 4 3 16 credits) 4 4 4 4 4 4 4 4 14 credits) 3 4 4 3 4 4 4 3 4 4 4 4 4 4 4 4 4 4 4
Chemistry/P First Semeste CEM 111 MTH 191 PHY 111 Elective Second Seme CEM 122 ENG 111 MTH 192 PHY 122 Third Semest CEM 211 ENG 226 MTH 197 Elective Fourth Seme COM 101 CEM 222 MTH 293	re-Medicine (CMED) er General Chemistry I Calculus I General Physics I Computer Lit. Elective(s) ester General Chemistry II Composition I Calculus II General Physics II ter Organic Chemistry I Composition II Linear Algebra Soc. Sci. Elective(s) ster Fundamentals of Speaking Organic Chemistry II	16 credits) 4 3 16 credits) 4 4 4 4 4 4 4 4 14 credits) 3 4 4 3 4 4 4 3 4 4 4 4 4 4 4 4 4 4 4
Chemistry/P First Semestr CEM 111 MTH 191 PHY 111 Elective Second Seme CEM 122 ENG 111 MTH 192 PHY 122 Third Semest CEM 211 ENG 226 MTH 197 Elective Fourth Seme COM 101 CEM 222 MTH 293 Elective	re-Medicine (CMED) er General Chemistry I Calculus I General Physics I Computer Lit. Elective(s) ester General Chemistry II Composition I Calculus II General Physics II ter Organic Chemistry I Linear Algebra Soc. Sci. Elective(s) ster Fundamentals of Speaking Organic Chemistry II Calculus III Calculus Calc	16 credits) 4 5 4 3 16 credits) 4 4 4 4 4 4 14 credits) 3 4 3 4 3 4 3 3 4 3 3 4 3 3 4 3 3 4 3 3 4 3 3 4 4 3 3 4 4 3 3 4 4 3 3 4 4 3 3 4 4 3 3 4 4 3 3 3 4 4 3 3 4 3 3 4 3 3 4 3 3 4 3 3 4 3 3 3 4 3 3 4 3 3 4 3 3 4
Chemistry/P First Semestr CEM 111 MTH 191 PHY 111 Elective Second Seme CEM 122 ENG 111 MTH 192 PHY 122 Third Semest CEM 211 ENG 226 MTH 197 Elective Fourth Seme COM 101 CEM 222 MTH 293 Elective	re-Medicine (CMED) er General Chemistry I Calculus I General Physics I Computer Lit. Elective(s) ester General Chemistry II Composition I Calculus II General Physics II ter Organic Chemistry I Composition II Linear Algebra Soc. Sci. Elective(s) ster Fundamentals of Speaking Organic Chemistry II Calculus III Calculus CALCULUUS CALCULUUUS CALCULUUUS CALCULUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU	16 credits) 4 3 16 credits) 4 4 4 4 4 4 4 14 credits) 3 4 3 14 credits) 3 4 4 3 3 4 4 3

Minimum Credits Required for the Concentration or Option: 66

🗱 Washtenaw Community College

Program Information Report

Computer Scie	nce (COMS) (68 credits	5)
First Semester MTH 191 PHY 111 Elective	Calculus I General Physics I) 5 4 3
Second Semes CPS 171 ENG 111 MTH 192 PHY 122	Introduction to Programming with C++ Composition I Calculus II) 4 4 4 4
Third Semeste CPS 271 ENG 226 MTH 197 PSY 100	Object Features of C++ Composition II Linear Algebra	4 3 4 3
Fourth Semest CPS 272 MTH 293 Elective Elective	Data Structures with C++ Calculus III Arts/Human. Elective(s)) 4 4 3 3
Fifth Semester COM 101 PLS 112 Elective Elective	Fundamentals of Speaking Introduction to American Government Arts/Human. Elective(s)) 3 3 3 3 3
Minimum Cred	its Required for the Concentration or Option: 68	
Mathematics (MATH) (61 credits)
First Semester BIO 162 or CEM 111 or PHY 111 MTH 191 Elective ENG 111	Calculus I Computer Lit. Elective(s)) 4 5 3 4
Second Semes BIO 161 or CEM 122 or PHY 122 MTH 160 MTH 192 Elective	General Biology I Ecology and Evolution General Chemistry II General Physics II Basic Statistics Calculus II	¥ 4 4 3
MTH 295	Fundamentals of Speaking Composition II Linear Algebra Calculus III Soc. Sci. Elective(s) er Differential Equations	3 3 4 4 3
Elective Elective Elective	Arts/Human, Elective(s)	3 3 3

Minimum Credits Required for the Concentration or Option: 61

Physics/Pre-Er	ngineering (PENG) (68 credi	ts)
First Semester CEM 111 MTH 191 PHY 111 Elective	General Chemistry I Calculus I General Physics I Computer Lit. Elective(s)	4 5 4 3
Second Semest ENG 111 MTH 192 PHY 122 Elective	ter Composition I Calculus II General Physics II Arts/Human, Elective(s)	4 4 4 3
Third Semester ENG 226 MTH 197 PHY 211 Elective	Composition II Linear Algebra Analytical Physics I Soc. Sci. Elective(s)	3 4 5 3
Fourth Semest COM 101 MTH 293 PHY 222 Elective	er Fundamentals of Speaking Calculus III Analytical Physics II Arts/Human. Elective(s)	3 4 5 3
Fifth Semester MTH 295 Elective	Differential Equations Soc. Sci. Elective(s)	ts) 4 3
Minimum Credi	its Required for the Concentration or Option: 68	
Minimum Credi <i>Notes:</i>	its Required for the Program:	61
*Students transf	ferring to EMU as a biology major may substitute MTH 176 or any higher 4-credit hour math course for MTH 191.	

*Students transferring to EMU as a biology major may substitute MTH 176 or any higher 4-credit hour math course for MTH 191. **Students transferring to EMU as a biology major may substitute MTH 160 or higher for MTH 192

Students transferring to EMU as a biology major may substitute MTH 160 or higher for MTH 192. *Students transferring to EMU as a biology major may consider completing BIO 208 at WCC prior to transfer.

Math and Science

Learn more about math or science through this associate degree program.

PROGRAM CHANGE OR DISCONTINUATION FORM

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Program Code: AS NS AS	Program Name:	MATH and Sc	IENCE	Effective	Term:
Division Code: M 5 N	Department: L i	fe Science	BNED	concentra	tion
X Add course(s): _BIO Science electives, Compute outProgram title (title was Description Type of award Advisors	text that should be d for each type of char he proposed program he same time as the S BIO CLECT Come Social Socie 161, BIO 162, Math er literacy elective or DY BIO 208	eleted and write in a nge being proposed. a change, must be ap program change for TH D I, MTHP MGS nge electives electives, Social	b site and indicate any additions. Extensive n Changes to courses, o proved separately usin m. Program admissio Continuing eligib Program outcom Accreditation info	changes to be ma harrative changes of discontinuing a co- ng a Master Syllab on requirements fility requirements hes formation (attach program d s transition of stud ourses)	ade. can be included on ourse, or adding ous form, but
Articulation information Show all changes on the <u>attac</u>		ılog.			
Rationale for proposed c Replace existing introduct requirement; create flexibi program so it can be used	hanges or disconti ory Biology sequenc lity in program so it	nuation: e with new majors-le can be adapted for t	ransfer to various 4-ye		
Financial/staffing/equip	oment/space impli	cations:			
List departments that ha Biology, Chemistry	ve been consulted	regarding their use	e of this program.		
Signatures:					
Reviewer	F	rint Name	Signat	ure	Date
Initiator	Ani	re Heise	and the	use	2/14/13
Department Chair	Ani	re Heise	ane	Herse	2/14/13
Division Dean/Administrate	or $M.S.$	howalter	71 Show	6	2/14/13

,,, _,			-	
Vice President for Instruction	Bin Abeneth		>	3/22/13
President	VIA		3	, , ,
Do not write in shaded area. Entered i	in: Banner C&A Database	3413 Log File - 19013 B	oard Approval	<u>an</u> sa kata kata k
logged 2/15/13 5/1 Office of Curriculum & Assessm	1	for the		
Office of Curriculum & Assessm	ient	http://www.w	/ccnet.edu/depart	ments/curriculum

PROGRAM CHANGE OR DISCONTINUATION FORM

· /

Program Code:	Program Name: Math and Science	Effective	Term: F' 2013				
ASMSAS	MATH & SEIBNCE						
Division Code: MSH	Department: Math and Science MATH concentratio	m for (MATH)					
Directions:		0					
1. Attach the current prog	1. Attach the current program listing from the WCC catalog or Web site and indicate any changes to be made.						
2. Draw lines through any a separate sheet.	text that should be deleted and write in a	dditions. Extensive narrative changes c	an be included on				
new courses as part of t	3. Check the boxes below for each type of change being proposed. Changes to courses, discontinuing a course, or adding new courses as part of the proposed program change, must be approved separately using a Master Syllabus form, but should be submitted at the same time as the program change form.						
Requested Changes:	Requested Changes:						
Review Program admission requirements X_Remove course(s): CPS 171, six additional elective credits in Continuing eligibility requirements Add course(s): Program outcomes Add course(s): Accreditation information Description Discontinuation (attach program discontinuation plan that includes transition of students and timetable for phasing out courses) Advisors Other							
Rationale for proposed changes or discontinuation: This change applies to the concentration in Mathematics. After researching comparable degrees in mathematics, requiring CPS 171 is not needed. In addition, the program does not require nine additional MTH credits as originally listed. Beyond MTH 295, it is very difficult for students to find courses that would meet this requirement.							
Financial/staffing/equi	pment/space implications:						
NA							
List departments that hat Mathematics, Science	we been consulted regarding their use	e of this program.					
Signatures:							
Reviewer	Print Name	Signature	Date				
Initiator	Kristin Good	Justa Mord	2/14/13				
Department Chair	Kristin Good	Mar grand	2/14/13				
Division Dean/Administrat	or M. Showalter	M. Shoual	2/14/13				
Vice President for Instructi	on STUBIT BLACKLOW	E melet	2/26/13				
President							
	Entered in: Banner C&A Database orm to the Office of Curriculum and Asse	Log File Board Approval					

Please submit completed form to the Office of Curriculum and Assessment and email an electronic copy to <u>sjohn@wccnet.edu</u> for posting on the website.

logged 2/15/13 % Office of Curriculum & Assessment

WASHTENAW COMMUNITY COLLEGE

PROGRAM CHANGE OR	DISCONTINUATION	N FORM						
Program Code: ASMSAS Division Code: MSH	Program Name:	Math & Sc	ener	Effective 7	Term: F	2013		
Division Code: MSH	Department: Ph	secal Scien	er for	PENG 1 (concentre	MED ations			
Directions:								
1. Attach the current program listing from the WCC catalog or Web site and indicate any changes to be made.								
2. Draw lines through any a separate sheet.	text that should be de	eleted and write in ac	lditions. Extens	ive narrative changes ca	in be included	lon		
3. Check the boxes below new courses as part of the should be submitted at t	he proposed program	change, must be ap	proved separatel			g		
Requested Changes:		2	+ot	······································				
Requested Changes:								
Show all changes on the atta	Show all changes on the attached page from the catalog.							
Rationale for proposed changes or discontinuation: This change applies to the Concentration for both Chemistry and Physics Pre engineering. After researching comparable degrees in pre-med W/ Chem & Physics, requiring CPS 171 is not needed. Financial/staffing/equipment/space implications:								
	T. manerall statung, edubinent, shace unbications:							
List departments that h	List departments that have been consulted regarding their use of this program.							
Signatures:		No. No.		1	T Dec			
Reviewer		rint Name	1/	Bignature	Date			
Initiator	TATKLE	en Butchen	Kathlee	- Butcher	1/3//2	2013		
Department Chair								
Division Dean/Administra	tor M. S.	howalter	m So	upl	2/14/	13		
Vice President for Instruct	ion Strert	· Bleckhan	SE	n lil	2/26/	13		

President C&A Database 3/14/13 Log File 3/14/13 Board Approval Do not write in shaded area. Entered in: Banner____

Please submit completed form to the Office of Curriculum and Assessment and email an electronic copy to siohn@wccnet.edu for posting on the website.

Mone Office of Curriculum & Assessment M logged 2/15/13 y

http://www.wccnet.edu/departments/curriculum

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Associate in Science Degree

2010 - 2011 2011 - 2012 2012 - 2013

Description

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This program prepares students to transfer to a four-year college or university to complete a bachelor's degree in biology, chemistry, computer science, math, or physics. The program will give students a solid foundation in math and science. Students should obtain program requirements and transfer equivalencies from the college to which they are transferring.

Complete the requirements for one of the following concentrations. The same source may not be used to meet both a concentration requirement and other program requirements above. Please consult an advisor to select appropriate electives (22-26 credits).-

Biology/Pre-Medicine (BMED) CEM 111 General Chemistry I CEM 122 General Chemistry II CEM 211 Organic Chemistry II CEM 222 Organic Chemistry II BIO 227 Biology of Animale

BID III or 208 or 215 or 227 or 228 or 237 Altorganic Biochemistry of BIO 208 Genetics

BIO 228 Biology of Plants U Elective: BJO 402, BIO 411, BIO 208, BIO 215, BIO 227, BIO 228, or BIO 237

Chemistry/Pre-Medicine (CMED) CEM 111 General Chemistry I CEM 122 General Chemistry II CEM 211 Organic Chemistry I CEM 222 Organic Chemistry II MTH 197 Linear Algebra MTH 293 Calculus III

Computer Science (COMS) CPS 171 Intro to Programming with C++

CPS 271 Object Features of C++ CPS 272 Data Structures with C++ MTH 197 Linear Algebra MTH 293 Calculus III Elective: Take an additional six credits in the CPS discipline

Mathematics (MATH) MTH 160 Basic Statistics MTH 197 Linear Algebra MTH 293 Calculus III MTH 295 Differential Equations Elective: Take an additional Me credits in the MTH discipline

Physics/Pre-Engineering (PENG) CEM 111 General Chemistry I MTH 197 Linear Algebra MTH 293 Calculus III MTH 295 Differential Equations PHY 211 Analytical Physics I PHY 222 Analytical Physics II

Articulation

This program will fulfill MACRAO requirements if, in addition to the courses completed to meet General Education requirements, students complete one additional course in Social and Behavioral Science. Students must have their transcripts certified for MACRAO completion by the WCC Student Records Office.

Admissions Requirements

- Students must have an Academic Math Level of 7 to begin the math sequence. Two years of high school algebra and one year of high school pre-calculus are recommended to prepare for this program.

- The chemistry, physics, and employer science concentrations requires one semester of high school physics (PHY 105 or PHY 111 with a "C" or better to enroll in PHY 211.

- The biology, chemistry, and physics concentrations require one year of high school chemistry or CEM 090 to enroll in CEM 111.

with a "C" or better

First Semester Class BIO 162 CEM 111 MTH 191 ¹ or MTH 176 Elective(s) Elective(s)	Title New Name General Chemistry I Calculus I College Algebra Computer and Information Literacy	Credits 4 3 15
BIO 162 <u>CEM 111</u> <u>MTH 191¹</u> or <u>MTH 176</u> Elective(s)	New Name General Chemistry I Calculus I College Algebra	
<u>CEM 111</u> <u>MTH 191¹</u> or <u>MTH 176</u> Elective(s)	General Chemistry I Calculus I College Algebra	
<u>MTH 191¹</u> or MTH 176 Elective(<u>s)</u>	Calculus I College Algebra	
<u>MTH 176</u> Elective(s)	College Algebra	
Elective(s)		
	Computer and Information Literacy	
C-4-1		. 1
fotal		
Second Semester		
Class	Title	Credits
310 161	New Name	
CEM 122	General Chemistry II	
ENG 111	Composition I	
<u>MTH 192²</u> or	Calculus II	
<u>MTH 160</u>	Basic Statistics	
Fotal		. 1
Third Semester		
Class	Title	Credits
CEM 211	Organic Chemistry I	
ENG 226	Composition II	
Social Science	Elective	
Biology Elective ³	Select one course from the following: BIO 111, BIO 208, BIO 215, BIO 227, BIO 228 or BIO 237	
Total		1
ourth Semester		
Class	Title	Credits
<u>CEM 222</u>	Organic Chemistry II	
COM 101	Fundamentals of Speaking	
Elective(s)	Arts and Humanities	
locial Science	Elective	
Elective(s)	Arts and Humanities	
otal		10
otal Credits Required		6
	¹ Students transferring to EMU as a biology major may substitute MTH 176 or any higher 4-credit hour math c	ourse for MTH 19
	² Students transferring to EMU as a biology major may substitute MTH 160 or higher for MTH 192	
	³ Students transferring to EMU as a biology major may consider completing BIO 208 Genetics at WCC prior t	o transfer

Chemistry/Pre-Medi	cine (CMED)			
First Semester				
Class	Title	Credits	Notes	New credits
<u>CEM 111</u>	General Chemistry I	4		4
<u>MTH 191</u>	Calculus I	5		5
<u>PHY 111</u>	General Physics 1	4		4
Elective(s)	Computer and Information Literacy	3		3
Total		16		16
Second Semester				
Class	Title	Credits		
CEM 122	General Chemistry II	4		4
ENG 111	Composition I	4		4
MTH 192	Calculus II	4		4
PHY 122	General Physics II	4		4
Total		16		16
Third Semester				
Class	Title	Credits		
<u>CEM 211</u>	Organic Chemistry I	4		4
ENG 226	Composition II	3		3
MTH 197	Linear Algebra	4		4
PSY 100	Introduction to Psychology	3	Change to social science elsective	3
Total		14	-	14
Fourth Semester				
Class	Title	Credits		
<u>COM 101</u>	Fundamentals of Speaking	3		3
<u>CEM 222</u>	Organic Chemistry II	4		4
<u>MTH 293</u>	Calculus III	4		4
Elective(s)	Arts and Humanities	3		3
Total		14		14
Fifth Semester				
Class	Title	Credits		
GPS 171			remove	2
PLS 112	Introduction to American Government		Change to social science elsective	3
Elective(s)	Arts and Humanities	3		3
Total		10		6
Total Credits Required	d	70		66

Mathematics				
(MATH)				
First Semester				
		~	.	New
Class	General	Credits	Notes	Credits
BIO tor led or	Concepts of Biology II Cells and A	lolecules		
<u>CEM 111</u> or	General Chemistry I			
<u>PHY 111</u>	General Physics I	4 keep		4
<u>MTH 191</u>	Calculus I	5 keep		5 3
Elective(s)	Computer and Information Literacy Take an additional three credits in the	3 keep)	3
	MTH discipline	³ rem	ove	
ENG 111	Composition I	4 keep))	4 moved from semester 2
Total	composition	19		16
Second Semester				
Class	Title	Credits		
BIO 103 16 or	General Biology I Ecology and General Chemistry II	Evolutio	¥7	
<u>CEM 122</u> or <u>PHY 122</u>	General Physics II	4 keep)	4
CPS 171	Introduction to Programming with C++	4 rem		
MTH 192	Calculus II	4 keep)	4
	Introduction to American Government	₃ Cha	nge to social	
<u>PLS 112</u>		scie	nce elsective	3 moved from semester 5
MTH 160	Basic Statistics	4 keej	0	4 moved from semester 3
Total		19		15
Third Semester				
Class	Title	Credits		
<u>ENG 226</u>	Composition II	3 kee	0	3
MTH 197	Linear Algebra	4 kee	þ	4
PSY 100	Introduction to Psychology		nge to social	
			nce elsective	3
<u>COM 101</u>	Fundamentals of Speaking	3 keep		3 moved from semester 4 4 moved from semester 4
<u>MTH 293</u> Total	Calculus III	4 keej 17	5	17
		17		
Fourth Semester				
Class	Title	Credits		
Elective(s)	Arts and Humanities	3 kee	p	3
	Take an additional three credits in the	3		
	MTH discipline	Tem		4 moved from semester 5
MTH 295	Differential Equations Arts and Humanities	4 kee 3 kee		3 moved from semester 3
Elective(s)	Arts and Humanifies Take an additional three credits in the			s morea nom semester e
	MTH discipline	³ kee	р	3 moved from semester 5
Total		16		13
Fifth Semester - no	longer needed			
Total Credits				
Required		71		61

Physics/Pre-Eng	gineering (PENG)	······	<u>.</u>	
First Semester				
Class	Title	Credits Notes	New Credits	
CEM 111	General Chemistry I	4 keep	4	
MTH 191	Calculus I	5 keep	5	
<u>PHY 111</u>	General Physics I	4 keep	4	
Elective(s)	Computer and Information Literacy	³ keep	3	
Total		16	16	
Second Semester				
Class	Title	Credits		
C PS 171		⁴ remove		
ENG 111	Composition I	4 keep	4	
MTH 192	Calculus II	4 keep	4	
PHY 122	General Physics II	4 keep	4	
<u>Elective(s)</u> Total	Arts and Humanities	3 keep 19	3 Note: N 15	Moved from semester 5
Third Semester				
Class	Title	Credits		
ENG 226	Composition II	3 keep	3	
<u>MTH 197</u>	Linear Algebra	4 keep	4	
<u>PHY 211</u>	Analytical Physics I	5 keep Change to social	5	
<u>PSY 100</u>	Introduction to Psychology	$\frac{3}{3}$ science elsective	3	
Total		15	15	
Fourth Semester				
Semester				
Class	Title	Credits		
<u>COM 101</u>	Fundamentals of Speaking	3 keep	3	
MTH 293	Calculus III	4 keep	4 5	
PHY 222	Analytical Physics II <u>Arts and Humanities</u>	5 keep 3 keep	3	
<u>Elective(s)</u> Total	Arts and numanities	15	15	
Fifth Semester				
Class	Title	Credits		
MTH 295	Differential Equations	4 keen	4	
PLS 112	Introduction to American	³ Change to social science elsective	3	
	Government		5	
Total		7	1	
Total Credits		70	68	
Required		72	08	

PROGRAM CHANGE OR DISCONTINUATION FORM

Program Code: ASMSAS	Program Name: Associates of Science Math and Science	Effective Term: W' 12
Division Code: MらH	Department: Math + Science	

Directions:

- 1. Attach the current program listing from the WCC catalog or Web site and indicate any changes to be made.
- 2. Draw lines through any text that should be deleted and write in additions. Extensive narrative changes can be included on a separate sheet.
- 3. Check the boxes below for each type of change being proposed. Changes to courses, discontinuing a course, or adding new courses as part of the proposed program change, must be approved separately using a Master Syllabus form, but should be submitted at the same time as the program change form.

Requested Changes: Review Remove course(s): X Add course(s): CEM 111 and CEM 122 to the possible general education and core course options for the ASMAS degree. <i>Mathematics</i> Program title (title was) Description Type of award Advisors Articulation information	 Program admission requirements Continuing eligibility requirements Program outcomes Accreditation information Discontinuation (attach program discontinuation plan that includes transition of students and timetable for phasing out courses) Other
Show all changes on the <u>attached page from the catalog</u> .	
Rationale for proposed changes or discontinuation:	

Students should have the option to use the Chemistry courses as possible general education and core course options for the ASMSAS degree in addition to the choices of Biology and Physics.

Financial/staffing/equipment/space implications:

List departments that have been consulted regarding their use of this program. Mathematics and Natural Science

Signatures:

Reviewer	Print Name	Signature	Date
Initiator	Kristin Chatas/Kathy	Red Shul	11.4.11
	Butcher	Happle Butche	11-7-11
Department Chair	Kristin Chatas	Vust Shal tother.	11.4.11 11-7-1
Division Dean/Administrator	Martha Showalter	m Horin But	te 11/10/11
Vice President for Instruction	Stuart Blacklaw	Secula -	12-6-11
President	N/A		
Do not write in shaded area. Entered i	in: Banner C&A Database	Log File <u>114/115</u> Board Approval	

fn 12/19/11

Office of Curriculum & Assessment

MATH AND SCIENCE

Students utilize this program in preparation for a degree in engineering or physics.

mathematics

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71

Math and Science (ASMSAS)

General Educati	on Requirements	(34 credits)
ENG 111	Composition I	4
ENG 226	Composition II	3
COM 101	Fundamentals of Speaking	3
MTH 191	Calculus I	5
BIO 101 or	Concepts of Biology	
PHY 111	General Physics OE CEM 111	4
PSY 100	Introduction to Psychology	3
PLS 112	Introduction to American Government	3
Arts/Human.	Elective(s)	6
Computer Lit.	Elective(s)	3
Core Courses		(12 credits)

Core Courses

CPS 171	Introduction to Programming with C++
MTH 192	Calculus II
BIO 103 or	General Biology II
PHY 122	General Physics II Or CEM 122

Complete the requirements for the following concentration.

Math Concentration

Mathematics (MATH)

(25 credits)

MTH 160	Basic Statistics	
MTH 197	Linear Algebra	
MTH 293	Calculus III	
MTH 295	Differential Equations	
Elective	Take an additional nine credits	

Minimum Credits Required for the Program:

Associate in Science Deg

TI a ba sc st St ar	ath and Science (ASMSAS) is program prepares students to transf four-year college or university to compl chelor's degree in biology, chemistry, com ence, math, or physics. The program will idents a solid foundation in math and sc udents should obtain program requiren d transfer equivalencies from the colle ich they are transferring.
re pl st ar tri	ticulation: This program will fulfill MAG quirements if, in addition to the courses eted to meet General Education requirem idents complete one additional course in a d Behavioral Science, Students must have anscripts certified for MACRAO complete e WCC Student Records Office.
Pi	ogram Admission Requirements:
	Students must have an Academic Math of 7 to begin the math sequence. Two ye nigh school algebra and one year of high pre-calculus are recommended to prepa chis program.

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Math and Science (ASMSAS) Associate in Science Degree

Program Effective Term: Fall 2012

This program prepares students to transfer to a four-year college or university to complete a bachelor's degree in biology, chemistry, computer science, math, or physics. The program will give students a solid foundation in math and science. Students should obtain program requirements and transfer equivalencies from the college to which they are transferring.

Articulation:

This program will fulfill MACRAO requirements if, in addition to the courses completed to meet General Education requirements, students complete one additional course in Social and Behavioral Science. Students must have their transcripts certified for MACRAO completion by the WCC Student Records Office.

Program Admission Requirements:

- Students must have an Academic Math Level of 7 to begin the math sequence. Two years of high school algebra and one year of high school pre-calculus are recommended to prepare for this program.

- The chemistry, physics, and computer science concentrations require one semester of high school physics or PHY 105 or PHY 111 with a "C" or better to enroll in PHY 211.

- The biology, chemistry, and physics concentrations require one year of high school chemistry or CEM 090 to enroll in CEM 111.

		· .]
ENG 111	Composition I	4
ENG 226	Composition II	3
COM 101	Fundamentals of Speaking	3
MTH 191	Calculus I	5
BIO 101 or	Concepts of Biology*	
CEM 111 or	General Chemistry I	
PHY 111	General Physics I	4
PSY 100	Introduction to Psychology	3
PLS 112	Introduction to American Government	3
Arts/Human.	Elective(s)	6
Computer Lit.	Elective(s)	3
CPS 171	Introduction to Programming with C++	4
MTH 192	Calculus II	4
BIO 103 or	General Biology II*	

CEM 122 or General Chemistry II PHY 122 General Physics II

Minimum Concentration Credits Required for the Program:

Complete the requirements for one of the following concentrations. The same course may not be used to meet both a concentration requirement and other program requirements above. Please consult an advisor to select appropriate electives.

Math and Science Concentrations

CEM 111 CEM 122 CEM 211 CEM 222	Medicine (BMED) General Chemistry I General Chemistry II Organic Chemistry I Organic Chemistry I Organic Chemistry II	(24 credits) 4 4 4 4
BIO 227 or BIO 228 Elective	Biology of Animals Biology of Plants BIO 102, BIO 111, BIO 208, BIO 215, BIO 227, BIO 228, or BIO 237	4 4-5
Chemistry/P CEM 111 CEM 122 CEM 211 CEM 222 MTH 197 MTH 293	Te-Medicine (CMED) General Chemistry I General Chemistry II Organic Chemistry I Organic Chemistry I Linear Algebra Calculus III	(24.credits) 4 4 4 4 4 4 4 4
CPS 271 CPS 272	COMS) Object Features of C++ Data Structures with C++	(22 credits) 4 4 Page 2 of 9

MTH 197 MTH 293 Elective	Linear Algebra Calculus III Take an additional six credits	4 4 6
Mathematics		(25 credits)
MTH 160	Basic Statistics	4
MTH 197	Linear Algebra	4
MTH 293	Calculus III	4
MTH 295	Differential Equations	4
Elective	Take an additional nine credits	9
Physics/Pre-	Engineering (PENG)	(26 credits)
CEM 111	General Chemistry I	4
MTH 197	Linear Algebra	4
MTH 293	Calculus III	4
MTH 295	Differential Equations	4
PHY 211	Analytical Physics I	- 5
PHY 222	Analytical Physics II	5
Minimum Cre	dits Required for the Program:	68
Notes:		

*The BMED concentration requires BIO 101 & BIO 103. The CMED, COMS, and PENG concentrations require PHY 111 & PHY 122. The MATH concentration may choose the BIO, CEM or PHY sequence.

Math and Science

Learn more about math or science through this associate degree program.

Monday, December 19, 2011 3:53:7 p.m.

Program Code: ASMSAS	Program Nar	ne: Math and Science A	5 program	Effective Term: f07
Division Code: MNB	Department:	Math & Natural Sciences		
Directions:				
1. Attach the current pro	ogram listing from	the WCC catalog or Web	site and indicate any o	changes to be made.
2. Draw lines through an a separate sheet.	ny text that should	l be deleted and write in ac	ditions. Extensive na	rrative changes can be included on
new courses as part o	f the proposed pro	f change being proposed. ogram change, must be app s the program change form	proved separately using	iscontinuing a course, or adding g a Master Syllabus form, but
Requested Changes:				
Review Remove course(s): Add course(s): Program title (title w Description Type of award Advisors Articulation informa Show all changes on the a	as tion)	plan that includes for phasing out co Other remove cho	lity requirements es ormation attach program discontinuation transition of students and timetabl
Rationale for propose Transfer implications &				
Financial/staffing/eq	luipment/space	implications:		
1		ulted regarding their use	of this program.	
List departments that	t have been const	uncu regularing their acc		
List departments that Signatures:	t have been const	uncu regurung men uce		ure Date

Kevlewer	Filit Ivanic	orginature	- Dute
Initiator	L. Nelson		
Department Chair	R. Hagood	-lot 7030	3/24/07
Division Dean/Administrator	M. Showalter	Mr. Januar 1	3/29/07
Vice President for Instruction		Moner M. Joley.	4/5/07
President			
Do not write in shaded area. Entered	in: Banner C&A Database	Log File 7/29/075 Board Approval_	

Please submit completed form to the Office of Curriculum and Assessment and email an electronic copy to <u>sjohn@wccnet.edu</u> for posting on the website.

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University Transfer Programs

Math and Science (ASMSAS)

Associate in Science Degree

Program Effective Term: Fall 2007

This program prepares students to transfer to a four-year college or university to complete a bachelor's degree in biology, chemistry, computer science, math, or physics. The program will give students a solid foundation in math and science. Students should obtain program requirements and transfer equivalencies from the college to which they are transferring.

Articulation:

This program will fulfill MACRAO requirements if, in addition to the courses completed to meet General Education requirements, students complete one additional course in Social and Behavioral Science. To use MACRAO, students must have their transcripts certified for MACRAO completion by the WCC Student Records Office.

Program Admission Requirements:

- Students must have a minimum COMPASS Trigonometry score of 46 or complete (MTH 176 and MTH 178) or MTH 180 with a grade of "C" or better to begin the math sequence. Two years of high school algebra and one year of high school pre-calculus are recommended to prepare for this program.

- The chemistry, physics, and computer science concentrations require one semester of high school physics or PHY 105 or PHY 111 with a "C" or better to enroll in PHY 211.

- A high school computer course or CIS 100 is required to enroll in CIS 110.

- The biology, chemistry, and physics concentrations require one year of high school chemistry or CEM 090 to enroll in CEM 111.

Continuing Eligibility Requirements:

Students must demonstrate basic computer literacy skills by successfully passing the Computer and Information Literacy Test. The test may be taken at any point during the program, but must be completed before graduating.

General Educa	tion Requirements (31 credits)
ENG 111	Composition I 4
ENG 226	Composition II 3
COM 101	Fundamentals of Speaking 3
MTH 191	Calculus I 5
BIO 101 or	Concepts Of Biology*
PHY 111	General Physics I 4
PSY 100	Introductory Psychology 3
PLS 112	Introduction to American Government 3
Arts/Human.	Elective(s) 6
*The BMED con	centration requires BIO 101 & BIO 103. The CMED, COMS, and PENG concentrations require PHY 111 & PHY 122. The

MATH concentration may choose either the BIO or PHY sequence.

Core Coureas CPS 171	Introduction to Programming with C++	4
MTH 192	Calculus II	4
BIO 103 or	General Biology II	889 200
PHY 122	General Physics II	4

Minimum Concentration Credits Required for the Program:

Complete the requirements for one of the following concentrations. The same course may not be used to meet both a concentration requirement and other program requirements above. Please consult an advisor to select appropriate electives.

Math and Science Concentrations

	(CORRESS)
CEM 111	General Chemistry I 4
CEM 122	General Chemistry II 4
CEM 211	Organic Chemistry I
CEM 222	Organic Chemistry II 4
BIO 227 or	Biology of Animals
BIO 228	Biology of Plants 4
Elective	BIO 102, BIO 111, BIO 208, BIO 215, BIO 227, BIO 228, or BIO 237 4-5

CEM 111	General Chemistry I
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CEM 122	General Chemistry II
CEM 211	Organic Chemistry I 9

Thursday , April 05, 2007 01:04:58 p.m.

Page 1 of 2

22

🗱 Washtenaw Community College

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Program Information Report

CEM 222	Organic Chemistry II
MTH 197	Linear Algebra 4
MTH 293	Calculus III 4
Computer Se	ence (COBS)
CPS 271	Object Features of C++ 4
CPS 272	Data Structures with C++ 4
MTH 197	Linear Algebra 4
MTH 293	Calculus III 4
Elective	Take an additional six credits 6
	(ALANDER)
MTH 160	Basic Statistics 4
MTH 197	Linear Algebra 4
MTH 293	Calculus III 4
MTH 295	Differential Equations 4
Elective	Take an additional nine credits 9
	Engineering (PENG)
CEM 111	General Chemistry I 4
MTH 197	Linear Algebra 4
MTH 293	Calculus III 4
MTH 295	Differential Equations 4
PHY 211	Analytical Physics I 5
PHY 222	Analytical Physics II 5
Minimum Cre	edits Required for the Program: 65

WASHTENAW COMMUNITY COLLEGE

PROGRAM CHANGE FORM

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Program Code:	Program Name: Math and Science Associate in Science		tive Term:		
ASMSAS	Math and Science Associate in Science	<u>105</u>			
Directions:					
	ram listing from the WCC catalog and indicat				
2. Draw lines through any a separate sheet.	text that should be deleted and write in addit	ions. Extensive narrative changes can	be included on		
new courses as part of t	for each type of change being proposed. Change proposed program change, must be appro- the same time as the program change form.	inges to courses, discontinuing a cour ved separately using a Master Syllabus	se, or adding form, but		
Requested Changes:					
) Current credits After changes s ched page from the catalog. changes:	Advisors Articulation information Program admission requireme Continuing eligibility requiren Program outcomes Other <u>readability/format</u>			
Financial/staffing/equi	pment/space implications:				
List departments that have been consulted regarding their use of this program.					
Signatures:					
Reviewer	Print Name	Signature	Date		

Keviewei	1 mit i vanie			
Program Change Initiator				
Department Chair				
Division Dean/Administrator	M. Showalter	m Shawat	4/14/05	
Vice President of Instruction	¥5	Roger M. Palacy	1/25/05	
Please submit completed form to the Office of Curriculum and Assessment.				

Please submit completed form to the Office of Curriculum and ssment.

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Math and Science (ASMSAS)

Associate in Science Degree

Program Effective Term: Fall 2005

This program prepares students to transfer to a four-year college or university to complete a bachelor's degree in biology, chemistry, computer science, math, or physics. The program will give students a solid foundation in math and science. Students should obtain program requirements and transfer equivalencies from the college to which they are transferring.

Articulation:

This program will fulfill MACRAO requirements if, in addition to the courses completed to meet General Education requirements, students complete one additional course in Social and Behavioral Science. To use MACRAO, students must have their transcripts certified for MACRAO completion by the WCC Student Records Office.

Program Admission Requirements:

- Students must have a minimum COMPASS Trigonometry score of 46 or complete (MTH 176 and MTH 178) or MTH 180 with a grade of "C" or better to begin the math sequence. Two years of high school algebra and one year of high school pre-calculus are recommended to prepare for this program.

- The chemistry, physics, and computer science concentrations require one semester of high school physics or PHY 105 or PHY 111 with a "C" or better to enroll in PHY 211.

- A high school computer course or CIS 100 is required to enroll in CIS 110.

- The biology, chemistry, and physics concentrations require one year of high school chemistry or CEM 057 to enroll in CEM 111.

Continuing Eligibility Requirements:

Students must demonstrate basic computer literacy skills by successfully passing the Computer and Information Literacy Test. The test may be taken at any point during the program, but must be completed before graduating.

(12 credits)

General Education Requirements (31 credit		
ENG 111	Composition I	4
ENG 107* or	Technical Writing	
ENG 226	Composition II	3
COM 101	Fundamentals of Speaking	3
MTH 191	Calculus I	5
BIO 101** or	Concepts Of Biology	
PHY 111	General Physics I	4
PSY 100	Introductory Psychology	3
PLS 112	Introduction to American Government	3
Arts/Human.	Elective(s)	6
*The Chemist	to/Pre-Medicine and Physics concentrations require FNG 10	7 [.] all

'The Chemistry/Pre-Medicine and Physics concentrations require ENG 107; al other concentrations require ENG 226.

**The Biology/Pre-Medicine concentration requires BIO 101 & 103; the Mathematics concentration can use either the BIO or PHY sequence; all other 9/15/05 make convection on Web fr concentrations require PHY 241 & 222:

111+122

Core Courses

	41363	(12 0104100)
CPS 171	Introduction to Programming with C++	4
MTH 192	Calculus II	4
BIO 103 or	General Biology II	
PHY 122	General Physics II	4

Minimum Concentration/Option Credits Required for the Program:

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Complete the requirements for one of the following concentrations. The same course may not be used to meet both a concentration requirement and other program requirements above. Please consult an advisor to select appropriate electives.

Minimum	Credits	Required	for the	Program
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Math and Science Concentrations

	re-Medicine (BMED) (24 Credits) es Department
CEM 111	General Chemistry I
CEM 122	General Chemistry II
CEM 211	Organic Chemistry I
CEM 222	Organic Chemistry II
Choose:	BIO 227 Biology of Animals or
	BIO 228 Biology of Plants
Elective	BIO 102, BIO 111, BIO 208, BIO 215, BIO 216, BIO 227, BIO 228, BIO 237
· · · · · · · · · · · · · · · · · · ·	/Pre-Medicine (CMED) (24 Credits)
Physical Sci Advisor:	iences Department
CEM 111	General Chemistry I
CEM 122	General Chemistry II
CEM 211	Organic Chemistry I
CEM 222	Organic Chemistry II
MTH 197	Linear Algebra
MTH 293	Calculus III
	Science (COMS) (25 Credits)
CIS 238	PC Assembly Language
CPS 271	Object Features of C++
CPS 272	Data Structures with C++
MTH 197	Linear Algebra
MTH 293	Calculus III
Elective	take an additional six credits
	ics (MATH) (25 Credits)
Mathematic Advisor:	s Department
MTH 160	Basic Statistics
MTH 197	Linear Algebra
MTH 293	Calculus III
MTH 295	Differential Equations
Elective	take an additional nine credits

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Physics/Pre-Engineering (PENG) (26 Credits) Department Advisor:

CEM 111	General Chemistry I	4
MTH 197	Linear Algebra	4
MTH 293	Calculus III	4
MTH 295	Differential Equations	4
PHY 211	Analytical Physics I	5
PHY 222	Analytical Physics II	5

Program Approval Document

Associate In Science In

MATH AND SCIENCE

Prepared by

Kathy Butcher, James Egan and David Shier Math and Natural Sciences Division Washtenaw Community College

April 21, 1999

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WASHTENAW COMMUNITY COLLEGE PROGRAM AUTHORIZATION FORM

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Date

1.	Program Title: Science And	Math Associate In Scie	nce Degree	Program Code: MSAS
2.	Division: MNS	3. Department:		CIP Code:
4.	Type of Program: A.A	A. 🛛 A.S.	🗌 A.A.S.	A.T.S.
	Advanced Certificate	Mastery Certificate	Achievement Ce	
5.	Will this program be Perkins fu	Inded? 🗌 yes	🗌 no	6. Effective Year: Fall 1999
7.	(BS) degree program in the	ransfer to a four-year co e sciences. Four-year li dies emphasize communduates become teache	iberal arts graduat inication, analytica rs, scientists, cher	y to complete a bachelor of science es prepare for a wide variety of jobs al, computational, scientific, and critical mists, biologists, doctors, laboratory s.

8. Advisors: Kathy Butcher, James Egan, Judith Fish, David Shier

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9. Admissions Criteria:	10. Criteria for Continuing Program Eligibility:
The following high school courses or WCC	
equivalents must be completed with a grade of "C" or better:	
-Two years of high school algebra and one year of	
high school analysis and trigonometry or MTH 178	
and 179.	
-One year of high school chemistry -Passing scores on the College's entering student	
placement tests in reading, writing, and math.	

11. Attach a Program Approval Document [PAD], which includes the following: G. Analysis of Affected Instructional Units D. Enrollment Projections A. Program Description H. Articulations E. Program Cost Analysis B. Program Goals I. Licensure/Accreditation F. Course Descriptions C. Needs Assessment /Signature Print Name Approval Recommended: 11

		5/11/59
Program initiator: K. Butcher, J. Egan, D. Shier	James y	
	Dame C. E	Stulss
Dept. Chain/Dir.: same as above		
Tuten Deak	Marrie CE	5/11/55
Dean/Admin .: George Griewold - James Egan	- Aller -	PLITEC
	The Aller	5/4/17
VP, Instr/Stud Ser: <u>Guy Altieri</u>	- And Carlie	16:00
La sur a 1876 Marca stile	Prophet & Meurtre	6/3/97
President: Larry Whitworth		
Dete of Board Approval: May 25, 1999		
Date of Board Approval: 11100 0511999	— ()	
Available on disk	\bigcirc	

COURSE REQUIREMENTS FOR PROGRAM

Course	Title	Credit	Pre-requisites/Co-requisites
BIO 101	Concepts of Biology	4	BIO 101L (co-req)
COM 101	Fundamentals of Speaking	3	None
CPS 171	Introduction to Programming with C++	4	MTH 169 or two years HS algebra; CIS 100 or CIS 110 or HS computer class
ENG 111	Composition I	4	ENG 000
ENG 122	Composition II	3	ENG 111
MTH 191	Calculus I	5	MTH 178 and MTH 179
MTH 192	Calculus II	4	MTH 191
PLS 112	Introduction to American Government	3	None
PSY 100 (optional)	Introductory Psychology	3	None
Select courses based on major:			
Biology & General Science:			
BIO 103	General Biology II	4	BIO 101; CEM 111; or Consent
BIO 215	Introduction to Cell Physiology	3	CEM 111; BIO 101; or Consent
BIO 216	Cell Physiology Lab	1	BIO 215 (co-req)
BIO 227	Zoology	4	BIO 101 or Consent
BIO 228	Botany	4	BIO 101 or Consent
CEM 111	General Chemistry I	1	CEM 057, or HS chemistry; HS algebra
CEM 122	General Chemistry II	4	CEM 111; MTH 169
CEM 211	Organic Chemistry I	4	CEM 111
CEM 222	Organic Chemistry II	4	CEM 122; CEM 211
Chemistry & Pre-Medicine			
CEM 111	see above		

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	Minimum Credits Required	: 60	
MTH 295	Differential Equations	4	MTH 197; MTH 293
MTH 293	see above		
MTH 197	see above		
MTH 160	Basic Statistics	4	MTH 097
Math:			
PHY 222	see above	Ì	
PHY 211	see above		
MTH 293	Calculus III	4	MTH 192; MTH 197 (co-req)
MTH 197	Linear Algebra	4	MTH 191
CIS 238	PC Assembly Language	3	1 semester computer program language
CPS 272	Data Structures with C++	4	CPS 171, or CPS 290, or consent
CPS 271	Object Features of C++	4	CPS 171 or consent
CPS 171	Introduction to Programming with C++	4	MTH 169 or two years HS algebra; CIS 100 or CIS 110 or HS computer class
Computer Science			
CEM 222	see above		
CEM 211	see above		
CEM 122	see above		
CEM 111	see above		
Physics:			
РНҮ 222	Analytical Physics II	5	PHY 211; PHY 222L (co-req)
PHY 211	Analytical Physics I	5	MTH 191; PHY 105 or PHY 111 or HS Physics
EM 222	see above		
EM 211	see above		
EM 122	see above		

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A. PROGRAM DESCRIPTION

This program prepares to transfer to a four-year college or university to complete a bachelor of science (BS) degree program in the sciences. Four-year liberal arts graduates prepare for a wide variety of jobs and professions. Their studies emphasize communication, analytical, computational, scientific, and critical thinking skills. Science graduates become teachers, scientists, chemists, biologists, doctors, laboratory researchers, nurses, pharmacists, among other possible professions.

B. PROGRAM GOALS

To prepare students for a successful transfer to a four-year institution in a science or math field

C. NEEDS ASSESSMENT

Employment Outlook

Information about employment trends indicate that the professions of biological, medical and physical scientists and chemists will grow faster than average from 1998-2006. Nationally, from 1998 through 2006, there will be a 20% increase in the openings for chemists and a 25% increase for scientists.

In the Ann Arbor area, it is expected that there will be 28% increase in openings for medicine and health science managers and a 35% increase in math and natural science managers.

Expected Earnings/Wages

Nationally, average salaries for biologists with bachelor's degrees were approximately \$25,868 and for chemists, the average salary was \$49,400. In Michigan, the annual salary range for biologists was between \$27,800-\$58,400 and for chemists \$29,114-\$50,998. (Michigan Occupational Information System, 1998).

D. ENROLLMENT PROJECTIONS

Estimated Number of Students per Year

We expect to enroll between 40-50 students the first semester and expect increased enrollments once this program becomes established.

Longevity of Program

E. PROGRAM COST ANALYSIS

Start-up Costs

There are no additional costs for this program.

F. COURSE DESCRIPTIONS

1. BIO 101: Concepts of Biology

Basic principles and concepts of biology are surveyed in lecture and laboratory with emphasis on biological processes as well as practical applications. if followed by BIO 103, this course provides a comprehensive year sequence for biology majors. Taken alone, it serves as a good introduction to biology for non-science students.

2. BIO 103: General Biology II

The emphasis in this course is on analyzing the processes and mechanisms involved in biological systems including the cell, genetics, organisms and ecology/evolution. Topics are covered from an experimental point of view. This course, with BIO 101, provides a

Document Code: Science & Math Approval

comprehensive survey of biological concepts and shows the interrelationship of topics covered from the molecular to the population level. This course is required for the Biology/Pre-medicine Program.

3. BIO 215: Introduction to Cell Physiology

Introduction to the chemistry and physiology of living cells, including cell metabolism, membrane permeability and excitability, movement and contractile elements, gene expression and protein synthesis. Properties common to all living things will be emphasized, as well as the importance of those properties in the human organism.

4. BIO 216: Cell Physiology Lab

This is a lab course designed to be taken concurrently with BIO 215, Introduction to Cell Physiology.

5. BIO 227: Zoology

Lecture, field, and laboratory investigation provide an intensive study of the classification, evolutionary relationship, structure, and function of the major animal groups. Included are the sponges, jellyfish, worms, mollusks, insects, arthropods, starfish and other echinoderms, fish, amphibians, reptiles, birds and mammals.

6. BIO 228: Botany

In this class, field and laboratory investigations provide detailed study of plant structure and function. It is for students with a general interest in plants or to provide a basis for further work in botany or other programs.

7. CEM 111: General Chemistry I

This course covers the major topics in chemistry. Laws of chemical combination, states of matter, atomic and molecular structure, bonding, and other basic principles are covered. It is for students in a professional or preprofessional curriculum.

8. CEM 122: General Chemistry II

This course covers four major topics in chemistry: kinetics, chemical thermodynamics, chemical equilibria, and electrochemistry. Laboratory work includes qualitative and quantitative analysis.

9. CEM 211: Organic Chemistry I

This course provides students with the background in nomenclature of organic chemistry, stereochemistry, the preparation and reactions of aliphatic and aromatic compounds. Students also practice the preparation and handling of organic compounds in the laboratory. This is the first course in a two-semester sequence.

10. CEM 222: Organic Chemistry II

This course provides a continued exploration of nomenclature, stereochemistry, preparations and reactions of organic compounds including spectroscopic analysis in the laboratory. Students apply the techniques used in CEM 211 to the synthesis and analysis of complex organic compounds. Laboratory work includes hands-on spectroscopic analysis (IR, GC, and NMR) of products and unknowns. This is the second course in a two semester sequence of organic chemistry.

11. CIS 238: PC Assembly Language

This is a first course in the PC assembly language. The organization of the 80x86 microprocessor is examined to aid in the study of the instruction set. Topics include various character/numeric conversions, twos and tens complement arithmetic. string and bit manipulation, the calling of assembly language routines from other assembly programs as well as from high level language programs, and the use and modification of DOS and BIOS interrupt routines.

12. COM 101: Fundamentals of Speaking

Instruction is provided in essential speaking and listening skills. Through the use of practical experience, students receive help in organization and delivery. The course attempts to relieve the stress the average person encounters when speaking in public. Students gain a heightened awareness of the relationship between speaker and audience.

13. CPS 171: Introduction to Programming with C++

This course is an introduction to programming with C++ language. Students should have basic experience using a computer but no prior programming is required. (Experienced programmers should consider CPS 290). Students learn about problem solving strategies, top-down program development and programming style. Topics include sequential, decision and iterative control structures, functions, basic data structures, and an introduction to classes. Students write and execute approximately eight C++ programs.

14. CPS 271: Object Features of C++

This course continues the study of C++ begun in CPS 171. (Experienced programmers should consider CPS 290.) Students learn the object-oriented features of the language. Topics include classes, constructors and destructors, operator overloading, pointers, dynamic allocation of memory, inheritance, polymorphism, file manipulation, templates, and exceptions.

15. CPS 272: Data Structures with C++

This is the third of a sequence of C++ courses, following CPS 171 and CPS 271. The course covers more advanced computer science features as implemented in C++. Topics include testing, verification and complexity of algorithms, recursion, advanced data structures, class libraries, and techniques for team design of large programs.

16. ENG 111: Composition I

This course focuses on developing skills in critical reading, logical thinking, and written composition (from paragraphs to expository essays and documented papers). Reading materials serve as a basis for papers and classroom discussions. Students write both in-class and outside themes frequently. Methods of organization and development are emphasized.

17. ENG 122: Composition II

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This course is a continuation of ENG 111 and further develops critical reading and logical thinking skills. Students will write argumentative essays using a variety of formats. The research paper is emphasized.

18. MTH 160: Basic Statistics

This course provides students with a general understanding of statistical concepts dealing with the processing and interpretation of numerical information. Topics covered include describing a numerical data set, central tendency, variability, probability distributions, inference, and hypothesis testing. This course transfers to many four-year institutions. A graphing calculator is required for this course. Consult the time schedule for current brand and model.

19. MTH 191: Calculus I

This is first-semester college calculus of one variable. Topics include limits, continuity, derivatives, applications of derivatives, elementary integration, and applications of integration. This course transfers to four-year institutions. A graphing calculator is required for this course. Consult the time schedule for current brand and model.

20. MTH 192: Calculus II

This is second-semester college calculus of one variable. Topics include the calculus of transcendental functions, techniques of integration, indeterminate forms and improper integrals, sequences and series, parametric equations and polar coordinates. This course transfers to four-year institutions. A graphing calculator is required for this course.

21. MTH 197: Linear Algebra

This is an introductory college course in linear algebra. Topics include linear systems of equations, properties of vectors and matrices, determinants, vector spaces, linear transformations, eigenvalues, and applications. This course transfers to four-year institutions. A graphing calculator is required for this course. Consult the time schedule for current brand and model.

22. MTH 293: Calculus III

This is the third-semester college calculus of more than one variable. Topics include geometry in the plane and in space, vector-valued functions, partial derivatives, multiple integrals, and an introduction to vector calculus. This course transfers to four-year institutions.

23. MTH 295: Differential Equations

This is a first college course in elementary differential equations. Topics include techniques for solving ordinary differential equations of order one, techniques for solving linear equations, applications, the Laplace transform, and solving linear systems of equations using eigenvalues. This course transfers to four-year institutions. A graphing calculator is required for this course. Consult the time schedule for current brand and model.

24. PHY 211: Analytical Physics I

The first of a two-course sequence in calculus-based physics for students intending to major in science or engineering, PHY 211 develops the concepts of mechanics, heat, and wave motion. Laboratory exercises are included to assist students' understanding of these topics.

25. PHY 222: Analytical Physics II

This second part of a two-course sequence in calculus-based physics covers the concepts of electromagnetism, light, and modern physics extending the student's knowledge of physics learned in PHY 211.

27. PLS 112: Introduction to American Government

This class studies the forms and functions of American government with emphasis on national government. The decision-making process in Congress, the Presidency and the federal court system are studied. The course also examines the relationship of political parties and public opinion to the electoral process. This course is also taught as a television course.

G. ANALYSIS OF AFFECTED INSTRUCTIONAL UNITS AND CORE CURRICULUM

All of the affected instructional units are in support of this program.

H. ARTICULATIONS

This program is considered a university parallel program and all the courses transfer to the four-year institutions. Students still need to consult with a transfer counselor or academic advisor to select elective courses for their program that are equivalent to the courses required by the college and major to which they will transfer. Transfer guides with specific course requirements and WCC equivalencies are available for most Michigan colleges and universities in the Transfer and Placement Center.

I. LICENSURE/ACCREDITATION (IF APPLICABLE)

ASSOCIATE IN SCIENCE DEGREE: Science and Math

General Requirements	nts (33-34 credits)* ENG 111&122 Composition I&II
Computers	CPS 171 Introduction to Programming with C++ 4
Humanities ^{UM1}	Select one courses in arts and humanities (choose from the list on p. 60 in the WCC Catalog)
Mathematics	MTH 191 Calculus I
Behavioral/ Social/Science	PLS 112 Introduction to American Government
Science	Choose either: BIO 101 Concepts of Biology or Physics 211 Analytical Physics I
Concentration	Frank Requirements (29-33 Credits)

Select a concentration in Biology and General Science Physics, Computer Science or Math. Please consult with an advisor prior to beginning these concentrations.

Biology & Pre-Medicine:	The following courses are required: BIO 103, 215, 216, 227, and 228; CEM 111, 122, 211 and 222
Chemistry & Pre-Medicine:	The following courses are required: CEM 111, 122, 211 and 222; MTH 197 and 293; and PHY 222. Students must select additional 4 hours in chemistry
Physics:	The following courses are required: CEM 111, 122, 211 and 222; MTH 197, 293 and 295; and PHY 222
Computer Science:	The following courses are required: CPS 271, 272; CIS 238; MTH 197, 293; and PHY 222. Select an additional 6-8 credit hours in the humanities, social, and/or behavioral sciences(30-32)
Math:	The following courses are required: MTH 160, 197, 293; and 295; Choose either BIO 103 or PHY 222. Select an additional 12 credit hours in the humanities, social, and/or behavioral sciences
Minimum Credits	

SCIENCE and MATH

to transfer to a This of 1 or university to 晋 eductor of science (BS) in the sciences. Foura graduates prepare for ny of jobs and ir studies emphasize mitytical, fic and critical nee graduates mists, chemists, laboratory ICIALS. inne

*If students are transferring to EMU or other Michigan universities, one option is to follow the MACRAO agreement. This agreement outlines a series of liberal arts courses that meet the general education requirements at various fouryear institutions. See p. 230 in the WCC Catalog and a counselor for additional information.

Except for the BGS degree, UM requires a minimum of 16 credit hours of one foreign language or fourth semester proficiency. Foreign language courses usually transfer in full year sequences only.