

# MATH AND SCIENCE (AS)

**Catalog Effective Term:** Fall 2024

**Program Code:** ASMSAS

**Credential:** Associate in Science

*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.

## 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

- Two years of high school algebra and one year of high school pre-calculus are recommended to prepare for this program.
- An Academic Math Level of 7 is required to begin the math sequence.
- The biology and chemistry concentrations require one year of high school chemistry or CEM 101 Introductory Chemistry with a "C" or better to enroll in CEM 111 General Chemistry I.

Complete one of the following concentrations:

- Biology/Pre-Medicine
- Chemistry/Pre-Medicine
- Mathematics
- Pre-Actuarial Science
- Pre-Pharmacy

*These concentrations may also list courses used to meet General Education requirements.*

See **Requirements** below for required courses for each concentration. See **Concentrations** below for full suggested layouts and total credits required for each concentration.

## Requirements

### Biology/Pre-Medicine Requirements (BMED)

Code	Title	Credits
CEM 111	General Chemistry I	4
CEM 122	General Chemistry II	4
CEM 211	Organic Chemistry I	4
CEM 222	Organic Chemistry II	4
Select one of the following electives:		4-5
BIO 111	Anatomy and Physiology - Normal Structure and Function	
BIO 208	Genetics	
BIO 215	Cell and Molecular Biology	

BIO 227	Biology of Animals
BIO 237	Microbiology

### Chemistry/Pre-Medicine Requirements (CMED)

Code	Title	Credits
CEM 111	General Chemistry I	4
CEM 122	General Chemistry II	4
CEM 211	Organic Chemistry I	4
CEM 222	Organic Chemistry II	4
MTH 197	Linear Algebra	4

### Mathematics Requirements (MATH)

Code	Title	Credits
MTH 160	Basic Statistics	4
MTH 191	Calculus I	5
MTH 192	Calculus II	4
MTH 197	Linear Algebra	4
MTH 293	Calculus III	4
MTH 295	Differential Equations	4

### Pre-Actuarial Science Requirements (PPAS)

Code	Title	Credits
ECO 211	Principles of Economics I	3
ECO 222	Principles of Economics II	3
MTH 191	Calculus I	5
MTH 192	Calculus II	4
MTH 197	Linear Algebra	4
MTH 293	Calculus III	4

### Pre-Pharmacy Requirements (PPHA)

Code	Title	Credits
ASMSAS Restricted Elective(s) (p. 3) (PPHA, select two)		
CEM 211	Organic Chemistry I	4
CEM 222	Organic Chemistry II	4
PHY 111	General Physics I	4
PHY 122	General Physics II	4

## Concentrations

### Biology /Pre-Medicine Concentration (BMED)

Minimum Credits Required for the Concentration or Option: 60

Course	Title	Credits
<b>First Semester</b>		
BIO 162	General Biology II Cells and Molecules	4
CEM 111	General Chemistry I	4
Select one of the following:		
MTH 176	College Algebra	4
MTH 191	Calculus I <sup>1</sup>	4
Open Elective(s) to reach a minimum of 60 total credits.		5
<b>Credits</b>		<b>17</b>
<b>Second Semester</b>		
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 <sup>2</sup> or Calculus II	4
<b>Credits</b>		<b>16</b>
<b>Third Semester</b>		
CEM 211	Organic Chemistry I	4
Soc. Sci. Elective(s) ( <a href="https://coursecatalog.wccnet.edu/academics/general-education/#socbehavsci">https://coursecatalog.wccnet.edu/academics/general-education/#socbehavsci</a> )		3
Speech/Comp. Elective(s) ( <a href="https://coursecatalog.wccnet.edu/academics/general-education/#writing">https://coursecatalog.wccnet.edu/academics/general-education/#writing</a> )		3
Select one of the following:		4
BIO 111	Anatomy and Physiology - Normal Structure and Function	
BIO 208	Genetics <sup>3</sup>	
BIO 215	Cell and Molecular Biology	
BIO 227	Biology of Animals	
BIO 237	Microbiology	
<b>Credits</b>		<b>14</b>
<b>Fourth Semester</b>		
CEM 222	Organic Chemistry II	4
Arts/Human. Elective(s) ( <a href="https://coursecatalog.wccnet.edu/academics/general-education/#arthuma">https://coursecatalog.wccnet.edu/academics/general-education/#arthuma</a> ) 1		3
Arts/Human. Elective(s) ( <a href="https://coursecatalog.wccnet.edu/academics/general-education/#arthuma">https://coursecatalog.wccnet.edu/academics/general-education/#arthuma</a> ) 2		3
Soc. Sci. Elective(s) ( <a href="https://coursecatalog.wccnet.edu/academics/general-education/#socbehavsci">https://coursecatalog.wccnet.edu/academics/general-education/#socbehavsci</a> )		3
<b>Credits</b>		<b>13</b>
<b>Total Credits</b>		<b>60</b>

<sup>1</sup> Students transferring to EMU as a biology major may substitute MTH 176 College Algebra or any higher 4-credit hour math course for MTH 191 Calculus I.

<sup>2</sup> Students transferring to EMU as a biology major may substitute MTH 160 Basic Statistics or higher for MTH 192 Calculus II.

<sup>3</sup> Students transferring to EMU as a biology major may consider completing BIO 208 Genetics at WCC prior to transfer.

## Chemistry/Pre-Medicine Concentration (CMED)

Minimum Credits Required for the Concentration or Option: 60

Course	Title	Credits
<b>First Semester</b>		
CEM 111	General Chemistry I	4
MTH 191	Calculus I	5
PHY 111	General Physics I	4
Open Elective(s) to reach a minimum of 60 total credits.		3
<b>Credits</b>		<b>16</b>
<b>Second Semester</b>		
CEM 122	General Chemistry II	4
ENG 111	Composition I	4
MTH 192	Calculus II	4
PHY 122	General Physics II	4
<b>Credits</b>		<b>16</b>

<b>Third Semester</b>		
CEM 211	Organic Chemistry I	4
MTH 197	Linear Algebra	4
Soc. Sci. Elective(s) ( <a href="https://coursecatalog.wccnet.edu/academics/general-education/#socbehavsci">https://coursecatalog.wccnet.edu/academics/general-education/#socbehavsci</a> )		3
Speech/Comp. Elective(s) ( <a href="https://coursecatalog.wccnet.edu/academics/general-education/#writing">https://coursecatalog.wccnet.edu/academics/general-education/#writing</a> )		3
<b>Credits</b>		<b>14</b>
<b>Fourth Semester</b>		
CEM 222	Organic Chemistry II	4
Arts/Human. Elective(s) ( <a href="https://coursecatalog.wccnet.edu/academics/general-education/#arthuma">https://coursecatalog.wccnet.edu/academics/general-education/#arthuma</a> ) 1		3
Arts/Human. Elective(s) ( <a href="https://coursecatalog.wccnet.edu/academics/general-education/#arthuma">https://coursecatalog.wccnet.edu/academics/general-education/#arthuma</a> ) 2		3
Soc. Sci. Elective(s) ( <a href="https://coursecatalog.wccnet.edu/academics/general-education/#socbehavsci">https://coursecatalog.wccnet.edu/academics/general-education/#socbehavsci</a> )		3
Open Elective(s) to reach a minimum of 60 total credits.		1
<b>Credits</b>		<b>14</b>
<b>Total Credits</b>		<b>60</b>

## Mathematics Concentration (MATH)

Minimum Credits Required for the Concentration or Option: 60

Course	Title	Credits
<b>First Semester</b>		
ENG 111	Composition I	4
MTH 191	Calculus I	5
Select one of the following:		3
CPS 120	Introduction to Computer Science	
CPS 141	Introduction to Programming Using Python	
CPS 161	An Introduction to Programming with Java	
CPS 171	Introduction to Programming with C++	
Nat. Sci. Elective(s) ( <a href="https://coursecatalog.wccnet.edu/academics/general-education/#naturalsci">https://coursecatalog.wccnet.edu/academics/general-education/#naturalsci</a> )		3
<b>Credits</b>		<b>15</b>
<b>Second Semester</b>		
MTH 160	Basic Statistics	4
MTH 192	Calculus II	4
Nat. Sci. Lab Elective(s) ( <a href="https://coursecatalog.wccnet.edu/academics/general-education/#natsscilib">https://coursecatalog.wccnet.edu/academics/general-education/#natsscilib</a> )		3
Soc. Sci. Elective(s) ( <a href="https://coursecatalog.wccnet.edu/academics/general-education/#socbehavsci">https://coursecatalog.wccnet.edu/academics/general-education/#socbehavsci</a> )		3
<b>Credits</b>		<b>14</b>
<b>Third Semester</b>		
MTH 197	Linear Algebra	4
MTH 293	Calculus III	4
Soc. Sci. Elective(s) ( <a href="https://coursecatalog.wccnet.edu/academics/general-education/#socbehavsci">https://coursecatalog.wccnet.edu/academics/general-education/#socbehavsci</a> )		3
Speech/Comp. Elective(s) ( <a href="https://coursecatalog.wccnet.edu/academics/general-education/#writing">https://coursecatalog.wccnet.edu/academics/general-education/#writing</a> )		3
Open Elective(s) to reach a minimum of 60 total credits.		3
<b>Credits</b>		<b>17</b>
<b>Fourth Semester</b>		
MTH 295	Differential Equations	4

Arts/Human. Elective(s) ( <a href="https://coursecatalog.wccnet.edu/academics/general-education/#arthuma">https://coursecatalog.wccnet.edu/academics/general-education/#arthuma</a> ) 1	3
Arts/Human. Elective(s) ( <a href="https://coursecatalog.wccnet.edu/academics/general-education/#arthuma">https://coursecatalog.wccnet.edu/academics/general-education/#arthuma</a> ) 2	3
Open Elective(s) to reach a minimum of 60 total credits.	4
<b>Credits</b>	<b>14</b>
<b>Total Credits</b>	<b>60</b>

## Pre-Actuarial Science Concentration (PPAS) - available online

Minimum Credits Required for the Concentration or Option: 60

Course	Title	Credits
<b>First Semester</b>		
ACC 111	Principles of Financial Accounting	3
CPS 161	An Introduction to Programming with Java	4
ENG 111	Composition I	4
MTH 191	Calculus I	5
<b>Credits</b>		<b>16</b>
<b>Second Semester</b>		
ACC 122	Principles of Managerial Accounting	3
ECO 211	Principles of Economics I	3
MTH 192	Calculus II	4
Arts/Human. Elective(s) ( <a href="https://coursecatalog.wccnet.edu/academics/general-education/#arthuma">https://coursecatalog.wccnet.edu/academics/general-education/#arthuma</a> ) 1		3
Nat. Sci. Elective(s) ( <a href="https://coursecatalog.wccnet.edu/academics/general-education/#naturalsci">https://coursecatalog.wccnet.edu/academics/general-education/#naturalsci</a> )		3
<b>Credits</b>		<b>16</b>
<b>Third Semester</b>		
ECO 222	Principles of Economics II	3
MTH 197	Linear Algebra	4
Nat. Sci. Lab Elective(s) ( <a href="https://coursecatalog.wccnet.edu/academics/general-education/#natcilab">https://coursecatalog.wccnet.edu/academics/general-education/#natcilab</a> )		3
Soc. Sci. Elective(s) ( <a href="https://coursecatalog.wccnet.edu/academics/general-education/#socbehavsci">https://coursecatalog.wccnet.edu/academics/general-education/#socbehavsci</a> ) <sup>1</sup>		3
<b>Credits</b>		<b>13</b>
<b>Fourth Semester</b>		
MTH 293	Calculus III	4
Arts/Human. Elective(s) ( <a href="https://coursecatalog.wccnet.edu/academics/general-education/#arthuma">https://coursecatalog.wccnet.edu/academics/general-education/#arthuma</a> ) 2 <sup>2</sup>		3
Speech/Comp. Elective(s) ( <a href="https://coursecatalog.wccnet.edu/academics/general-education/#writing">https://coursecatalog.wccnet.edu/academics/general-education/#writing</a> )		3
Open Elective(s) to reach a minimum of 60 total credits.		5
<b>Credits</b>		<b>15</b>
<b>Total Credits</b>		<b>60</b>

<sup>1</sup> See the MTA (<https://coursecatalog.wccnet.edu/academics/michigan-transfer-agreement-mta/>) list to make course selections from any discipline except ECO.

<sup>2</sup> Transfer students should consider a course from the the EMU Diverse Word Requirements list (<https://www.wccnet.edu/learn/transfer-wcc-credits/emu-diverse-world.php>).

## Pre-Pharmacy (PPHA) Concentration

Minimum Credits Required for the Concentration or Option: 60

Course	Title	Credits
<b>First Semester</b>		
CEM 111	General Chemistry I	4
MTH 191	Calculus I	5
Arts/Human. Elective(s) ( <a href="https://coursecatalog.wccnet.edu/academics/general-education/#arthuma">https://coursecatalog.wccnet.edu/academics/general-education/#arthuma</a> ) 1		3
ASMSAS Restricted Elective(s) (p. 3) (PPHA)		4
<b>Credits</b>		<b>16</b>
<b>Second Semester</b>		
CEM 122	General Chemistry II	4
ENG 111	Composition I	4
ASMSAS Restricted Elective(s) (p. 3) (PPHA)		4
Open Elective(s) to reach a minimum of 60 total credits.		3
<b>Credits</b>		<b>15</b>
<b>Third Semester</b>		
CEM 211	Organic Chemistry I	4
PHY 111	General Physics I	4
Arts/Human. Elective(s) ( <a href="https://coursecatalog.wccnet.edu/academics/general-education/#arthuma">https://coursecatalog.wccnet.edu/academics/general-education/#arthuma</a> ) 2		3
Soc. Sci. Elective(s) ( <a href="https://coursecatalog.wccnet.edu/academics/general-education/#socbehavsci">https://coursecatalog.wccnet.edu/academics/general-education/#socbehavsci</a> )		3
Speech/Comp. Elective(s) ( <a href="https://coursecatalog.wccnet.edu/academics/general-education/#writing">https://coursecatalog.wccnet.edu/academics/general-education/#writing</a> )		3
<b>Credits</b>		<b>17</b>
<b>Fourth Semester</b>		
CEM 222	Organic Chemistry II	4
PHY 122	General Physics II	4
Soc. Sci. Elective(s) ( <a href="https://coursecatalog.wccnet.edu/academics/general-education/#socbehavsci">https://coursecatalog.wccnet.edu/academics/general-education/#socbehavsci</a> )		3
Open Elective(s) to reach a minimum of 60 total credits.		1
<b>Credits</b>		<b>12</b>
<b>Total Credits</b>		<b>60</b>

## Biology Restricted Electives for Pre-Pharmacy (PPHA)

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

Code	Title	Credits
BIO 111	Anatomy and Physiology - Normal Structure and Function	5
BIO 161	General Biology I Ecology and Evolution	4
BIO 162	General Biology II Cells and Molecules	4
BIO 208	Genetics	4
BIO 237	Microbiology	4
BIO 215	Cell and Molecular Biology	4
BIO 227	Biology of Animals	4