

# Southwestern Michigan College

## Arts and Sciences

### Environmental Science AS Program Review 2020

#### Resources

Full-time Instructors: 4 (science courses, all faculty credentialed)  
 Adjunct instructors: 2 (science courses, all adjunct faculty credentialed)

Program Costs: All laboratory instruments, equipment, and chemicals associated with teaching lab courses in Biology, Chemistry, Environmental Science, and Physical Geography. The Environmental Science and Physical Geography classes are required courses in many other associate degree programs. Biology and Chemistry are required courses for the Associate in Biology and Medical Pre-Professional degree and the Chemistry courses are required in the Associate in Science, Engineering, and Math degree. There are no courses in the AS in Environmental Science that are exclusive to this degree program and therefore all instruments, equipment, and chemicals are used for multiple programs.

#### Enrollment Data

The full-time science faculty participate in on campus recruiting invents to attract students to the Associate in Science in Environmental Science degree program that have included a STEM Day, STEM Conferences, and Career Days. In addition, science faculty host students during the Niles Eastside STEM Club visits, judged student projects at the Fall 2019 Innovations Expo held on campus, and judge science projects at local schools. At Career Day, faculty impress upon students that Environmental Science is an interdisciplinary science and there is a wide array of careers in the field. Finally, the Math/Science department provides STEM scholarships to attract students to our degree programs and selects students to receive Math/Science department awards and scholarships when completing degrees.

The Environmental Science AS became a stand-alone program in Fall 2019. Prior to Fall 2019, Environmental Science was included with Life Science as a major and it was difficult to track the students pursuing the environmental degree. Therefore, data will be analyzed starting with Fall 2019.

**Environmental Sciences AS (3503, 19/20)**  
 (This major created Fall 2019)

Applicants & Enrollment	Fall 2019	*Fall 2020
Environmental Sciences (3503)		
Applicants <sup>1</sup>	16	21
Applicant Yield <sup>2</sup>	37.5% (6)	
Enrolled <sup>3</sup>	11	

\* as of 11/10/2020. Yield data not available until fall begins

**Course Enrollment<sup>4</sup>**

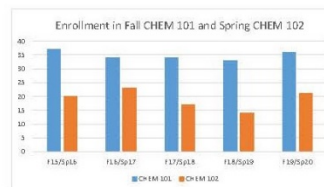
Course	Number of Students Enrolled					Trend	Number of Sections				
	Fall 2015	Fall 2016	Fall 2017	Fall 2018	Fall 2019		Fall 2015	Fall 2016	Fall 2017	Fall 2018	Fall 2019
CHEM 101	37	34	34	33	35	↔	2	2	2	2	2
BIOL 101	40	42	33	26	30	↔	2	2	2	2	2
CHEM 201	6	7	7	3	6	↔	1	1	1	1	1
ENST 112	95	120	140	133	105	↔	5	7	7	7	7
GEOG 110	24	47	60	51	55	↔	1	2	3	3	3

Course	Number of Students Enrolled					Trend	Number of Sections				
	Spr 2016	Spr 2017	Spr 2018	Spr 2019	Spr 2020		Spr 2016	Spr 2017	Spr 2018	Spr 2019	Spr 2020
BIOL 101	29	13	10	28	15	↔	2	1	1	2	1
BIOL 102	25	20	16	11	21	↔	2	2	2	2	2
CHEM 101	24	21	27	21	27	↔	1	1	1	1	1
CHEM 102	20	23	17	14	21	↔	1	1	1	1	1
CHEM 202	5	6	4	1	6	↔	1	1	1	1	1
ENST 112	105	138	144	125	137	↔	5	7	7	7	8
GEOG 110	43	47	68	54	67	↔	2	2	3	4	4

Course	Number of Students Enrolled					Trend	Number of Sections				
	Sum 2016	Sum 2017	Sum 2018	Sum 2019	Sum 2020		Sum 2016	Sum 2017	Sum 2018	Sum 2019	Sum 2020
ENST 112	8	28	32	28	18	↔	1	2	2	2	2
CHEM 102	4	3	4	5	14	↔	1	1	1	1	1



**Awards Conferred<sup>5</sup>**

	2020/2021	2021/2022	2022/2023	2023/2024	2024/2025
3500					

\* as of 2/24/20 includes pending for spring

First Time in Any College (FTIAC) Cohort	Fall 2019	Count	Percent
Total Enrolled		9	
Enrolled full time		7	77.8%
Earned 70% or 1st Term <sup>6</sup>		5	55.6%
Passed CHEM 101 First Term <sup>7</sup>		0	0.0%
Passed MATH 130 First Term <sup>8</sup>		1	11.1%
Enrolled following spring		7	77.8%
Changed major (spring)		2	
Enrolled following fall			
Change major (sum/fall)			
Graduated 150%			
Graduated 150%+			
Deficient grad apps			

1. 11/NO STUDENT HAS REQUESTED A MAJOR CHANGE REPORT REQUESTED MAJOR CHANGE REPORT 2019/2020 APPLICATION STATUS REPORT BY TERM, BY  
 2. Applicant Yield is the percentage of students who enrolled after applying. Number enrolled is in parenthesis.  
 3. 11/CRYSTAL REPORTS X3 Crystal Reports - Banner/Institutional Research/Map\_Cours\_Registrar1.rpt includes all students, returning, transfer, and new students  
 4. 11/CRYSTAL REPORTS 2019 Course & Section Schedule.rpt  
 5. 11/CRYSTAL REPORTS 2019 Student Graduation Outcomes\_Enrolled\_MyDesc.rpt  
 6. Credits Earned divided by Credits Attempted. This is a rough estimate of success in the first term (progression metric).  
 7. 2 FTIAC took CHEM 202 and passed; 2 took CHEM 102 and did not pass; 1 did not take chemistry  
 8. 2 FTIAC took a math and not passed; 3 took a math and did not pass; 1 did not take MATH 130; 2 did not take MATH

For Fall 2019, 16 students had applied to the program and a total of 11 were enrolled in the program that first semester. Of the 16 applicants, 6 students enrolled at SMC. The other 5 students in the program were previously enrolled in the combined Environmental/Life Science AS, other major at SMC, or transferred from another institution. For Fall 2020, 21 students have applied to the program. Since the program is new, we do not have graduation information for students in the Environmental Science AS.

The AS in Environmental Science has a challenging curriculum that includes core biology, general chemistry, and organic chemistry courses. We believe that students benefit from taking these core classes at the community college level due to the small class sizes and individual instruction that is provided. The sequence can be intense for students and CHEM 102 is offered in the summer to help students better manage and complete the sequence in two years.

Enrollment data for the core science courses over the last five years indicates that there are students that may not complete the program on time or complete the degree. For example, there were a total of 54 students taking CHEM 101 in Fall 2018 and Spring 2019, while only 19 students taking CHEM 102 in Spring/Summer 2019. The data shows a similar trend with the BIO 101/102 sequence. During the second year of the program, students are required to complete organic chemistry, CHEM 201/202. Student enrollment in the organic chemistry courses are in the single digits. As stated above, the sequence is challenging and may result in a lack of retention in the program. These challenges and possible solutions will be addressed in the SWOT section of this review.

## Curriculum

The Environmental AS program includes a four-semester path to completion. Courses are offered in a logical sequence of core science courses. In addition, various MTA courses are required in the curriculum. The ENST 112 – Environmental Science is a survey course that was recently moved to the first semester of the sequence to introduce students to the study of environmental science, degree options, and potential careers in the field. There are no courses in the AS in Environmental Science that are exclusive to this degree program. Total program credits are 62-63 credits.

As stated in the Program Objectives, the AS degree in Environmental Science is intended for students who plan to transfer to a Bachelor program. Since the associate's degree includes the core science courses, students who transfer are prepared to complete degrees related to Environmental Science, Biology, Ecology, or Chemistry. Students interested in Environmental Engineering should follow the pathway for the Associate in Science, Engineering, and Math Professional. Environmental technician positions are available for students that obtain an associate's degree.

As stated earlier, the Environmental Sciences AS was separated from the previously named Environmental/Life Science AS degree program in Fall 2019. Faculty determined that the joint program was confusing to students and that the programs should be separate entities. Having the degree programs separated will help us to better monitor the success of students within the programs and therefore the programs themselves.

Many local transfer institutions offer Bachelor's degree programs related to Environmental Science and Sustainability Studies including Grand Valley, Western Michigan, Central Michigan, Eastern Michigan, Michigan State, The University of Michigan, Goshen College, Indiana University, and Perdue.

## Program Objectives

Upon completion of the degree, students will be able to understand the fundamental concepts of earth, environmental, chemical, and biological sciences and will be prepared to transfer to a four-year institution to study upper level courses in relevant science.

## Extracurricular

Field trips have been included in the Environmental Science curriculum and include touring the Niles Waste Water Treatment Plant. In addition, the class includes a field work requirement involving chemical and physical analysis and macroinvertebrate identification for fresh water monitoring. Full time faculty are looking into potential future field trip opportunities including a visit to the Michiana Waste and Recycling facility in Niles. In addition, faculty are interested in organizing trips to newly constructed local wind and solar farms. Field trip opportunities may be on hold due to the COVID 19 pandemic.

SMC's Environmental Research Group continues on campus research into ways to remove lead from water resources. The group has prepared research presentations and participated in the American Chemical Society Annual Conference.

Science faculty have participated in honor's program service work with IUSB providing invasive species presentations and have worked with students from both colleges during the river cleanup and identification and removal of invasive species on both campuses.

Science faculty will continue to dialogue with the Michigan State representative on SMC's campus to find ways to get our students involved in agricultural related activities. Students have participated in the honey harvest in the past and we will continue to coordinate new opportunities for student involvement. In addition, there is interest in collaborating with Building Trades on a Green Building project or some other cross curricular endeavor.

## Potential

According to the Bureau of Labor Statistics' Occupational Outlook Handbook: "Employment of environmental scientists is projected to grow 8 percent from 2018 to 2028, faster than the average for all occupations." The national median annual wage for environmental scientists was \$71,360 in May 2019.

<b>Employment projections data for environmental scientists and specialists, 2018-28</b>						
<b>Occupational Title</b>	<b>SOC Code</b>	<b>Employment, 2018</b>	<b>Projected Employment, 2028</b>	<b>Change, 2018-28</b>		<b>Employment by Industry</b>
				<b>Percent</b>	<b>Numeric</b>	
<b>Environmental scientists and specialists, including health</b>	19-2041	85,000	92,000	8	7,000	<a href="#">Get data</a>

SOURCE: U.S. Bureau of Labor Statistics, Employment Projections program

"Heightened public interest in the hazards facing the environment, as well as increasing demands placed on the environment by population growth, are projected to spur demand for environmental scientists and specialists. Many jobs will remain concentrated in state and local governments, and in industries that provide consulting services. Scientists and specialists will continue to be needed in these industries to analyze environmental problems and develop solutions that ensure communities' health.

Businesses are expected to continue to consult with environmental scientists and specialists to help them minimize the impact their operations have on the environment. For example, environmental consultants help businesses to develop practices that minimize waste, prevent pollution, and conserve resources. Other environmental scientists and specialists are expected to be needed to help planners develop and construct buildings, utilities, and transportation systems that protect natural resources and limit damage to the land."

The Bureau of Labor Statistics' Occupational Outlook Handbook states that "Environmental scientists and specialists should have good job opportunities. In addition to growth, many job openings will be created by scientists who retire, advance to management positions, or change careers.

Candidates may improve their employment prospects by gaining hands-on experience through an internship." Faculty at SMC work with students to provide local contacts for potential internships.

The Bureau of Labor Statistics indicates that Michigan has many people employed in Environmental Science related jobs as indicated in the table below.

Bureau of Labor Statistics

Multiple occupations for one geographical area

Area:Michigan

Period:May 2019

Occupation (SOC code)	Employment <sup>(1)</sup>
Zoologists and Wildlife Biologists(191023)	380
Biological Scientists, All Other(191029)	440
Conservation Scientists(191031)	440
Foresters(191032)	270
Environmental Scientists and Specialists, Including Health(192041)	3030
Geoscientists, Except Hydrologists and Geographers(192042)	440
Hydrologists(192043)	80

(1)Estimates for detailed occupations do not sum to the totals because the totals include occupations not shown separately. Estimates do not include self-employed workers.

SOC code: Standard Occupational Classification code -- see <http://www.bls.gov/soc/home.htm>

Date extracted on :Aug 09, 2020

Source: Bureau of Labor Statistics

In addition, earning potential in Michigan is high for students completing Environmental Science related degrees who are employed in the field as indicated in the table below.

Bureau of Labor Statistics

Multiple occupations for one geographical area

Area:Michigan

Period:May 2019

Occupation (SOC code)	Annual mean wage <sup>(2)</sup>
Zoologists and Wildlife Biologists(191023)	65040
Biological Scientists, All Other(191029)	76390
Conservation Scientists(191031)	64480
Foresters(191032)	68870
Environmental Scientists and Specialists, Including Health(192041)	71140
Geoscientists, Except Hydrologists and Geographers(192042)	-
Hydrologists(192043)	88000

(2)Annual wages have been calculated by multiplying the corresponding hourly wage by 2,080 hours.

(8)Estimate not released.

SOC code: Standard Occupational Classification code -- see <http://www.bls.gov/soc/home.htm>

Date extracted on :Aug 09, 2020

Source: Bureau of Labor Statistics

## **SWOT**

There are multiple strengths of the AS in Environmental Science program and potential for the program to grow. Today's students are more engaged and understand that we are facing a number of serious environmental problems locally, nationally, and around the world. In recent years, we have seen higher enrollment in the environmental science course. Fortunately, most of our local transfer institutions provide Bachelor's degree programs related to environmental science. Job prospects for students earning a degree in an environmental related career are good. An area of weakness is the ability to attract strong STEM students to SMC and to retain them. The data shows that we have low enrollment in the AS in Environmental Science and a decrease in students in the core classes as they move through the prescribed sequence. The Math/Science department and marketing may need to develop new and innovative ways to attract these students, making potential students aware of the value of environmental science degrees. The degree requirements are challenging and SMC may need to provide additional support to retain students in the degree program until completion and graduation. Now that the AS in Environmental Science is a stand-alone program, the faculty advisor can better mentor students pursuing this degree. Finally, faculty could reach out to local organizations and businesses to help secure internships for students in the degree program.

## **Conclusion**

Course offerings and the number of course sections support students in completing the new AS in Environmental Science degree in two years. With continued advertising and recruitment into this program, student enrollment is expected to increase. Employment projections indicate a demand for students graduating with environmental degrees. The current AS in Environmental Science program has only existed for one year and therefore we will need to continue to monitor enrollment and completion to determine the program's success. The Math/Science department will continue to support students while they are pursuing their degree.