

# **Agriculture, Food and Natural Resources Education and Course Credit Offerings**

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## **Introduction**

Recruitment and retention of students is one of the struggles that many secondary Agriculture, Food and Natural Resources (AFNR) programs face. To combat this issue, AFNR teachers are finding innovative ways to market their program to prospective students, such as offering core academic credit toward agriculture classes. This approach incentivizes students to consider taking AFNR courses, even when they have little room in their class schedule for more elective classes. Offering academic credit for AFNR courses has additional benefits as well, such as displaying the interconnectedness of agriculture to other disciplines, receiving administrative and community support for the program, and increasing the level of collaboration between AFNR teachers and those of other disciplines. These are all among some of the top challenges faced by AFNR educators today (Boone & Boone, 2007). Given the importance of offering academic credit within AFNR programs, I explored the current academic offerings available throughout Michigan AFNR programs.

## **Literature Review**

The connection between AFNR and other disciplines, such as Science, Technology, Engineering, and Mathematics (STEM) is prevalent both in the vocational workplace and in educational institutions. STEM education focuses on teaching problem solving in real world applications, much like the experiential learning opportunities that often occur in the AFNR education field. One study shows that science and math are well represented in AFNR education (Scherer et al., 2019).

Incorporating content from other disciplines into AFNR courses requires both motivation and knowledge of content among the AFNR teacher. One study found that the interconnectedness of science in AFNR education was dependent on whether the AFNR teacher was motivated to incorporate science content and whether they were educated on the content. They categorized AFNR teachers into three types based on these factors: science illuminators, illumination attempters, and vocational purists (McKim et al., 2017a).

Similar factors of motivation exist for incorporating math content in AFNR programs. McKim et al. (2017b) used a conceptual framework of five factors that impact the behavior of incorporating math into AFNR courses, including attitude toward the behavior, subjective norms, Mathematics knowledge, perceived behavioral control, and behavioral intentions. This study found that AFNR teachers had positive attitudes towards teaching math in AFNR. A similar framework was

used in another study to determine the implementation of Common Core math and English Language Arts (ELA) standards into agricultural education. This framework only consisted of four contributing factors: attitude towards the behavior, subjective norms, perceived behavioral control, and intention (McKim et al., 2015). This study discovered that the majority of AFNR educators used teaching materials that were already aligned with Common Core State Standards.

## **Purpose and Objectives**

The purpose of this research is to analyze the current academic credit that is being offered in Michigan AFNR programs and investigate the factors that affect these credit offerings. By discovering this information, current AFNR teachers can develop a wider understanding of the progression of courses and areas of content taught in other programs, which can inspire them to develop similar systems among their own programs. To help meet this purpose, we proposed the following objectives:

**Objective 1:** Determine the percentage of Michigan AFNR teachers that teach courses in which students receive a core academic credit.

**Objective 2:** Determine the type of AFNR course(s) that count toward academic credit.

**Objective 3:** Determine the academic credit that is received via AFNR courses.

## **Methods**

### *Population and Data Collection*

The population from which we collected data consisted of current Agriculture, Food and Natural Resources educators in Michigan during the 2020-2021 school year. We received email addresses for the 139 current teachers and developed a Qualtrics survey to send to these emails. We first sent out the survey starting in late March 2021 and sent four additional reminder emails throughout the course of the following four weeks. At the end of the data collection period, we had received 100 complete survey responses, which we used in our data analysis.

### *Instrumentation*

The Qualtrics survey began by asking teachers which disciplines of academic credit students could receive by taking AFNR courses in their program. Depending on their answer, different blocks of questions were displayed for each discipline, asking to describe the title, topic(s), and credit received for each course that counts for additional credits. Data used in this research are part of a larger project exploring academic credit availability in Michigan through AFNR Education. As part of a larger research project, the data collection instrument included additional elements not discussed here.

## *Data Analysis*

The data we collected from our Qualtrics survey were analyzed using SPSS. For our first objective, we looked at the percentage of teachers who indicated that any of their courses received an academic credit. For the second objective, we tallied the number of instances that each category was selected to describe a class. For the third objective, we separated the disciplines (i.e., reported via an open-ended response) into subcategories based on Michigan Merit Curriculum (MMC) graduation requirements and counted the instances that each subcategory was described (Michigan Department of Education, 2017).

## *Description of Respondents*

The respondents of this survey were all Michigan Agriculture, Food and Natural Resources Educators, with the majority completing an undergraduate or graduate degree in agricultural education with a teacher certification route (77.2%). Most respondents had received a postgraduate degree (66.7%) and had taught school-based agriculture for an average of 9.5 years. The majority of respondents taught in rural districts (78.5%) with an average of 97.45 students enrolled in the agricultural education program.

## **Findings**

In our first objective, we analyzed the percentage of Michigan AFNR teachers who taught courses that allowed students to receive a core academic credit, separating the credit by discipline. Nearly all AFNR programs received some sort of academic credit for their course(s) (95.00%), with the majority of credit offerings in the science discipline (89.00%).

**Table 1**

*Frequency of academic credit offerings in AFNR courses*

Academic Offering in AFNR Courses	Frequency	Percentage
Some Academic Offering	95	95.00%
Science	89	89.00%
Math	43	43.00%
English Language Arts	10	10.00%
Foreign Language	38	38.00%
Other	23	23.00%

In our second objective, we looked at the type of AFNR course that received academic credit for each discipline. We separated the courses into categories that defined their subject area and included an introductory and advanced section for each category. In general, the majority of categories that receive academic credit were Introductory Animal Science (77 instances), Introductory General Agriculture (68 instances), and Introductory Plant Science (66 instances) courses.

**Table 2***Distribution of Core Academic Credit Received by AFNR Course Type*

Course Type	Science	Mathematics	ELA	Foreign Language	Course Type Total
Introductory Animal Science	56	7	2	12	77
Introductory General Agriculture	40	13	3	12	68
Introductory Plant Science	50	5	0	11	66
Introductory Natural Resources	27	3	0	2	32
Advanced Animal Science	19	7	1	5	32
Advanced General Agriculture	12	10	2	5	29
Advanced Plant Science	9	7	1	4	21
Introductory Food Science	15	2	0	2	19
Introductory Leadership	13	2	0	4	19
Introductory Agribusiness	9	5	0	1	15
Advanced Natural Resources	6	1	0	0	7
Advanced Agribusiness	2	5	0	0	7
Advanced Food Science	5	1	0	0	6
Introductory Agricultural Mechanics	4	1	0	1	6
Advanced Leadership	3	2	0	1	6
Advanced Agricultural Mechanics	0	0	0	0	0
Instance Total	270	71	9	60	410

Our third objective looked at the type of core academic credit received for each discipline, defined by the Michigan Merit Curriculum requirements for graduation. The trends in science found that the majority of AFNR courses in the science discipline receive a General Science credit (56.00%), with 36.00% receiving a Life Science and 7.00% receiving a Physical Science credit. In the math discipline, the majority of AFNR courses receive a 4th year math credit (96.00%), with only 4.00% receiving a general math credit. The other disciplines were not separated into subcategories because the Michigan Merit Curriculum simply requires four English Language Arts courses and two Foreign Language courses for graduation.

### **Discussion**

There were several trends present in our data that we will highlight. First, nearly all AFNR programs in Michigan offer a core academic credit for at least one of their courses. The majority of programs receive some type of science credit. This is understandable considering the high correlation between science and agricultural topics and the congruence of the Next Generation Science Standards (NGSS) with the Michigan AFNR standards. Also in high abundance are math and foreign language credits. Math content is often taught in AFNR courses in relation to agribusiness, animal science, and plant science topics. However, since foreign language is rarely taught in relation to agriculture, we hypothesize that this credit is received as part of the Michigan Merit Curriculum allowance of receiving a foreign language credit for completing a Career and Technical Education program.

Other structural features may have led to an abundance of academic credit offerings, as well. For example, Michigan State University (MSU) requires all AFNRE students to pursue a teachable minor in addition to their AFNRE major. This promotes students to receive an additional teaching certification in science or other core disciplines, making them more qualified to teach credits that receive core academic credit. MSU also requires all College of Education students to complete a full year of post-Bachelor's Degree student teaching in order to receive their teaching certificate. This requirement may make space for students to take additional courses in other disciplines that would help prepare them for teaching a variety of subjects, such as math, science, and ELA.

The trends for our second objective show Introductory Animal Science, Introductory General Agriculture, and Introductory Plant Science as the most prevalent course types that receive academic credit, with the majority of each type receiving science credit. We hypothesize that these course types are most prevalent because they are the most common categories for agriculture classes in Michigan. These courses may also be the most common for 9th grade or beginning AFNR students to enroll in, which may lead teachers to have a higher interest in offering core academic credit as a recruitment strategy for new students.

In the third objective, we found that General Science accounted for 56% of all science credit offerings in AFNR programs, followed by Life Science and Physical Science. We hypothesize that General Science is the most prevalent category because it is easiest to justify receiving a general credit for the majority of agricultural classes that cover NGSS standards related to a broad range of scientific sub-disciplines (e.g., physical science, life science, earth science) . Life Science is a logical second choice because there are a lot of parallels in content between biology and agriculture. In the math category, nearly all (96%) of AFNR courses receiving math credit fell under the 4th year math credit category. We hypothesize that it is easiest to justify an agricultural course as a math credit when the credit is in addition to the original 3 years of math credits that a student has already received.

Further qualitative research could be conducted to determine the pathways that teachers took to receive the credit options they have for AFNR courses and the reasoning behind their credit offerings. Research could also look at the relationship between AFNR teachers and school counselors or administrators in relation to their program credit offerings.

### **Conclusion and Recommendations**

Overall, we found that our data supports the notion that offering a core academic credit is a common practice in Michigan AFNR programs and there are a variety of course credit offerings that could be justified in an AFNR course. We recommend that AFNR teachers use this research as a template to develop courses and credit options that make sense for their program, knowing that there are few limitations to the academic credit that AFNR programs can receive in Michigan. We also recommend that teachers be familiar with content and be prepared to collaborate with teachers from other disciplines with the potential of including the content and discipline into their own curriculum.

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