Review of Natural Sciences Program

Reviewer: Dr. David Dawson
Spring 2016

This review follows the external reviewers report template set by the Arkansas Department of Higher Education.

I. Review of Program Goals, Objectives and Activities

A. Are the intended educational (learning) goals for the program appropriate and assessed?

The goal for the program is carefully outlined and appropriate. UAM lists five goals for the School of Mathematical and Natural Sciences and THE major goal for the Natural Sciences major is "to offer a Bachelor of Science degree with a major or minor in Natural Sciences. Every course required for graduation with a Natural Sciences degree come from classes used for the Biology or Chemistry majors, or from the Physics minors. Assessment of whether the program meets its stated goal comes from the number of Natural Sciences majors completed in any given year.

Year	Number of Majors
2005	12
2006	10.
2007	10
2008	6
2009	4
2010	7
2011	12
2012	8
2013	8
2014	36

The numbers above show that an average of 8.5 students graduating per year prior to 2014. Including the year 2014 includes allied health majors. Allied health majors are now required to have a major for financial aid and have been assigned to the Natural Science major. The average for Natural Sciences majors for all of the years shown above is 11.6.

B. How are the faculty and students accomplishing the program's goals and objectives?

This is a loaded question. The best case scenario is for there to be no natural science majors. This would mean all of the students were in one of the two majors (Chemistry, Biology) or Physics minor. However, reality intrudes upon college students and requires students to become a Natural Science major. The low number of Natural Science majors means that faculty and students in the School are doing a great job of meeting their goals and objectives. The presence of any Natural Sciences majors means the faculty is doing a good job of getting students to

complete a degree. It would be interesting to compare the number of graduates at universities that have a Natural Sciences major to universities that do not.

C. How is the program meeting market/industry demands and/or preparing students for advanced study?

The students come out of the natural sciences program ready for advanced study. The major allows for students to take multi-disciplinary courses which will make them very prepared for advanced degrees that require knowledge of multiple areas. An example would be knowledge of chemistry and biology for pharmacy school. For example, most chemistry degrees do not require any biology which is integral for pharmacy and other professional fields.

D. Is there sufficient student demand for the program?

Please see the number of majors presented in section A. The natural sciences program is **essential** for students. While there may not be many majors in any particular year, the program allows students to graduate from UAM and further their career goals. A student demand of one, an almost certainty in any School, is more than enough to STRONGLY support the program.

E. Do course enrollments and program graduation/completion rates justify the required resources?

The Natural Sciences program, either option, is embedded in the other majors in the School of Mathematical and Natural Sciences. The amount spent on the Natural Sciences major is minimal and returns are likely the highest of any major on campus.

II. Review of Program Curriculum

A. Is the program curriculum appropriate to meet current and future market/industry needs and/or to prepare students for advanced study?

The Natural Sciences major's classes (both the Life Science Option or the Physical Sciences Option) are the same classes as required for one of the two majors (Chemistry, Biology) or a Physics minor. A look at the number of Natural Sciences majors shows that the number of Natural Science majors increases in the senior year. This means that the majority of students are in one of the major programs for most of their time at UAM. These programs have curriculums that DO prepare students for advanced study. These major programs also change to keep up with requirements from industry.

B. Are institutional policies and procedures appropriate to keep the program curriculum current to meet industry standards?

UAM has a very detailed procedure in place to make adjustments to the curriculum when needed. Those procedures are outlined on pages 12 – 13 of the program review document. Two important parts of those procedures involve faculty. First, the faculty review their courses continuously for items that need to be changed. Secondly, after the faculty proposes changes, the proposal goes to the faculty assembly for a vote. This allows other faculty members to comment and make improvements if needed.

C. Are program exit requirements appropriate?

While there is not a required capstone course in either option of the Natural Science degree, both options do have highly recommended courses. For example, students on the Physical Science track with Chemistry as their specialty are advised to take the Chemistry Advanced Lab Techniques. Students in the Life Sciences track are advised to take the Biology seminar. These classes require an oral presentation and a paper which really helps crystallize all of the information learned from earlier courses.

D. Does the program contain evidence of good breadth/focus and currency, including consistency with good practice?

The Natural Science program can be assessed to see if the courses are teaching the material required to give students a good coverage of topics. A better way to determine if the major is successful is to see how the students use the degree after graduation. Appendix G shows the wide range of avenues available to students upon graduation. For example, Morgan Cole (2015 graduate) is teaching physical science in Arkansas while Kelley Rasco is in the Dental Hygiene program at the University of Arkansas School for Medical Sciences.

E. Are students introduced to experiences within the workplace and introduced to professionals in the field?

The School of Mathematical and Natural Sciences appears to keep in good touch with their majors after graduation. Also, Natural Sciences majors appear to be either in the health sciences or in teaching. Students who are Natural Sciences majors get to interact with professional teachers through participation in the local science fair. In addition, the UAM medical science club sponsors visits by recruiters from medical, pharmacy, dental or veterinary schools. The club also promotes talks from graduates who can talk with current students. Finally, the club also facilitates visits by UAM students to professional schools. The school receives money through the Arkansas Space Grant Consortium which allows students to visit NASA research facilities.

F. Does the program promote and support interdisciplinary initiatives?

An important part of the Natural Sciences major is to have both a Life Science and a Physical Science Option. Students can start in one option and move to the other option with few problems. The General Education requirements allow the students in either option to take courses outside of the Sciences.

G. Does the program provide respect and understanding for cultural diversity as evidenced in the curriculum, in program activities, in assignment of program responsibility and duties; in honors, awards, and scholarship recognition; in recruitment?

Most of the students at UAM are students that are local. The School of Mathematical and Natural Sciences has out-reach programs in local schools though the science fair, for example. This is a big time commitment and UAM has been doing this for 59 years.

III. Review of Academic Support

A. Does the program provide appropriate quality and quantity of academic advising and mentoring of students?

The major focus of professors in every department in the School of Mathematical and Natural Sciences is the success of the students. The professors know that the success of the Natural Sciences major is judged on how many students complete the major. The students are advised over the course of their college career. The Natural Sciences major is mostly used for seniors who would not complete a major in four years. Students are advised to switch to the Natural Sciences major when they see a student unlikely to finish the requirements for another major in the School of Mathematical and Natural Sciences.

B. Does the program provide for retention of qualified students from term-to-term and support student progress toward and achievement of graduation?

The goal of the program is to get students to graduate. Progress of students is monitored through advising and is usually carried out in one of the other majors in the School of Mathematical and Natural Sciences. The Natural Science major is required of any school to make sure students have a near certain chance of graduating.

IV. Review of Program Faculty

A. Does program faculty have appropriate academic credentials and/or professional licensure/certification?

UAM has been very lucky to recruit and retain very good professors. Many of the professors have terminal degrees or many years of experience to bring to students. An instructor at CBU, my current school, only has a master's degree but is one of the best teachers at CBU in biology. I would predict that this is also the case at UAM. The CV's of teachers and professors at UAM are impressive.

B. Are the faculty orientation and faculty evaluation processes appropriate?

New faculty have an official orientation session during Faculty Development Week. New faculty are instructed on the rules for advising, teaching resources and other important matters that help new faculty to become more settled. The faculty evaluation processes are very extensive and allow for early detection of problems. Faculty in the first six years are reviewed in class by three other faculty members which is called a full evaluation. Student evaluations are also taken in multiple classes. In addition, faculty members are required to have a full evaluation once every five years. The evaluations of the faculty member are then sent to the Dean who then makes a recommendation to the Vice Chancellor of Academic Affairs.

C. Is the faculty workload in keeping with best practices?

Table 5 shows the workload for the faculty for the 2014 -2015 year. The workload varies by professor with some working much heavier loads that others. The varying workloads is expected as different semesters require different classes. For example, marine biology is taught as needed and is included in the total but might not be taught again for a while. As long as the professor who has a large number of contact hours, like Kelly Sayyar, gets a reduced load from time to time, it appears the faculty workload is in line with other universities.

V. Review of Program Resources

A. Is there an appropriate level of institutional support for program operation?

There is support from the University for the Program. The report mentions that upper Administration supports the School. Since the Natural Sciences major is part of the other majors in the School of Mathematical and Natural Sciences, no money is given specifically to the program. There is $6600 set aside for faculty development and $10,000 for equipment purchases. Both amounts show support from the university but it appears from the report that the physical plant needs updating. This is VERY common among universities so should not reflect badly on the university or program. It appears the faculty carry out an incredible job with the resources given to them.

B. Are faculty, library, professional development and other program resources sufficient?

As pointed out above, the faculty do an incredible job with the resources they are given. The library resources, at least in chemistry which is the reviewer's discipline, appear sufficient. It is difficult for the reviewer to comment on the biology's library resources. The $6600 amount could be greatly increased as well as the amount for maintenance. The $10000 budgeted for equipment purchases is helpful but not adequate for maintaining the needed equipment.

VI. Review of Program Effectiveness

A. Indicate areas of program strength.

The reviewer gets four areas of strength for the program. First, and most important, is the faculty. The faculty appears to be heavily invested in the students and are the most important part for a successful program. Secondly, the students are an area of strength. While UAM is an open enrollment university, the School gets a good share of the better students. Also, courses are in place to bring students who are behind up to speed. Third, there appears to be a good investment in technology and the means to keep the Program from falling behind in the technology race. Finally, there appears to be support from the upper administration which is crucial for the success of the program.

B. Indicate the program areas in need of improvement within the next 12 months; over the next 2-5 years.

The program is doing well with its current resources. However, it needs three things. First, it needs money to reward the faculty for all of the hard work that they do on a daily basis. Secondly, it needs money to hire additional faculty. It appears the turnover of faculty for the program is very low but additional hires are required for the program to continue. Finally, money is needed to fix equipment as well as buy new equipment. It is important for students in the program to work with equipment that is currently used in industry and in the health sciences.

The items needed are needed in the next twelve months and these needs will be ongoing in the next 2 – 5 years.

C. Indicate areas for program development based on market/industry demands that have not been identified by the institution.

The School has identified the health care field and teaching as two important areas that are in very large need. These two areas are both growing and vibrant fields and likely to remain important. Therefore, no new areas have been identified.

VII. Review of Instruction by Distance Technology (<u>if program courses offered by distance)</u>

A. Are the program distance technology courses offered/delivered in accordance with best practices?

The only course taught via distance technology is meteorology and its lab. Exams in this course are only given face-to-face so that the delivery is a hybrid course. An asset of the program is that no required courses are taught via distance learning.

B. Does the institution have appropriate procedures in place to assure the security of personal information?

The university follows the security policies recommended by the State of Arkansas. UAM screens websites from time to time for personal information and removes it when it is found.

C. Are technology support services appropriate for students enrolled in and faculty teaching courses/programs utilizing technology?

UAM does a good job helping students with technology. The university has an Office of Academic Computing. This office helps students and faculty with questions through email and phone numbers for support. The office also has a WebChat option.

D. Are policies for student/faculty ratio and faculty course load in accordance with best practices?

As stated earlier, it is imperative for the future success of the program to hire more professors. This will allow for the student/faculty ratio to decrease from its current numbers. This will also allow the faculty course load to be reduced. The current student/faculty ratio and faculty course load are similar to other institutions.

E. Are policies on intellectual property in accordance with best practices?

This question does not really apply to the Natural Sciences program since only one course is taught via distance education. It is stated that the University does follow Policy 210.2 of the University of Arkansas Board of Trustees.

VIII. Review of Program Research and Service

A. Are the intended research and creative outcomes for each program appropriate, assessed, and results utilized?

The program does not have any research outcomes. The outcome of the creativity of the students graduating with a Natural Sciences degree can be assessed in all of the different fields that students have partaken after graduation.

B. Are the intended outreach/service/entrepreneurial outcomes for each program's initiatives appropriately assessed and results utilized?

There is only one program reviewed in this report. The members of the School have great outreach programs with local schools. The faculty has lots of service hours in the community. The utilization of the outreach and service provided by the Natural Science major can be seen in the community and state.

IX. Local Review Comments

A. How is the program meeting market/industry demands and /or preparing students for advanced study?

NOT APPLICABLE

B. What program modifications are needed?

NOT APPLICABLE.

X. Report Summary

A. Include reviewer comments on the overall need for the program graduates/completers in the local area, region, and/or nation over the next 5 years.

The program is essential for any university. UAM does an exceptional job of keeping their students in the other majors offered by the School of Mathematics and Natural Sciences. However, some students need the Natural Science major to graduate in four years. The graduates of the Natural Sciences program go on to be assets in the local area, state and national area. Two major areas of need for the local area, state and nationally are as teachers and the health care field. The Natural Sciences major allows students to graduate in four years and continue in the health science field. The addition of allied health students into the Natural Science major help prove that Natural Sciences majors are needed now and in the future.

B. Include reviewer comments on overall program quality, state program review process, etc.

The Natural Sciences program at the University of Arkansas at Monticello is an embedded program in the School of Mathematics and Natural Sciences. It has both a Life Science Option and a Physical Science option. It is an **EXCELLENT** program and it is imperative that it be continued. The faculty members of the School of Mathematics and Natural Science are given limited resources but do an amazing job with the resources given. The Natural Sciences is an essential program and could be made even better if given more resources. The reviewer compared the Natural Sciences program at his school, Christian Brothers University to the UAM program and found many similarities. However, the program at CBU is able to have more resources and has students that are, at least initially on the average, better students.

The review process of programs is a natural process to make sure resources are not wasted and maybe could be used in other high need areas. The review process for the Natural Sciences program required a bunch of effort on the effort of administration and was done in an impressive manner. It was helpful to see how the UAM carries out its business and many of the processes carried out by the faculty and administration could be adopted by other universities to improve their programs.