METROPOLITAN STATE COLLEGE of DENVER

PROGRAM REVIEW

ENVIRONMENTAL SCIENCES PROGRAM

Executive Summary

The Department of Earth and Atmospheric Sciences in conjunction with two of its young assistant professors has established a remarkable undergraduate degree in Environmental Science with five concentrations and two minors. The program is in demand, attracting working adults and traditional four year students. The comprehensive document for the program review provides directions for the future while documenting accomplishments.

Some key points from the program review include:

- New facilities (renovated space) and equipment are being eagerly awaited.
- The program, though growing, can be sustained at the current level of support.
- The Multidisciplinary concentration should be reduced in scope unless more faculty are available.
- Degree plans for all concentrations must list every prerequisite course and the accurate total number of credits needed to earn a degree.
- Ecology for non majors should be required in all concentrations.
- Unrestrictive electives should be eliminated in each concentration.
- Finalize the Advisory Board with members from industry.
- Faculty must enforce completion of prerequisites before students enroll in advanced courses.
- Department needs a computer technician for hardware and software in the GIS labs.
- IT must be more responsive to student needs for software in College computing facilities.
- Encourage students who qualify for work study to seek employment with the Department of Earth and Atmospheric Sciences.
- The quality of online classes must be monitored.
- Explore the use of online mathematics classes for remedial work and courses through calculus.
- Arrange for more field experiences and use of equipment to collect field data.
Another staff person, full or part-time, could be invaluable for tracking student accomplishments (written and oral projects) during the entire program. This is a key learning objective for assessment.

Central Administration needs to arrange for full-time financial aid when a student enrolls in more than one institution in a semester and enrollment equals or exceeds 12 credits.

I have elected to address the questions in the order provided.

Role and Mission:

Is the program consistent with the role and mission of Metropolitan State College of Denver (MSCD)?

The Environmental Sciences Program offers programs of study related to the mission of MSCD, an urban institution with a diverse student body. Courses offered during the evening and online, plus throughout the day, provide students with choices of when to earn credits and complete degrees. The program has several components which allow students to acquire knowledge about a specific aspect of the environment in preparation for a career. The courses challenge the students in scholarly inquiry, creative activity and application of knowledge. Students seeking degrees in this program desire to address environmental issues for careers.

1. Curriculum:

a. Is the core curriculum appropriate? If not, why not?

The core curriculum has two parts: General Studies course requirements and Core Requirements for majors. Within General Studies, I found the requirement of MTH 1210 – Introduction to Statistics unusual. If students are deficient in mathematics to start, the program would be better served by getting students started on a sequence of mathematics classes that will serve the majors. The Statistics course can be offered later in the program once students begin to collect data. At that point knowledge of statistics will help them interpret the data and assess the significance of the data.

Given that Biology is important to some of the options, perhaps the requirement for Natural Sciences could be Physical Geology and a choice between CHE 1800 General Chemistry I or BIO 1010 – Ecology for non-majors. Students requested that Ecology be a required course and should be taken early in the program.

All other General Studies courses are appropriate; the courses appropriate for each student can be addressed during advising.

b. Do the service courses meet the needs of the audiences for whom they are intended?
The primary service courses, ENV1200 – Introduction to Environmental Sciences and ENV1400 – World Resources, do help the student acquire perspectives on local and global issues. One student complained that the content of the courses overlap but the program guide clearly states you can take one but not the other. Because each person interacts constantly with the environment, the course (ENV 1200) would be an excellent course for every MSCD student. If ENV 1400 overlaps, it could be eliminated in favor of more sections of ENV 1200. As MSCD reassesses the core curricula for all students, ENV1200 should be considered because knowledge of the environment is critical for everyone.

c. Are the elective courses current and useful?

The elective courses are current and useful but too many choices are available given the limited resources of the program. Many of the advanced courses use adjunct professors who may or may not be available when a particular course needs to be taught. By reducing the number of elective courses better control will exist over what is offered and when. For example, in the Multidisciplinary option, fewer choices should be considered. The concentrations also specify that some electives can be taken to complete the 120 credits needed to earn the degree. Clearly, reference to elective credits needs to be dropped because of prerequisite courses that must be taken prior to taking required advanced classes.

d. Are the educational goals (desired student outcomes or competencies) that the program has for its students clear and reasonable?

The educational goals as specified in student learning outcomes are clear and reasonable for students in an undergraduate program. If students do acquire the ability to monitor and sample environmental conditions, they will possess qualifications desired by private companies and governmental agencies charged with maintaining environmental quality. The small number of students in advanced classes will be beneficial for students to get oral and written experiences often expected by employers. Field experiences are essential in the advanced classes to provide the students with experiences with the equipment and the problems associated with data collection. Oral and written communication skills are essential because so many environmental issues are controversial. Accurate statements about the problem and proposed solutions must be created. Technical Writing should be a required course for all Environmental Science students.

e. Are there areas of emphasis that should be developed by the program to meet future needs?

No. The current tracks in the program, however, do require some modifications to insure quality (to be discussed later). More areas of emphasis are not possible without adding permanent faculty. The faculty believe an emphasis is needed on mountain environments and land use. This can be accomplished without establishing a formal track through advising students on selecting courses to support individual goals. Such tracks, however, may be too focused for undergraduates. Being all things to all students is not possible with limited resources (faculty, facilities, and equipment). Focus on the established concentrations and be certain that each is an excellent program.

f. Should certain areas of emphasis be given low priority or discontinued? Explain why.
The Multidisciplinary Concentration should be reexamined with a goal of providing more focus rather than using such a broad approach. The four other concentrations are well focused and should be the primary options for students in the program. The Multidisciplinary Concentration can be de-emphasized by reducing the number of courses students can elect. I think some students will always exist who will opt for such a general degree, therefore, it should not be eliminated. Faculty can use advising to direct students into areas of strength rather than having a catch-all program that requires so many elective courses which become difficult to provide.

g. Is any overlap or duplication that exists between departments, institutes, disciplines and programs appropriate and has it been explained or justified?

The Department of Earth and Atmospheric Sciences is the right place for an Environmental Sciences program. Environmental Sciences must receive cooperation, however, from the other sciences (Chemistry, Biology, and Physics) because the identification of problems and solutions require the integration of other disciplines rather than segregation from them. Use of classes from those departments is critical for Environmental Sciences to have quality programs. This is preferred rather than courses being created within Environmental Sciences that would teach those subjects to Environmental Science majors.

h. Are there any anomalies in the distributions of grades?

The percentage of As and Bs for courses at the lower level is lower than for courses at the upper level (as it should be). Similar grading standards for the distribution of all grades are similar to the standards that I have observed at Oklahoma State University and Texas A&M University. The total percentage for failing grades seems high but perhaps can be explained by the type of student attracted to MSCD – one who is older and may have conflicts arise that prevents the completion of the class. Grades should reflect what the students learned and can be high if quality has been achieved based upon meeting demonstrated criteria.

i. Are courses scheduled at times, locations, and frequencies that are consistent with the objectives of the program?

The program makes every effort to rotate the times of courses such that they will be offered in the morning, afternoon, and evening to accommodate students. Students would like to know in advance when particular courses will be taught. The Department Head and faculty are aware of this request. If fewer elective courses are offered, a more accurate long term schedule could be developed. Some courses perhaps can be adapted to online availability although courses with field components should not be taught in that format. An online course for ENV 1200 or ENV 1400 may assist in raising total credits but developing and maintaining such courses requires effort.

j. How does the curriculum of this program compare with similar programs at comparable institutions?
The focus on five aspects of the environment exceeds what is offered in the Environmental Science program at Oklahoma State University. Both offer programs related to water that are similar. OSU offers options on policy and natural resources whereas MSCD provides emphasis on ecological restoration, environmental chemistry and hazardous materials. What MSCD offers is very appropriate for an urban institution because the urban environment has a tremendous impact on the natural environment. Moreover, given that the majority of students prefer to live and work in Denver (or Colorado), the curricula is very appropriate. Environmental Studies at Texas A&M University, an interdisciplinary undergraduate degree within the College of Agriculture, specializes in societal forces that influence environmental issues. The primary emphasis is social and political compared to the physical sciences nature of the MSCD program.

2. **Students and Student Satisfaction**

3. Based on the data provided, consider the program's effectiveness when evaluated with respect to the:

   a. **number of degrees awarded**

      Based upon five years of data (2003-2008), approximately 15 students earn degrees annually. When broken down by length of time it takes to earn a degree, approximately 40% of all transfer students take from 4 years to 8 to earn a degree. Perhaps degrees could be earned in less time but the time is a function of what the students took before transferring to MSCD. For a relatively new program, the number of degrees indicates that students have accepted the program and are completing degrees. I would expect the number of degrees to increase because the number of majors has increased significantly in a few years. When a student commits to a degree is another variable in the amount of time needed to earn the degree and that variable cannot be controlled by the faculty advisors.

   b. **number of courses offered**

      The number of classes has increased every year from 24 in 2003-04 until 37 classes were offered in 2007-08. In my opinion, fewer courses should be offered to create more focused degree plans. With the department having to rely on adjunct faculty to teach important courses, students may suffer delays in degree completion if adjuncts cannot be found with the skills necessary for the required courses.

   c. **FTE student enrollments**

      FTE enrollment has also increased yearly in response to students attracted to the program as majors plus the increase in students taking ENV 1200 and ENV 1400 to meet general education science requirements. Enrollments could be further increased if ENV 1200 was viewed by MSCD as a core course for all students.

   d. **credit hours generated**
Demand for general education credit is reflected in the yearly increase in lower division credits whereas upper division credits reflect growth of department majors. Lower and Upper division credits are clearly on an upward trend since 2003. This trend reflects that students are selecting the program and staying with it. Two permanent faculty charged with the Environmental Science program also contribute to the growth and stability of the credit hours generated.

c. **average class size by level of course**

The average class size at the lower division level has reached 42.8, a number significantly higher than desired by central administration. MSCD is viewed as a teaching institution and desires to keep class size low. In contrast, 23.5 students populate upper division classes. Such a low number can contribute significantly to quality experiences for majors. Faculty teaching loads could be reduced if fewer sections of the lower division courses were offered and class sizes were increased to 200. Given the MSCD mission, however, I envision that the average class size for lower division classes will remain relatively stable, i.e., in the low 40s. As the number of majors increase, the average upper division class size will probably increase which will put additional burdens on the faculty when it comes to field activities and use of equipment.

d. **number of degree recipients who continue their formal education (masters, doctorate, professional degree)**

The survey given to graduates and seniors revealed that none of the recent graduates went on to seek graduate degrees. Because many of the students are non-traditional students in the sense that they are employed while seeking a degree, the experiences acquired as undergraduate students may be sufficient for them to continue with their current employers.

Moreover, the program has a focus on degrees that provide students with skills in demand in government agencies and/or private businesses. In addition, the length of time required to complete the undergraduate degree may discourage immediate movement into a graduate program. As place bound students, options for graduate degrees are somewhat limited in the local area and competition for admission may also discourage some from seeking advanced degrees. For those who wish to seek advanced degrees, help is available from faculty who have connections at universities in the area. I did address questions from students about graduate education, specifically on admission and assistantships.

Based on the information provided:

g. **Does the assessment plan devised by the program faculty have the potential for effectively determining if students have achieved the desired competencies?**
Five learning objectives have recently been established for the program since two assistant professors were hired to lead the Environmental Science effort within the department. The review report indicates that a 70 question multiple-choice assessment was recently given to students in Environmental Science classes to assess if the learning outcomes have been achieved. A very low correlation exists between the number of courses completed and the test scores achieved. Clearly, more courses did not contribute to higher test scores as postulated by the faculty. In such a new program, more time is obviously needed to increase student participation and acquire meaningful assessment data. Questions on the test should also be evaluated to determine what courses must be completed to successfully answer questions related to specific courses. In a perfect world, students would be unable to answer questions if they did not have the courses which generated the questions.

The assessment plan in place has the potential to determine if specified competencies have been achieved. Time is needed to increase the sample size and to refine the techniques to collect the necessary data.

h. Does a review of the assessment results indicate that students have obtained those competencies?

The summary of the assessment survey tends to indicate that several of the outcomes are program strengths whereas several objectives could be improved. The learning objective to monitor and sample environmental conditions needs improvement. Comments from students in one class stressed the need for more fieldwork with equipment, one of the 5 learning objectives. Attaining this goal requires equipment and transport costs of getting to field sites where data are collected. Small classes are critical to enhance the opportunities to use equipment and assess the meaning of the data collected.

How to determine field competencies was not addressed in the report. Perhaps an exit interview (questionnaire) could be employed to learn what equipment the student used (or did not use) and these results could contribute to revisions in the curricula to insure that competencies are being obtained.

Faculty (or a staff member) will also have to track written and oral communication skills by student by assessing the number and quantity/quality of written assignments and the number of oral presentations given during degree completion. Procedures must be established to collect and track results by student.

i. Are program faculty making effective use of the information gained from assessment activities?
The report says findings are preliminary. With only two permanent Environmental Science faculty, an effort must be made to assess the syllabi of adjunct faculty and provide information about the assessment program and how their efforts will contribute to a successful plan. A concerted effort is needed to train faculty about assessment and the role of assessment in establishing that learning objectives have been met. Such information is critical in the next review by The Higher Learning Commission, the agency that accredits MSCD. The Office of Assessment, under the Provost, should provide the leadership to teach all faculty about the importance of assessment. By all I mean permanent faculty and adjuncts. I learned that 60% of all classes are MSCD are taught by adjuncts. Efforts to educate those faculty about assessment are critical to a successful program.

j. What changes, if any, should be made in the assessment plan?

No changes are needed in the assessment plan. With established goals, the faculty can focus on how to assess student learning outcomes. For example, what will demonstrate that students have acquired the ability to monitor and sample environmental conditions? Also, what is an effective oral presentation and scientific paper produced by an undergraduate? Faculty will need to carefully define terms and specify the types of accomplishments that are necessary to satisfy the objectives. Once the types of accomplishments are agreed upon, faculty should agree on the courses in which the objectives will be met. They also will have to create procedures to collect data and track the results for each student.

Based on the information provided, do students in the program and graduates of the program:

k. seem satisfied?

Based upon a survey of graduates, 95% were very satisfied or satisfied with their experiences at MSCD. They also believed that the instructional program at MSCD met their educational goals (72%). Although the total sample size is small (22), the general impression is very positive. Some students expressed frustrations with when classes were offered or not offered, the lack of up-to-date software in the GIS labs, some classes are too generic, and need more detailed focus (Ecological Restoration needs more focus on clean-up). The number of hours needed for a degree does not include hours that must be taken in pre-requisite courses and, therefore, the total number of hours to earn a degree is misleading. Revising the concentration plans can also solve the latter issue by listing every prerequisite course that must be taken before an advanced class is selected.

l. perceive that they were prepared for graduate or professional school?
In a recent survey of graduates (February 6, 2010) six of seven graduates stated that they believed they were highly or moderately prepared for graduate school based upon MSCD experiences. Faculty can help students by explaining what is expected of students in MS and PhD programs and provide activities in the realm of research such that the experiences prepare students for graduate degrees. Independent Study could be arranged for research experiences which would help students gain an understanding of graduate expectations. Such efforts, however, place extra teaching burdens on the faculty, especially the permanent faculty who are always available compared to adjuncts who only teach specific courses.

m. obtain suitable employment?

Nearly half of the respondents in a survey reported have employment related to their major upon graduation and another quarter had positions somewhat related to their major. The program, therefore, does meet the needs of the students and prospective employers seeking to fill positions related to Environment Science. Once a coordinating board of interested professionals is in place to advise the program, I would expect to see more students obtaining employment related to their degree. Such a board will be able to assess the quality of the program, offer suggestions about the curricula, and provide advice to students about the employment needs in the local environment.

4. Faculty:

a. Are the areas of faculty specialization and competence appropriate for the program? Are other specialties needed?

Two faculty (tenure track) are responsible for the Environmental Sciences program although other members of the Earth and Atmospheric Sciences program contribute courses. Of the two faculty hired for Environmental Sciences, they have different specialties that complement each other. Additional permanent faculty would, of course, enhance the quality of the program. Such faculty could help with advising, assessment, and other aspects of service necessary to run effective programs. But an alternative may be better involvement from faculty in other sciences whose disciplinary interests are related to the environment. Currently, such courses are required in various aspects of the program but I sense more cooperation could be achieved. High reliance on adjunct faculty detracts from quality because they are paid to teach courses and have no other duties relative to program development.

b. Is the use of part-time faculty appropriate?

I can answer this question as yes although the real answer should be no. In such a large metropolitan area, a pool of expertise exists which permits hiring individuals with special skills that match the needs of the Environmental Sciences program. Rapid growth of MSCD and Environment Sciences necessitates the use of adjuncts. Program quality, however, could suffer in the long run if permanent faculty are not hired into the program. Lack of permanent faculty may also hinder the growth of the program.
In reflecting on adjunct faculty, one concern would be what type of formal orientation to MSCD are they given and what type of orientation does MSCD require from departments before adjunct faculty are allowed to teach? Legal issues abound in the realm of higher education that may be very different than the various types of employment adjuncts have before entering the classroom. How are they introduced to assessment? Can I assume that assessment is left to the department head rather than a university administrator? Yet every adjunct, regardless of the discipline, would need some oversight and instruction about their position from central administration. Absence of such a program is a central administration issue, first, but the Department should also assess the need for orientation for every adjunct faculty member hired. Finally, who determines the content of the courses taught by the adjuncts? Does that content match the needs of the program? If an adjunct is teaching an online course, is the content monitored and assessed relative to the goals and objectives of the program?

Based on the information provided, evaluate the faculty collectively with respect to:

c. their interest in curriculum revision.

The number of courses developed to service the Environmental Sciences program demonstrates commitment from the faculty to provide the courses needed by the students to achieve the goals and objectives of the program. As a relatively new program, program revisions will be necessary until the faculty are satisfied that students needs are being met. I sat in on classes taught by three professors and was impressed with their dedication to the topics and the students.

d. their professional development and scholarship including research in support of teaching and learning.

I sensed a dedication to teaching with a willingness to use certain classes to help students learn about research which in turn helps the faculty remain in touch with their research frontiers. Small upper division classes allow this type of interaction. Organizing field trips is an issue because many students have jobs that conflict with times when trips could occur. An active student club does attract some students who are concerned about involvement and are willing to make time for special events. Commuting students have different issues to overcome to obtain the experiences necessary to prepare for careers or seek graduate degrees.

Faculty do make time to attend special events, such as the Conference on First Year Students and regional and national meetings of professional societies. They recognize that such activities can enhance their performance and improve the quality of their classes. They should encourage students to attend any conferences in Denver, such as the Geological Society of America which meets at the Denver Convention center every three years.

In terms of research, variation exists among the faculty as it would in any college in the country. Some write peer reviewed material and others write and publish material that is not peer reviewed. Seeking grants is another peer reviewed activity that can have great rewards for the individual and the college. The volume of such activity is probably lower in total than for a department at a university that offers graduate degrees because they have teaching loads significantly less than required of faculty at MSCD and research is the dominant part of the tenure process.
e. their service to MSCD and professionally-related public service.

Service is required in the Department, College, and University. Some faculty are committed to this service and their efforts are reflected on their resumes. Input from faculty is critical on many of the issues being addressed by central administration that impact the department, like required general education courses and core courses in majors and minors. Advising requires a major time commitment from permanent faculty. Students need quality efforts from the faculty to achieve career success. I sensed that the permanent faculty enjoy interacting with the students, a real plus given the teaching and advising loads required. As Assistant Professors, I did not expect to see much involvement with professional organizations (i.e., elected positions) because they have had insufficient time to become well known in specialty groups, the level at which most interaction begins. Attendance will help them establish a network of colleagues so critical in advancing their careers.

f. their participation in professional organizations.

Professional organizations attract the interest of most faculty because of their ability to interact with peers at regional and national meetings. I sense that minimal funding is available from the college, therefore, the level of involvement represents a personal commitment to advance professionally. Those involved can inform students about new ideas and opportunities that arise specifically for students in most organizations. Because resumes indicate attendance at meetings, I sense that the faculty are committed to participating in professional organizations.

g. the distribution of their effort related to instruction, professional development, and service.

Regular faculty (those with tenure and those in tenure tracks) teach 12 hours per semester, in positions defined by MSCD as teaching. Research expectations are, therefore, minimal though seeking grants is encouraged. With the requirement to advise students who are seeking majors and minors without release time, MSCD expects that the permanent faculty serve as the driving force in all aspects of the education offered to the students. More than ninety percent of faculty effort is related to instruction and service with minimal time available for professional activities and research. Adjunct faculty teach but provide little in the way of service to MSCD, the program, or the students.

h. the number of grants applied for, received, and the amount received.
The process of writing grants varies among members of the Department of Earth and Atmospheric Sciences. Several faculty are actively seeking funds whereas others are not. Many small grants have been received whereas major grants have not been funded. Faculty should be encouraged to apply and then be compensated for their efforts. Grants can be the stimulus to professional growth by assisting with the purchases of equipment, travel, and salary. Such funds may also allow students to be hired as assistants, thereby expanding individual goals and objectives. Administrators at MSCD must realize, however, that their faculty are at a competitive disadvantage compared to faculty as research institutions with the time and support for grant writing.

i. the diversity of their academic backgrounds.

The faculty in Earth and Atmospheric Sciences have diverse backgrounds. The two faculty charged with Environmental Science are diverse yet complement each other. Diversity is, however, lacking in terms of women and color. (I am not aware of the ethnic mix of the adjuncts but role models are needed with respects to the students attracted to the program.)

5. Resources/Institutional Support:

a. Are resources adequate for achieving the goals and objectives of the program? Consider the facilities, capital equipment, operating expenses, office, laboratory, classroom, and other instructional space, library, number of faculty, support staff, and other resources.

The resources appear to be adequate to achieve the goals and objectives of the program but will improve with the renovated space the department will occupy in 2011. The new space will include resources to equip the space, thereby allowing the faculty to have the equipment necessary to offer students outstanding experiences. Field equipment is as critical as laboratory equipment because students must learn how to collect field data. I am certain that some Biology classes have similar needs for field data in contrast to Chemistry which may not need field data to train students.

The addition of equipment, however, will bring to light a deficiency – the lack of support staff to maintain the equipment. Computers in the GIS labs and in all offices need a technician to maintain the software and hardware. Students complained of using older versions of software yet they were paying fees for these classes and expecting to use the latest versions of the software. Using the new software would give them a competitive edge in seeking employment whereas training on older versions does not enhance their skills. Perhaps the department does not need a full-time person but could share an individual with such expertise with another department or two. Faculty cannot be expected to maintain hardware and software on the number of machines required for educational purposes.

Students complained that computer labs on campus do not possess the software they need to complete GIS assignments. When IT was approached about the problem, they made no effort to accommodate the students. If this truly is a teaching institution, then IT must be responsive to student needs. Failure to do so puts the students at a disadvantage compared to students at institutions that do cater to student needs. Because the students have irregular schedules and are commuters, all aspects of the university must help the student maximize their efforts during time on campus. Failure to do so leads to negative comments about the quality of the services provided by the college.
Another support staff issue is one secretary for a growing program. Perhaps a joint position could be established with another department once the move is made or a half-time position could be developed to ease the burden on the present staff member. Staff can also be used to collect and monitor assessment data collected by the faculty (permanent and adjuncts).

The large number of adjunct faculty used to support the Department of Earth and Atmospheric Sciences increases the service burden on tenured and tenure track faculty. More faculty would be ideal in a growing program but with essentially negative national and state economies, more regular faculty will probably not be given to a small program. For the near future, some retraction in the number of courses from which students can select for their majors and minors must be examined. Clearly, the Multidisciplinary degree option requires courses to be deleted and in turn will provide more focus to the program. Small programs cannot be all things to all people. Dropping some courses will enhance the quality of the program.

b. Does the review indicate that the program should be expanded, sustained at the same level, or contracted?

Based upon my assessment, the program should be sustained at the same level unless a number of adjunct faculty can be converted into a tenure track line. By sustaining the program, the move into new facilities will allow current faculty to adjust accordingly to the new building and additional equipment that will be provided. Moreover, any initial expansion should first be related to technical assistance with computers and other staff to assist with effective management of all of the activities necessary to make the department functional. With a re-examination of courses offered in various Environmental Science options, the department can better focus the options being made available to the students.

c. Are there initiatives and improvements that faculty and administrators should be making?

The first initiative involves better cooperation among departments that contribute to the Environmental Sciences program. Specifically, the heads of Chemistry, Biology, Physics and perhaps Mathematics should meet with the head of Earth and Atmospheric Sciences to assess the courses that are being used for the majors and minors in all departments. Because Environmental Sciences is an interdisciplinary program, such cooperation can only improve what students are offered. Although I was scheduled to meet with faculty from other departments, none of those meetings took place so I did not learn much about the view of the program from outside the home department.

Second, assessing all classes taught online is essential to a quality program. This assessment should involve the department and perhaps the assessment office to insure that students are getting a viable education from these online experiences.

Third, administrators should require Mathematics to look into self-paced online courses for all of the mathematics courses required for the Environmental Sciences program and all other non-major programs. Courses through advanced calculus have been taught online at Virginia Tech for over decade. Evidence documents that these courses improve retention and the rates of completion. Moreover, the quality of what is being taught and learned is easily assessed which is often not the case for a classroom environment. Central Administration may also have to interact with the junior college charged with remedial math to have them employ such online courses.
Central administration needs to assess the role of IT in the classroom. Faculty should not be required to maintain hardware and software. Central computer labs should provide students with the software necessary to complete various assignments when the teaching facility is in use for other classes. IT must be user friendly for students and faculty. The focus should be on student learning. Administrative tasks are essential but should not take priority over student learning.

Central Administration needs to facilitate the availability of financial aid when a student is enrolled in more than one institution during a semester. Such arrangements were made between Oklahoma State University and a local junior college to allow full-time aid for 12 hours taken at two institutions.

The administration must develop an orientation session for all adjunct faculty prior to them entering the classroom. Many legal issues can arise and should be addressed before problems occur. I should add that all new faculty also need an orientation session to MSCD which stresses expectations and every aspect of the faculty position that is essential to earning tenure. At Research I institutions, faculty are informed during an orientation session about expectations for tenure.

d. Could the program be more effective if its place in the organizational structure of the school or college were changed, e.g., if it were in a different department?

No. Environmental Science is in the correct department and college. What is needed is greater awareness from other departments of the interdisciplinary nature of the Environmental Sciences program and that the needs of the program require courses from many other departments. Once in a permanent home in close proximity to other sciences, the linkages should improve. As mentioned in previous comments, frequent meetings among science department heads would be a great first step to improve awareness and uniqueness of the program.

Please rate the following aspects of the program. It would also be most helpful if you also provided a short rationale for your rating.

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<th>The perceived quality of the curriculum</th>
<th>Substantially below average</th>
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**The Multidisciplinary Concentration**

Selection of this option requires completion of the General Studies Course Requirements and the Environmental Science Core Requirements, a stated minimum of 72 credits. Missing from these two areas are a course in Ecology and a course in Technical Writing. Both are critical for career preparation. Students mentioned the need for a general ecology course; one for non-majors would be sufficient. Given the necessity to write environmental impact statements and reports, all students should be required to take Technical Writing.
Fine print states that some of the required courses have prerequisites. These prerequisite courses MUST be shown on the plan and the actual number of required hours stated so that students are not led astray by the total credits listed, the minimum to earn a degree.

The requirements for the Multidisciplinary Concentration specify 38 credits are required from six subject areas plus a required internship and a senior graduation experience for a total of 44 credits. The plan shows four credits of unrestrictive electives which should be deleted when the prerequisites are added for other required courses in the Core.

This concentration lacks focus and perhaps it was designed as such. Based upon the courses listed, the concentration includes rigorous courses yet the focus of the combination of courses selected cannot be defined. Moreover, by listing the courses, the Department is stating that they will be offered on a regular basis. The lack of focus can be seen as creating a generalist yet specialists are needed such as those developed by the other concentrations. Perhaps you can provide a focus with fewer classes listed with the tacit understanding that students can make substitutions if needed.

The internship is an interesting concept. For students already employed in a position related to the degree being sought, the requirement should be waived. The Senior Experience should bring the students together to focus on a single topic from the different perspectives that each has acquired while completing his/her degree. This experience should be in the Environmental Sciences program rather than allowing students to have the experience in other departments.

**Unrestricted Electives**

All concentrations available to an Environmental Science student specify that some credits are available as unrestrictive electives. All such statements should be eliminated because required prerequisite courses will increase the total credits required for a degree beyond the minimum of 120 credits and unrestrictive electives are not needed to reach 120 credits.

**Minors**

For a person seeking a minor in Environmental Science or Environmental Studies, more focus should be created. Use ENV 1200 as the only required course and delete ENV 4970 Environmental Field Studies as required. Mixing majors and minors may not allow the course to be as rigorous as intended. Ecology (BIO 1010 Ecology for Non-Majors) should be a required course for Minors and eliminate courses such as GEL 1510 Geology of Red Rocks Park and Vicinity. Such a specific course should not be included in a list with general introductory courses. The capstone course for minors could be ENV 4960 Global Environmental Challenges, the broad perspective after acquiring more local information in the other courses.

**Other Courses**

GEL 3120 is listed as Advanced Geomorphology yet a lower level Geomorphology course is not available. I suggest deleting the “Advanced” from the title and teach the class as the basic geomorphology class such that the students will acquire perspectives on how surficial processes shape the surface. This class should then be the prerequisite for ENV 3700 Mountain Environments.
ENV 1400 World Resources may be a very informative course but should be very different than ENV 1200. It should not serve as a substitute for ENV 1200. Perhaps it can be taught as an upper division course such that only ENV 1200 fulfills general education requirements. The focus could shift to resources and what those resources contribute to the quality of life and how the acquisition of these resources has negatively impacted the environment.

ENV 4400 Landscape Ecology should have Ecology as a prerequisite. Students must be grounded in the fundamentals of Ecology before venturing into advanced classes.

ENV 4950 Internship in Environmental Science is a very useful course for students who are not employed in an area already related to Environmental Science. As a required course, it should be waived if current or previous employment meets the spirit of the internship.

ENV4970 Environmental Field Studies is a capstone course but the title does not reflect this as a final course. I believe that all majors should experience one course in which the topic is addressed from different perspectives. In this manner students learn that an environmental issue must be addressed by many perspectives rather than just a few. With written and oral components to the course, students would be leaving with an understanding of their role in solving complex problems. They would also recognize why so many environmental specialists can converge on one topic and have something important to say.

CHE 3050 Environmental Chemistry is taught as an online course. Students drop the class because of unclear instruction and expectations. Perhaps an assessment of the course is warranted with input from the departments that use this course for their majors.

Students stated that a real class in Ecological Restoration is lacking. Focus must be on clean up and habitat planning that includes soils and weather/climate specifically.

One student stated that the one credit Introduction to Planning (Land Use and Environmental Resources) ran for six weeks and focused on getting a job. Did not believe the course was informative enough.

Students believe that advanced classes must require that all students meet the prerequisites before the class can be taken. It is up to the faculty to enforce completion of prerequisites. Failure to do so waters down the level of the class and hurts those who are prepared.

One student commented and others agreed that the Multicultural requirement was a boring course and a waste of time. Although not a departmental issue, central administration must assess course content to insure that meaningful knowledge is being transmitted to the students. I believe such courses are very important in the general education curricula but they must meet quality standards expected by the College.

One final thought on courses involved students stating that more field experiences and more laboratory experiences are essential. The inclusion of both items in courses, however, involves equipment and resources. The costs associated with these experiences must be transmitted to the students. If they are willing to pay these costs, then the curricula should change to include more field trips and increased usage of field equipment.

Program Enhancement
Moving intro renovated facilities in the very near future will greatly improve the morale of the faculty and students. Having space in which various labs can function in close proximity to faculty offices will improve student/faculty interaction.

The Department Head shared with me that a field site for student use is being donated. Such a site will permit long-term monitoring of the environment. Base data can be collected and expanded upon in subsequent years to demonstrate change to students. Coupled with students wanting to do more field work, this site can only enhance student performance in the program.

Environmental Science has a primary focus on the physical environment. Whereas education, policy, economics, and other social aspects of the environment are important, two permanent faculty can only do so much. Program expansion should not occur until additional permanent faculty join the department. If such lines become available, the first question should be – do we strengthen the program as currently defined or broaden it into areas mentioned in this paragraph? Once you have a well-rounded advisory board in place, their expertise will be invaluable in helping with future directions of the program. The availability of careers in the region will also help define the future direction of the program.

The Department should tell students who qualify for work study that positions can be created in the department which will allow the students to get directly involved with activities related to their major. Announcements about such opportunities should be made in every class or sent to majors via email. Such programs are win-win for the department and the students. These students could be engaged in faculty research rather than mundane tasks typically associated with work study.

Finalize the Environmental Science Advisory Board by adding individuals from Businesses, like Waste Management, to go with the government agencies mentioned in the program review. Experts from governments or businesses that employ environmental specialists can provide insight into the changing needs of the agencies doing the hiring. In this manner, the curricula can be assessed and kept current.

The program can also be enhanced if MSCD establishes links between other institutions that allow students to receive financial aid when enrolled in more than one institution in a semester. The Financial Aid Directors of the institutions can put in place memorandums of understanding that allows multiple enrollments to meet federal guidelines for full-time enrollment. Students can take remedial courses at one institution while working on general education or major requirements at another institution.

Program Objective 2.1 aims to develop a concentration in Mountain Environments in conjunction with the Land Use Program. Such a program would be very specialized and probably not generate enough students to justify the effort. Before proceeding, bounce the idea off of an Advisory Board to learn their perspectives on the need for such a degree.

Program Objective 3.1 addresses a GIS facility to perform work for various agencies. Be careful of getting involved in activities that may compete with private industry. Does the State have laws against using state equipment to earn a profit, even if the profits are for the department? As mentioned previously, space, computers, and personnel would be needed to make this a reality.
Transfer students are important to the Environmental Science program. To ease the transition, it appears that a 60 + 60 policy has been established to assist students in during the transfer process from the junior colleges to the Environmental Science program. In this manner, as students begin at the junior college they can look at the sequence of courses that will fulfill requirements for the AA degree and lead directly into the BS in Environmental Sciences. Such effort should help ease the advising burden when students seek to enroll at MSCD. The goal of the process is to minimize the number of credits beyond 60 that transfer students will need to earn the BS.

Dedicated laboratories (used only by Environmental Science classes) will enhance the program (I am assuming that such laboratories will be provided in the renovated facilities). Faculty and students need such space to perform experiments that require more time to set up and run than is available in a normal class period. Without such dedicated space, instruction and learning suffers.

**SUMMARY**

The Department of Earth and Atmospheric Sciences in conjunction with two of its young assistant professors has established a remarkable undergraduate degree in Environmental Science with five concentrations and two minors. The use of adjunct professors facilitates being able to offer the wide variety of courses necessary for the various concentrations. Despite being in temporary facilities while waiting to move into renovated facilities, the program is growing in majors and averages approximately 15 degree completions per year. Clearly, the program is in demand, attracting working adults and traditional four year students.

The comprehensive document for the program review provides directions for the future while documenting accomplishments. Program objectives are clearly articulated with foci on teaching, advising, and development of a quality program. The major flaw in the entire program is attempting to provide too many concentrations with too few permanent faculty. One cannot fault the effort being put forth to achieve the objectives. Although I rated aspects of the program from good to above average, the ratings should not detract from the effort being expended to provide students with positive experiences. Some conditions are beyond the control of the department and the faculty yet the negatives do not detract from the effort being made.
As mentioned in answers to specific questions, revised degree plans are needed that list all pre-requisite courses that must be completed before the required courses can be taken. The total credits needed for a particular concentration total to 120 credits but clearly this is a minimum number. Once pre-requisite courses are listed, the unrestricted electives should be dropped to keep the number of credits needed for the degree as close to 120 as possible. Such truth in advertising is essential for proper advising and minimizing time to complete a degree. Of all the suggestions included in this review, providing an accurate list of courses for the degree is most critical. With all courses listed on one sheet for each concentration, the task of advising will be easier and more accurate.

The Multidisciplinary Concentration is clearly an attempt to help students earn a degree without selecting one of the four very specific concentrations. If this concentration has resulted in more new courses, efforts should be made to reduce the number of courses being taught – faculty are spread to thin with regard to the other four concentrations.

All Departments need more money, more faculty, better facilities, and more equipment. A balance must be achieved to serve the students with the resources available, grow the program within limits and take advantage of opportunities that emerge in the future. A new field site is one such opportunity that can contribute to the students’ requests for more field experiences with modern equipment. The new facility also provides opportunities for positive change with minimal expense to the Department. Changes in how IT services computers and software could also have major benefits for the Department. Changes in how Central Administration operates MSCD will also impact every aspect of the Environmental Science program. The Departmental Review of the Environmental Science program, including recognition of the strengths and weaknesses of the program, coupled with suggestions for change specified in these pages, will initiate a renewed vigor by the faculty to help students achieve personal goals in the program.

Respectfully submitted,

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