

Program Review
Biology and Geology
September 6, 2005, Dan Elliott, PhD

I. Program Goals and Objectives:

The Goals of the Biology and Geology Program are to:

- Personalize education as much as possible. The biology faculty do this by knowing the names of the students in their classes. By knowing why a student does not attend class regularly. By knowing why assignments are not of adequate quality. By making ourselves available to counsel students on classroom issues as well as extra-curricular issues. By making ourselves available for additional help outside of the regular class setting. By advising our advisees in ways that will allow them to attain the best education possible for their future needs.
- Provide an introductory course sequence in Biology 101-102 or Geology 101-102 to satisfy the general education requirement for students at CMU. This course sequence has been developed to support the mission of Central Methodist University.
- Provide an introductory course sequence in Biology or Geology to support other disciplines within the division. These includes majors in Biology, Middle School and Secondary Science Education, Marine Biology, Chemistry, Physics and Environmental Science. They also include programs in Pre-med and Pre-engineering. These courses have been designed to enable students to interact intelligently with others during their lifetime. This includes pursuit of academic and professional excellence, ethical leadership and social responsibility.
- Provide a major or minor in Biology within the limited resources available. The major in Biology is designed to enable the graduate to seek employment in any number of areas in the life sciences. This includes entrance to graduate schools and various professional schools, especially those schools dealing with health sciences. Most Pre-med students major in biology. The Pre-med Program will be covered in its own Program Review. Some biology courses are cross listed under the Chemistry Major and the Environmental Science Major. All Biology majors are required to do undergraduate research which is directed one of the biology faculty. Results of this research is required to be presented during a Science Seminar. These seminars are open to the entire campus. Instruction in all of these courses has been designed to encourage these students to pursue academic and professional excellence, ethical leadership and social responsibility.
- The two courses in geology are not sufficient to award a minor.
- Provide assistance to the Central Methodist University Dual Credit Program and to develop a collaboration with dual credit teachers. The Dual Credit Program is an avenue to recruit prospective students to the university, to provide high school students with college level instruction while still in high school, as well as provide substantial income to the university.
- To teach our majors to: think objectively and critically in the area of biology, to make responsible value judgments, communicate using skills and knowledge from several areas of science and technology and to inter-relate biology with other areas of the curriculum.

A. Faculty:

- The Biology and Geology Programs involve 4 full time faculty; Dan Elliott, PhD; Becky Enochs, PhD; Andrew Herbig, PhD and Paul Porneluzi, PhD. Dan Elliott has been at Central Methodist for 32 years, Becky Enochs for 20 years, Andrew Herbig for 2 year and Paul Porneluzi for 10 years. We take great pride in the quality and longevity of our teaching faculty.
- The quality of instruction is perhaps best defined by the number of teaching awards won by the Biology faculty. Dan Elliott has been awarded 6 awards determined by the student body, the Governor's Award for Excellence in Teaching and the Exemplary Teacher Award given by the United Methodist Church. Becky Enochs has been awarded 2 awards determined by the student body, the Governor's Award for Excellence in Teaching, the Exemplary Teacher Award given by the United Methodist Church and the John Kincaid Exemplary Teacher Award. Paul Porneluzi has been awarded 1 award determined by the student body and the Governor's Award for Excellence in Teaching.
- Quality of advising and number of advisees go hand-in-hand. The better advisers usually have a large number of advisees who seek them out. Dan Elliott usually averages 15-20 advisees. Becky Enochs usually averages around 50 advisees. In addition to being an excellent adviser, she serves as the Pre-med adviser and she teaches a section of CMU 111. Paul Porneluzi averages 15-20 advisees. Andrew Herbig is in his second year and only has 1 advisee. With time and experience his advisee list will increase.
- Involvement with students outside of advising and teaching involves a wide variety of activities. Dan Elliott is the Faculty Adviser of Omicron Delta Kappa, the National Leadership Honorary. He is also adviser of Beta Beta Beta, the National Biology Honorary and co-sponsor of Alpha Epsilon Delta, the National Pre-med Honorary. He is a member of the Pre-med Committee. Becky Enochs is the Faculty Adviser of Omicron Delta Kappa. She is the co-sponsor of Beta Beta Beta and the sponsor of Alpha Epsilon Delta. She is Chair of the Pre-med Committee. She is also the sponsor of and a member of NAMI and the Faculty/Alumni Mentors of Medical Profession Students. She is a member of the Institutional Ethics of Research Committee. She has guided student research which was presented to the Missouri Academy of Science. Paul Porneluzi is co-sponsor of Beta Beta Beta. He is SGA co-sponsor. He is a member of the Pre-med Committee. Andrew Herbig is co-sponsor of Beta Beta Beta and Alpha Epsilon Delta. He is also a member of the Faculty/Alumni Mentors of Medical Profession Students. He is a member of the Pre-med Committee.
- Quality of Professional Growth involves a wide variety of activities and events. Dan Elliott has published 2 recent articles, one of which was in an international journal. He also has had 3 recent abstracts of oral presentations published. He is a member of the Missouri Academy of Science, the Missouri Archaeological Society, the Paleontological Society of America, the Geological Society of America and a member of Southeastern Naturalists. He was the recent recipient of the Carl and Eleanor Chapman Award given annually to an outstanding non-professional archaeologist in the state of Missouri. He has served as past Vice-president and past President of the Missouri Archaeological Society. He has

recently developed an innovative course on Biology of the Dinosaurs which is taught in the May Term. Becky Enochs is a member of the Missouri Academy of Science. She is a member of the American Chemical Society. She is also a member of the Central Association of Advisers of Health Professions and she is a member of the National Association of Advisers of Health Professions. Paul Porneluzi has published 6 recent articles. He is a member of the American Society of Mammalogists, Wilson's Ornithological Society, Cooper Ornithological Society, Society of Conservation Biologists, the American Ornithological Union and the Association of Field Ornithologists.

- Involvement in the life of the university is equally varied and involved. Dan Elliott is the elected Faculty Representative to the Board of Trustees. He is also a member of the Enrollment Management Committee and an *ad hoc* member of the Governance Committee for the School of Graduate and Extended Studies. He is the campus contact and Director of Marine Biology Studies. He has served on several recent national search committees for faculty and administrators. Becky Enochs is a member of the Committee on Honors. Paul Porneluzi is a member of the Committee on Faculty Personnel and the Committee on Nominations. Andrew Herbig is a member of the Committee on Honors.
- Involvement with recruiting students is a major event in the Biology and Pre-med Programs. Pre-med will be addressed in its own Program Review. Dan Elliott has served on the Enrollment Management Committee since its inception. He served 3 years as the contact person for all awards from all academic areas. This process involves taking up several Saturdays during the school year. Each of the biology faculty is very actively involved with recruiting and interviewing prospective majors and minors.
- Involvement in other extracurricular or co-curricular duties is less varied. Dan Elliott is a member of the Fayette Rotary Club. He is also an appointed member of the Parks and Recreation Commission and the Tree Committee of the Fayette city government. He currently serves as the Chair of the Parks and Recreation Commission. Rotary issues and the two city appointments occasionally involve Central Methodist.
- Adjunct faculty are occasionally used in the Biology Program. Such faculty are reimbursed at the rate of \$500 per credit hour generated, with a minimum number of students involved. The Fall of 2005 saw the cancellation of the Behavior Biology course because an adjunct could not be attracted for the salary offered. It is commonly thought that it will become increasingly difficult to attract adjunct faculty for this salary, since there is no allowance for mileage and the price of gasoline is at record highs.

B. Students:

- Quality of current students as estimated by ACT scores is always among the highest on campus. This is true to a large degree because most pre-meds are also biology majors. (Specific data are not available)
- Evidence of student development is typified by the high acceptance rate in graduate and professional schools. It is also seen in the seminars presented at the weekly Interdisciplinary Science Seminars. Scores on national standardized exams also indicate our majors are above the average biology graduate.

(Specific data are not available)

Fall Term Distribution of Biology Majors (freshman-senior)

2004 = 62
2003 = 73
2002 = 83
2001 = 73
2000 = 75

- 4 Year Graduation Rate for Freshmen (1993 to 2000):
graduate = 25 don't graduate = 43 total = 63 graduation rate = 36.8%

5 Year Graduation Rate for Freshmen (1993 to 1999):
graduate = 27 don't graduate = 31 total = 58 graduation rate = 46.6 %

6 Year Graduation Rate for Freshmen (1993 to 1998):
graduate = 26 don't graduate = 23 total = 49 graduation rate = 53.1%

- Number of Degrees Awarded in Biology (counting Biology Pre-med):

2004 = 18
2003 = 11
2002 = 13
2001 = 15
2000 = 12

- Student Recruitment Strategies (AY 2003-2005):

Recruitment concentrated on students who had a 20 or above ACT score, a 3.0 or above high school GPA and in the top 50% of their graduating class. These scores were allowed for the lowest award offer of \$7,000 per school year. Any score below these levels, no award was offered. The highest awards of \$13,000 were offered to students who had a 28 or above ACT, a 3.5 or above high school GPA and who graduated in the top 10% of their high school class. Typically, these students have an index of 100 or above, based upon the high school ACT score multiplied by the GPA. These are the students who are also recruited by most other colleges and universities and competition is extreme.

C. Curriculum:

- With the exception of Andrew Herbig, the following information is based on past figures from AY 2000-2001 to date, plus Fall Semester of 2005.

Dan Elliott normally teaches the following courses in the Fall Semester:

course number and title:	workload hours:	ave. students:
Geology 101, Physical Geology	6	68 (large class)
Biology/ES 301, Ecology and En. Sci.	4	11
Museum Curator	3	

Spring Semester:

Geology 102, Historical Geology	6	64 (large class)
Botany 302, Botany, alt. with Bi 206	3	14
Biology 206, Invert. Zoology, alt. with Bi 302	4	6 (small class)
Museum Curator	3	

Becky Enochs normally teaches the following courses in the Fall Semester:

CMU 111, The College Adventure	3	
Biology 306, Genetics	4	16
Biology 315, Immunology	3	8 (small class)
Biology 225/325, Inter. Science Seminar	1	13
Biology 360, Special Problems	no credit	
Biology 368, Internship	1	4 (small class)
Spring Semester:		
Biology 305, Microbiology	5	21
Biology/Chemistry 317, Biochemistry	5	4 (small class)
Biology 225/325, Inter. Science Seminar	1	13
Biology 368, Internship	1	4 (small class)
Biology 360, Special Problems	no credit	
Biology 364, Biology Research	1	8 (small class)
Paul Porneluzi normally teaches the following courses in the Fall Semester:		
Biology 101, General Biology, 2 sections	11	70 (large class)
Spring Semester:		
Biology 102, General Biology, only 1 section as of Spring 2002	7	72 (large class)
Biology 200, Ornithology, alt. with Bi 304	3	11
Biology 304, Mammalogy, alt. with Bi 200	3	13
Biology/ES 311, Conservation Biology	3	12
Andrew Herbig normally teaches the following courses in the Fall Semester:		
Biology 107, Human Anatomy	6	59 (large class)
Biology 308, Histology	4	11
Science 382, History and Phil. of Science	3	data not found
Spring Semester:		
Biology 205, Human Physiology	7	41 (large class)
Biology 380, Biology Major Readings	3	9 (small class)
Biology/ES 318, Toxicology	3	data not found

In recent years, Biology has had only one course that has been offered by adjunct, this is Biology 307, Behavior Biology. The course was offered in each of the past four Fall Semesters by this method. This Fall Semester 2005, the course had 7 students enrolled, but no adjunct instructor would teach it for the money offered. The course was cancelled on the first day of class.

At this point in time there are no plans to alter our curriculum offerings.

- Student Credit Hours generated in all Biology courses since AY 2000-2001:
 - 2003-2004 = 2249
 - 2002-2003 = 2411
 - 2001-2002 = 2109
 - 2000-2001 = 2118
- Student Credit Hours generated in all Geology courses since AY 2000-2001:
 - 2003-2004 = 542
 - 2002-2003 = 536
 - 2001-2002 = 539
 - 2000-2001 = 569

D. Resources:

- The total budget for Biology-Geology in 2004-2005 was \$8,775. This total is about what the Biology-Geology budget has been for the past five years. This total allows for the purchase of most essential, expendable items for each AY. It does not allow for the purchase of items that would be considered to be course enhancement, that is above and beyond what has been done in the immediate past. It does not include any items that would be considered to be of major cost, or even for the replacement of major cost items that have broken down from years of normal use.

This Fall Semester (2005) saw an increase in lab fees jump from \$25 to \$50 per student. Biology-Geology desperately needs a budget increase from these fees. Currently, Biology-Geology has about 300 students enrolled in lab courses. At \$50 per student, this generates about \$15,000. There is usually a slight decrease in lab course enrollment for the Spring Semester, but should total about 250 students. This should generate another \$12,000 or so. Where will the money from the lab fee increase go? It will be a dramatic misuse of funds if this money does not go to the Biology-Geology Program.

- Cost per credit hour analysis:

Cost of the Program:	Faculty salaries (estimated)	\$167,000
	Faculty benefits @ 25% (estimated)	41,750
	Overloads (estimated)	15,000
	Student Work Study (estimated)	15,000
	Annual Budget (estimated)	<u>8,775</u>
	Total	\$247,525

Revenue Generated:	Student credit hours generated, Fall and Spring Semesters (estimated)	2,800
	\$200 per credit hour, total	\$560,000
	Lab fees generated (estimated)	<u>27,000</u>
	Total	\$587,000

The obvious conclusion is that the Biology-Geology Program is more that paying for itself.

II. Assessment:

- Assess the Biology Major by requiring each major to complete a written assignment sometime during the year of graduation. All majors are required to do undergraduate research, write a paper on this research in scientific format and give an oral presentation of that research in Biology 325, Interdisciplinary Science Seminar. Biology faculty will grade the paper and faculty in the Science Division will grade the seminar presentation by making written comments on a grade sheet. Areas of particular interest include adequate preparation from existing course work, lab facilities to carry out this research and use of appropriate technology in the research and the presentation.
Fund undergraduate research, which is greatly lacking. Currently, the Callis Fund for the Promotion of Basic Science Education and Technology is the major means

of covering research expenses. The start of each school year is the normal time to make application to the Callis Fund. Unfortunately, many research projects are severely limited by limited funding.

Provide further assessment by the biology faculty interviewing biology majors who have just taken a standardized test. Such post-exam interviews provide feedback concerning adequate preparation to take such exams.

All assessments will be considered to determine strengths and weaknesses of the Biology Major. All assessment information is kept on file by the Pre-med adviser. As the university makes alumni survey information available, these data will also be incorporated into such files.

III. Most Pressing Program Needs:

- Most labs and lecture rooms on the Biology and Geology floors are in serious need of renovation, to include air conditioning. Recent improvements in Stedman 107, 110 and 200 are used as show rooms to recruit students. However, a serious problem arises when we do successfully recruit students and they walk into Geology 101, Stedman Room 311, in the Fall Semester. This lecture room is not air conditioned. This room has 77 chairs in it and currently has 74 students. At 9:00 a.m. it is typically 80-82 degrees to start the geology class. At the end of class it is typically 84-85 degrees. This increase of heat is from human body heat. This increase of heat takes place with the ceiling fans on high. The comfort level is very low until the outside temperature stays in the low to mid 70s or lower. Most classrooms and labs are in the same situation, with Geology 101, the most extreme example. Classroom or lab renovation, to include air conditioning, costs around \$60,000. On the Biology floor there are seven labs that need this type of renovation. The Geology Lab (Stedman 111) and Stedman 311 (where Geology 101 meets) make a total of nine lecture rooms or labs in need of renovation. This totals around \$600,000.
- Stedman Hall needs a face lift. The halls are in serious need of new floor tiles. It is an embarrassment to bring visiting students and parents on a campus tour that includes Stedman Hall. We do get at least a little new paint here and there over the summer months, which helps.
- Biology and Geology are getting needed access to technology. Stedman 311 recently received computer access. Further computer access is needed in all labs and lecture rooms.
- Considering the heavy teaching loads and huge amount of profit created by the Biology-Geology Program, it is essential that Biology-Geology faculty receive a 1 hour teaching credit for 1 hour lab contact time. This proposal has been debated in the immediate past and we feel the one-for-one reimbursement is appropriate and crucial for our time spent.
- An increase in the operating budget is essential. The Biology-Geology annual budget has been in the \$8,000-\$9,000 range for many years. It is adequate for the purchase of expendable items only. See **Resources** above.
- There is a serious need of new lab-grade, compound microscopes. This type of microscope can be used in General Biology, Physical Geology, Historical Geology, Invertebrate Zoology, Botany and any other field course in biology. These scopes sell for about \$500 each. There is an immediate need for 20 of

these scopes, which totals about \$10,000. Although this type of scope is not normally considered to be an expendable item, they only last about 20 years or so, before they start to wear out from normal use. These scopes are about 20 years old and they must be replaced. There is also a need for additional lab-grade, dissecting microscopes. We currently have five of these scopes and we could use another five. They sell for about \$750 each. This totals about \$3,750.

IV. Program Plan:

- We must continue to update our course offerings to meet the changing needs of our Biology Major. The primary feedback mechanism is student research and the written and oral presentation of the research results in Science Seminar 325. Scores on standardized exams must be considered as well.
- In the past two academic years, the number of biology majors as first time freshmen has declined. We must get back to where we were two years ago and then strive for an increase in the numbers of biology majors (to include Biology Pre-meds). This will likely require an increase in the amount of money offered to non-athlete Biology Majors. This Fall Semester awards given to non-athlete students from all of the academic areas averaged about \$8,400 for the academic year. Whereas, awards give to athlete students from all sports averaged about \$8,950. In other words, athletes are offered over \$500 up front to come to Central. If non-athletes were offered the same amount up front, maybe there would be considerably more non-athletes on campus today. We do need to wean ourselves off of high awards to athletes. We feel a modest increase of Biology Majors is essential to our cause. It is reasonable to expect an increase to 80 interviews of non-athlete biology (counting pre-med) majors within the next five years. Of these 80 interviews we hope to have 40 commit to Central. Of the 40 to commit we hope to graduate over 20 at the end of the traditional 4 year span of time and 30 within a 6 year span of time. This is a realistic and attainable goal for the next 5 years.
- Better recruitment of biology majors is a major concern. We need to increase our interviews of prospective Biology Majors. In the immediate past, the Biology Department (counting pre-med) has about a 50% success rate in getting students to commit to CMU. That is, about half of all interviewed students come to Central. We need to interview more prospective biology students to increase our commitment rate. Currently, there is some off-campus recruitment going on. There is little compensation for off-campus recruiting. We can also increase recruiting by increasing telephone calls to high school seniors. To some degree increasing the numbers of e mails can be a good way to maintain contact with students. However, all of these require time and energy. The Science Division is among the best of all academic areas at making student contacts. We want to do more to increase our number of majors. This Friday, September 9, the science faculty will meet with Larry Anderson and some of his recruiters to discuss the best techniques to attract prospective majors.
- We can also increase student contacts by collaborating with Dual Credit teachers in our local high schools. Efforts are already in place to maintain those contacts.
- It is felt that better retention of our students can occur by emphasizing research by our students. By emphasizing research at the freshman level students can develop

more lasting relationships with upper class majors, who are used as mentors, as well as our professors who are used as mentors.