B.A., B.S. ANNUAL GEOLOGY PROGRAM ASSESSMENT 2009-2010

Prepared by: William L. Niemann, Chair

I. Program Goals

The BA/BS undergraduate program in Geology directly supports most of the basic tenets of the Mission of Marshall University. The program is designed to train graduates to 1) think logically, critically and creatively, 2) communicate ideas clearly and effectively in speaking and writing, and 3) recognize, analyze, and solve problems utilizing the most appropriate research methods available.

The Geology Department is committed to :

1. provide high quality undergraduate education
2. develop opportunities for undergraduate research
3. maintain a strong curriculum and rigorous standards that are relevant to the profession
4. support economic development through maintenance of a degree program in environmental geoscience and engineering geology
5. address environmental issues in service courses (e.g. water pollution, global warming), upper level courses (e.g. environmental geology, hydrogeology), and areas of emphasis (e.g. Engineering Geology and Environmental Geoscience).

Faculty within the department have supported training and enrichment for elementary and secondary schools by providing lectures, leading field trips, participating in collaborative research with high school students, and summer institutes in earth science for science teachers, judging science fairs, and merit badge counseling for Boy Scouts.

As part of its mission as a liberal arts institution, Marshall University has an obligation to provide students with coursework and degree programs that cover natural sciences. Geology is in many ways the cornerstone of our society. Our way of life depends on geologic resources, and our ability to sustain mankind depends on a thorough understanding of how our activities impact the environment around us. The water, soil, air upon which we depend is primarily the product of ongoing geologic processes. Our society will continue to need earth scientists with a sound geologic background because of its continuing need for fossil fuels, metallic and nonmetallic resources, ground and surface water, and because of the need to manage increasing amounts of waste that will be produced by an ever-expanding, consumer oriented population.

Goals related to Student Academic Achievement: The goal of the program is to train students so that they will be successful in graduate school or as professional geoscientists. The program strives to ensure that all graduates have an opportunity to do one or the other, continue their education or enter the work force.

***Goals related to Faculty Development*:** Geology faculty must have the opportunity and support to conduct research, attend professional meetings, and participate in training workshops if they are to remain current and enthusiastic about their profession. The goal of

the Geology program is to provide faculty with sufficient time and resources to be able participate in developmental activities. These activities help maintain faculty morale, enhance teaching effectiveness, and provide opportunities for increased scientific knowledge and its benefits to society.

Goals related to Curriculum Development: The B.A. and B. S. curricula provide a solid foundation in geology and allied sciences and mathematics. They are intended to provide a foundation of core courses with enough flexibility to meet a students specific interest or career track. Two areas of emphasis are engineering geology and environmental geoscience. Other course combinations can be used to prepare students for careers in oil, gas or coal exploration and production.

II. Learning Outcomes

Geology Major Outcomes

The B.A./B.S. Geology graduate should acquire the following competencies:

1. proficiency in technical writing
2. effective oral communication
3. critical thinking
4. computer competency
5. quantitative math skills
6. acquisition of basic data and knowledge in geology and allied disciplines
7. basic field skills
8. to work effectively in group projects

Technical Writing

Criteria:

-capacity to research the available literature using library and Internet sources, collect data in some cases, and critically and effectively synthesize the information into a well structured, logical analysis

- capacity to adapt final report to specific formats depending on application; in some cases the required format is that used in professional geologic journals.

- effectively use and manipulate & modify graphic materials including digital photos, graphs, maps and the like in research papers

Indicators:

Successful completion of upper level GLY courses with a significant writing component: GLY 325 (Stratigraphy and Sedimentation), 427 (Fossil Fuels), 485-488 (Independent Study), 491-492 (Capstone) and ENG 354 (Scientific and Technical Writing) [required for GLY areas of emphasis]. Most lab based courses have lab reports. Other geology courses with term papers include GLY 421 (Petrology) and 425 (Geochemistry).

Oral Communication

Criteria:
- capacity to express ideas effectively in oral form both informally and in formal presentations, in a manner that is clear, concise, well-informed and which takes nature of audience into account.
- Completion of CMM 103, Fundamentals of Speech Communication or demonstrated proficiency.
- Oral reports, typically incorporating Powerpoint, in GLY 427, 430 (Computer Methods), 451 (Geomorphology), 455 (Hydrogeology), and 491-492.

Indicators:
Grades and written comments on oral presentations by faculty and peer evaluation, faculty discussions of capstone presentations

Results:

Capstone presentations have been of uneven quality. Many presentations were rushed, disorganized, and of less than desired quality. The reasons are attributable to multiple factors, perhaps most notably differences in student motivation and ability and unclear communication of expectations.

Actions:
It is clear that the Department needed to get better quality and time constraint controls on its capstone experience. These are used as part of program assessment. Other departments in our division have more rigorous guidelines that are posted on their department web page. In response the department completed a policy document on our capstone policy that took effect in the fall of 2009. It is posted on the department's website along with the other required course syllabi. The changes that are included in the new guidelines are meant to promote greater consistency and clarify procedures and expectations. These include:

1) capstone projects may be of three types: research, internship, or geology field camp.
2) formal capstone proposals are required for research projects and prior approval is required for internships and field camp. All geology faculty are involved in the approval process.
3) research and internship capstones must be completed under the supervision of a geology faculty advisor.
4) clear criteria have been defined for capstone grades:
    a) for research projects, 70 % based on written report, 30% on oral presentation.
    b) for internships, 50 % based on employer input, 30% based on written report, and 20% based on oral presentation.
    c) for field camp, the grade is assigned by the sponsoring institution (Marshall does not offer its own geology field camp).

5) the capstone guidelines give required formats, lengths, and content for proposals and written reports
6) the ACAT exam will no longer be factored into the capstone grade.
7) eliminate capstone presentations during summer due to limited availability of faculty (all are on 9 month contracts) and limited student audience.

Critical Thinking

Criteria:
-Capacity to carry out lab and field projects, and exercises in GLY 313 (Structural Geology), 314 (Mineralology), 421, 423 (Sedimentary Petrography), 425, 427, 430, 451L, 455L, 456L (Environmental Geology), 485-488, and 491- 492), involving collection, analysis and interpretation of data.
- Ability to effectively respond to questions regarding their research from an audience of faculty and students follow-up to capstone presentations.
- Ability to evaluate the validity of results and interpretations of others
- Capacity to seek out previous work relevant to a particular geologic problem and apply available information to a solution or interpretation.

Indicators:
- successful completion of upper level GLY coursework, all of which include a significant lab/field component.
- completion of independent studies (GLY 485-488)
- completion of capstone project including written report and oral presentation.
- feedback from employers
- presentation of capstone results to Research Day and meetings

Results:
Completion of Capstone Projects (see Oral Presentation-Results)

Computer Competency

Criteria:
-use of email for correspondence and submitting assignments
- use of online databases for imagery, maps and data archives
-use of scanners; annotation, integration of graphics into reports (all upper level courses)
-use of Word for report writing (all upper level courses)
-use of Excel for Data Management and Statistical Analysis (GLY 321 (Lab Techniques), 427, 430, 455)
-use of PowerPoint for Oral Presentations
-use of Internet for Research (all upper level GLY courses)
-use of Surfer for Map Making (GLY 212, 313, 430, 455, 455L)

-use of Rockworks for Stratigraphic and Structural Analysis (GLY 325, 427)
-completion of GLY 430, Computer Methods in Geology

Indicators:
-successful completion of upper level geology courses
-feedback from employers

Quantitative Math Skills

Criteria:
-Capacity to carry out field projects, lab exercises and problem sets in GLY 212 (Field mapping), 313, 314, 325, 421, 423, 425, 430, 455, 457 (Engineering Geology), 485-488, and 491- 492, involving collection, analysis and interpretation of data
- use of geometry, trigonometry, statistics and algebra to analyze geological problems

Indicators:
- successful completion of projects, exercises, problem sets and passing tests

Fundamental and relevant knowledge in Geology and allied sciences

Criteria:
-comprehension of the structure and composition of the earth, geologic processes and their products, earth origin and history, as well as relevant aspects of physics, biology, chemistry, and mathematics.
-knowledge of sufficient breadth and depth to be employable and certifiable (in those states that use Certified Professional Geologist system) as a professional geologist

Indicators:
- Hiring of internship students to full time positions upon graduation
-Completion of geology curriculum
-Acceptance into graduate school or entry level geology position
-Employer feedback
-Course embedded testing in the two introductory courses: GLY 110 (General Geology) and 200 (Physical Geology)

Results:
Seven geology students graduated with BS degrees and one with a BA during the 2009-2010 year with an average (mean) overall GPA of 2.80 and a range of 2.15-3.51. One additional student graduated with a BS in summer 2010.

Results of course assessment testing:

FALL 2009

Semester	Course	Faculty	# students beginning	Entrance	# students end	Exit	score diff	% improvement
200901	110/101	WLN	40	41.88	35	65.57	23.99	57
200901	110/102	DDS	45	41.22	37	63.51	22.29	54
200901	110/103	DDS	31	40.00	26	57.88	17.88	45
200901	200/101	RLM	62	47.66	53	71.42	23.76	50

SPRING 2010

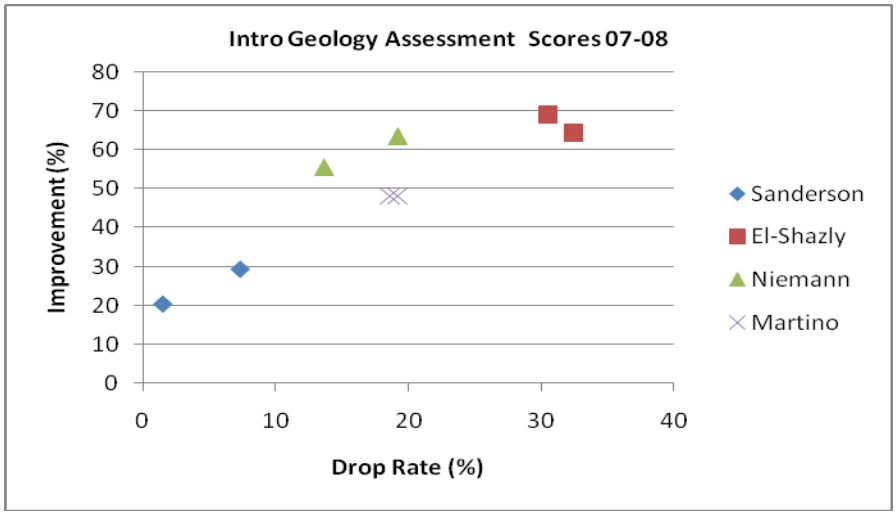
Semester	Course	Faculty	# students beginning	Entrance	# students end	Exit	score diff	% improvement
201002	110/201	DDS	43	43.02	36	61.67	18.65	43
201002	110/202	WLN	37	40.54	35	65.14	24.60	61
201002	200/201	RLM	60	45.92	50	69.60	23.68	52
201002	200/202	AELS	45	45.33	41	67.80	22.47	50

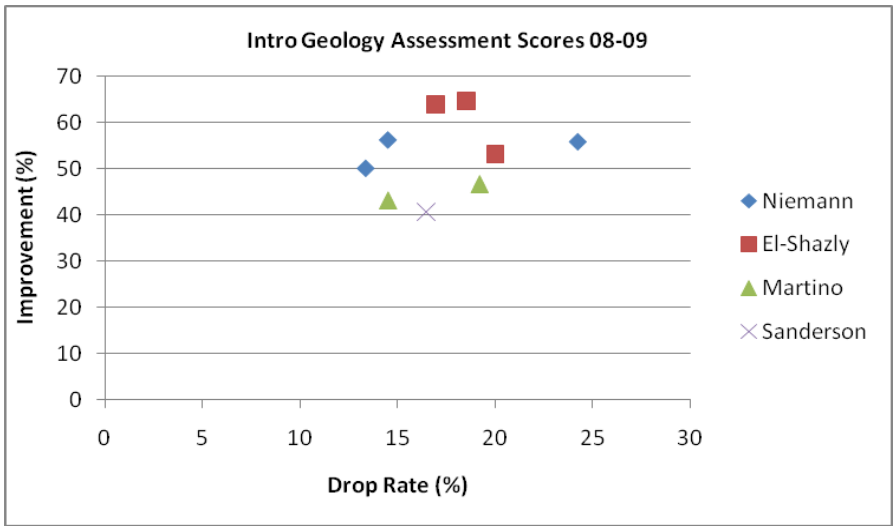
* Basis of calculations: ((Exit-Entrance)/Entrance)x100 This is a comparison of what the student knew at the end of the course compared to what was known at the beginning of the course. To insure that students take the assessment tests seriously, a percentage of what they make on the test is added to their first and final test scores.

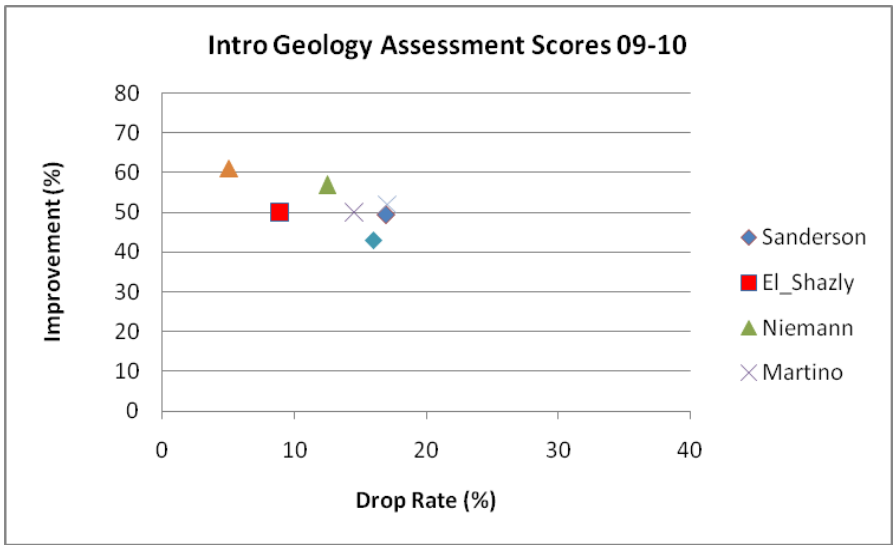
These results show significant gains in basic knowledge of geology. It is seen that both the entrance and exit exam scores for GLY 200 are higher than for GLY110. This result is somewhat predictable, as the former course is taken primarily by science majors and the latter by non-science majors. The result is also desirable in that it may indicate that students are taking the courses appropriate for their ability levels. However, in some previous years GLY 110 exit scores have not been significantly different than those for GLY 200. We will continue to monitor the situation.

There is a wide range of improvement based on the entrance/exit score comparisons: a range in percent improvement of 45-57 in fall 2009 and a range of 43-61 in spring 2010. In an attempt to determine a possible explanation a plot was made from the data for the last three years showing percent improvement versus percent drop rate for all four faculty.

For 2007-2008 there appears to be a marked relationship (strong positive correlation) between drop rate and improvement. This could be explained by weaker students dropping the course, which would presumably raise the exit scores. For 2008-2009 there is no clear relationship between drop rate and improvement, and for 2009-2010, there appears to be a negative correlation, with higher improvement scores correlating with lower drop rates. The latter relationship demonstrates that low drop rates and improvement are not incompatible

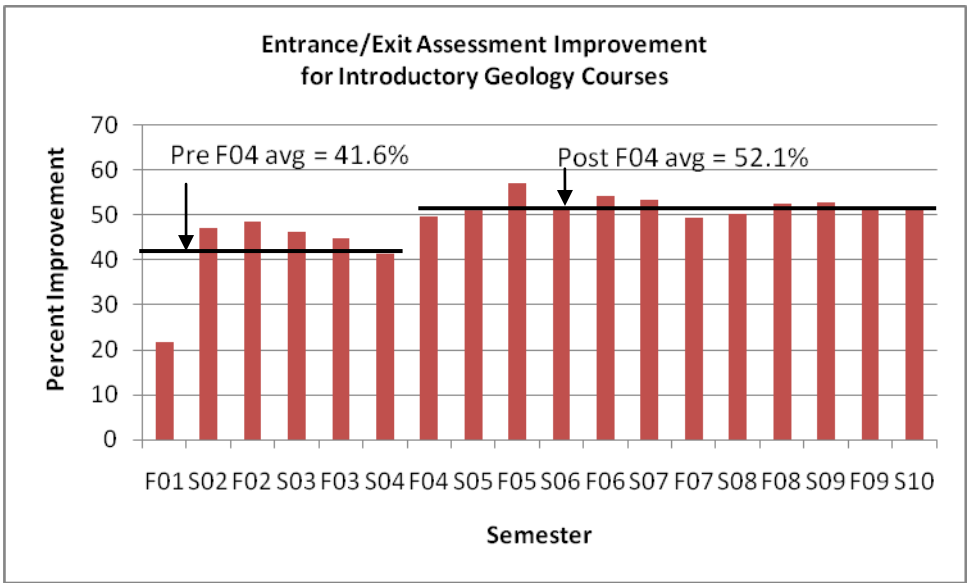

Intro Geology Assessment Scores 07-08
Improvement (%)
Drop Rate (%)
0
10
20
30
40
50
60
70
80
Sanderson
El-Shazly
Niemann
Martino


Intro Geology Assessment Scores 08-09
Improvement (%)
Drop Rate (%)
0
5
10
15
20
25
30
40
50
60
70
Niemann
El-Shazly
Martino
Sanderson


Intro Geology Assessment Scores 09-10
Improvement (%)
Drop Rate (%)
0
10
20
30
40
50
60
70
80
Sanderson
El_Shazly
Niemann
Martino

and that there may even be a causative relationship. Once again we will continue to monitor the situation.

The department has been compiling entrance/exit exam results since the fall of 2001. To see if there has been any change over time the average improvement for all introductory courses each semester has been compiled and plotted as shown below.



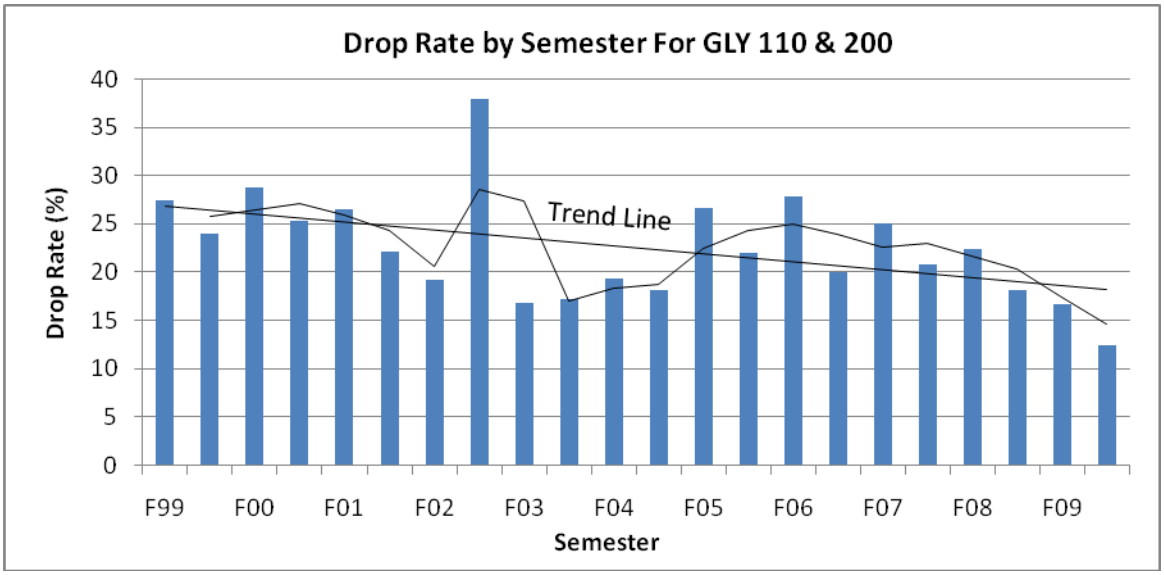
The summer session data was not included in the plot. The department only offers one introductory geology class each summer school.

The data in the plot is broken into two sections, F01 – S04 and F04-S10. The reason for this is the addition of two new faculty in 2004 to replace two retiring faculty. The data should indicate if the new faculty have resulted in an improvement in learning outcomes. It appears to have done so: the values listed on the plot show a nearly 11% gain. This improvement is likely due to a combination of newer faculty who are more dynamic and senior faculty who are nearing retirement and have lost some of their enthusiasm for teaching and do not utilize new techniques employed by the new faculty. But senior faculty have also adapted, perhaps partly in response to the success of the new faculty in the classroom. All of the current faculty use PowerPoint instead of the chalk board; makes notes available on the web or by email; give quizzes (including group quizzes); and give different kinds of extra credit activities including field trips. When the data assessment was first collected, the classes were taught as chalk/talk and field trips. The use of technology and requiring more of the students has apparently been successful. Perhaps most of all, Geology faculty realize that the introductory courses are the department's bread and butter: they are the classes with the highest enrollment and, unlike other departments, they represent the primary pool of potential new majors. Thus, since 2004

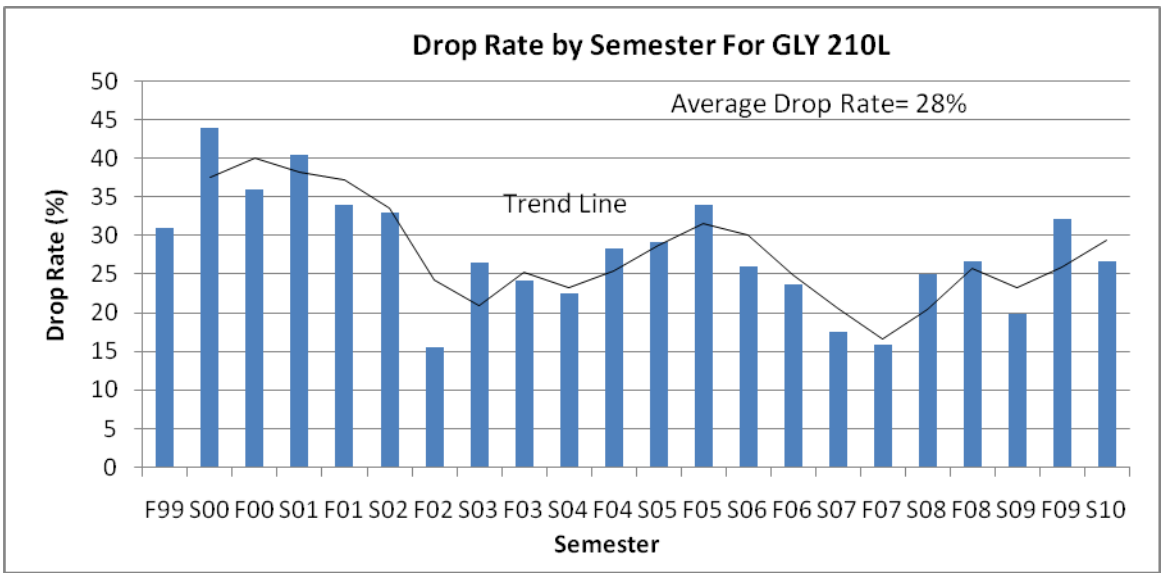
all faculty have evidently expended greater effort towards making these classes as effective as possible.

Another indicator of the department's success in retaining students is to look at the withdrawal rates of its classes. This is also a parameter of keen interest to the university as a whole. Withdrawal from individual courses may in fact be withdrawal from all classes and the student leaving the university completely and not returning. Withdrawing from a class can be for a number of reasons including reasons including, financial, doing poorly, the subject matter not being what it was thought to be, a personal crisis situation, medical, military and others as well.

Data were compiled from BERT over the past 11 years by semester and plotted on the following bar graph. The chart below is for the department's introductory courses, general geology (GLY 110), and physical geology (GLY 200).



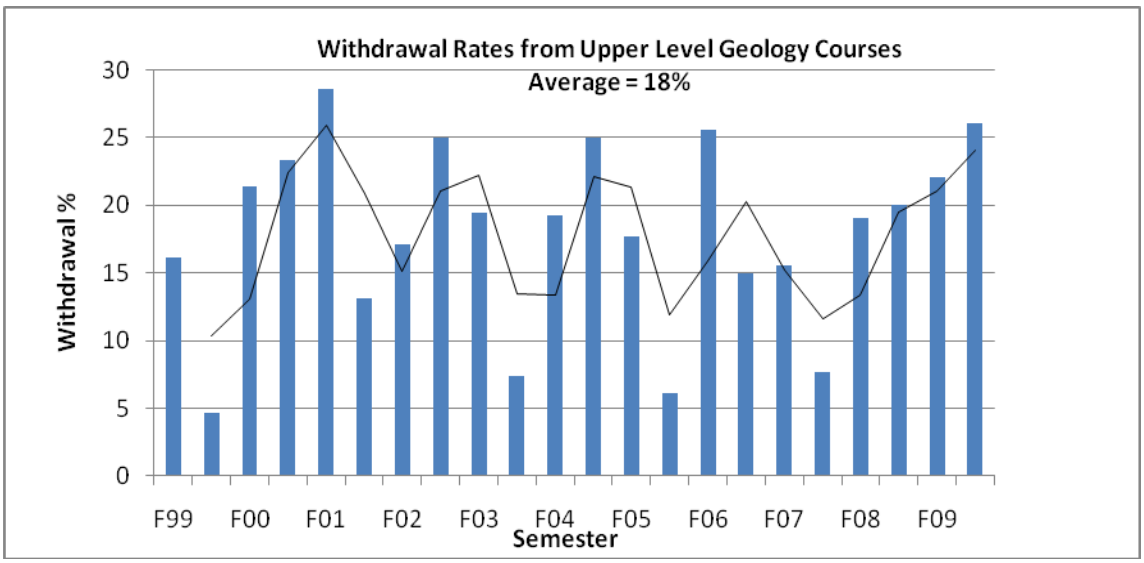
Both a linear trend line and a moving average are shown superimposed on the data for GLY 110 and GLY 200 to allow identification of any trends. There has been both an overall decrease in drop rate over the 11-year period, as indicated by the linear trend, and a clear reduction in drop rate over the last three years, as indicated by the moving average. The average drop rate for the most recent year, 14.5%, is the lowest of the 11 years charted. In addition, the drop rate has declined more dramatically since 2007 than at any time since 2003. There also appears to be consistently lower spring semester drop rate in GLY 110/200 compared to fall. An explanation for this is that most of the introductory class enrollment is freshmen; by the spring semester many of them have dropped out of school or have gotten their "act together." Both factors improve the drop rate statistics. The above trends are very encouraging. The Geology department cannot attribute all of the improvement in GLY 110/200 retention to internal factors-- as university and college wide factors may also be at work--but given the strong trends, certainly internal factors are playing a positive role.



Of concern to the department has been the relatively high drop rate in our GLY 210L, Earth Materials Lab, which services both GLY 110 and 200. The average drop rate is 6% higher than the companion lectures for the period 1999-2010 and, as shown above, after declining steadily from 2005-2007 has been increasing again. The drop rate in fall 2009 was over 30%, the highest in this course since fall 2005.

Some of the loss for the lab is due to students finding out the lab is not required by the Geology Department and may not be required by their college. Our labs are taught by faculty, not graduate assistants, although we have had their assistance in the labs. Another explanation is that the material in this course is simply too difficult for non-science majors. This, however, would not explain the up and down trends in drop rates, as the curriculum in has not changed in many years and the same instructors have taught th course since 2004.

Retention/withdrawal rates were also compiled for the upper level geology classes that are primarily taken by geology majors (see below). These include included in this compilation is mapping (GLY 212) and the 300-400 level courses.



The overall withdrawal rate is 18% with no difference for the pre-F04 and post-F04 periods. Apparently the faculty change made no difference. The retention in the major courses is better than that for the non-major courses (18% versus 22% for GLY 110/200 and 26% for GLY 210L). It seems reasonable to conclude that the lower overall drop rate for upper-level geology classes is indicative of academically superior and more experienced students, as these courses are more difficult than the introductory classes, and perhaps also that geology faculty invest more time and effort in teaching upper-level classes.

There has been an upward trend in drop rates for the upper level courses since 2007. It is hard to say that this is significant, however, because there a smaller number of students is used in calculating the averages than for the introductory courses. The variation can also be due to some semesters having required courses and others having elective course. The department has a two year rotation on its upper level courses.

Assessment to a National Norm

The only nationally normalized exam currently available for assessing undergraduate programs in Geology is the ACAT. This exam has been available at least as far back as 1995, though this fact was not discovered by our department until 2003. The ACAT (Area Concentration Achievement Tests) is produced by Austin Peay University.

The ACAT exam has two serious shortcomings. There were only 14 schools out of a potential several hundred that could participate in the Geology ACAT exam (see Table).It is difficult to say what the national norm really is since such a small percentage of the geoscience programs in the U.S. participate. The second issue involves the exam itself. The treatment of various subject areas is uneven and a number of questions used on the exam are ambiguous or have no correct answer. At the time of this report, the number of geology departments taking the exam has not increased.

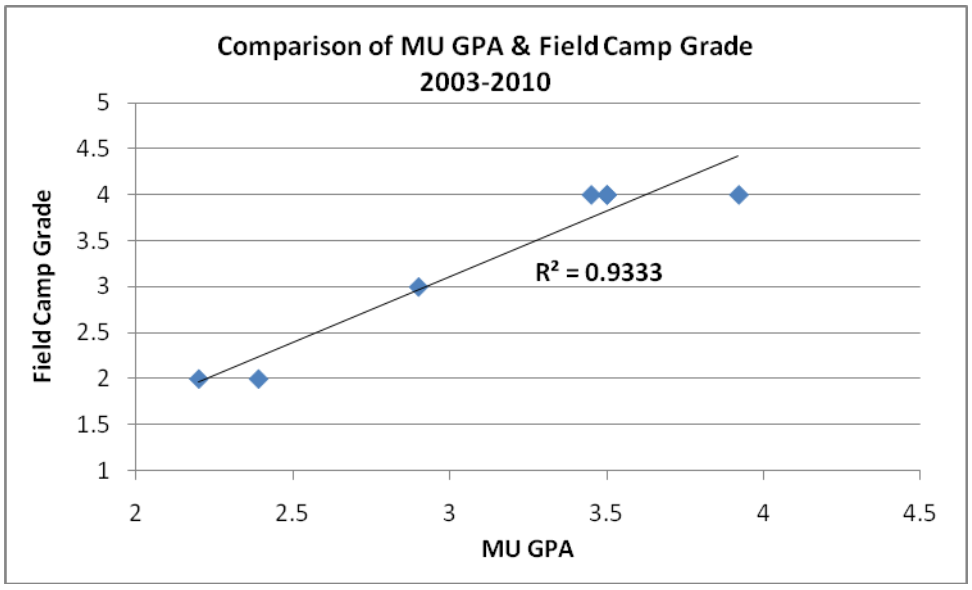
Our program began implementing the ACAT exam in Spring 2004. The original policy required that all seniors take the ACAT exam as part of their capstone requirement. Their

performance relative to the national average counted toward 20 % of their capstone grade. Students were given a 4 week notice to prepare and each instructor provided a 2-3 hour review session in their areas of specialization. Most of the students did not take advantage of the review.

The results of the exam were disappointing. In most categories are students ranked in the lower 50 percentile. After three years, the faculty decided to abandon the ACAT.

A new assessment instrument was instituted in the 2008-2009 annual assessment report that can give a measure of how Marshall's geology students compare to those of other universities and that is through our summer field camp option. Approximately seven years ago an alumnus of our department, Robert Fox, donated money to the geology department through the Marshall Foundation for the purpose of providing a scholarship to a geology major to attend an accredited university's geology field camp. To date we have had seven students awarded this scholarship. The competitive scholarship does not completely cover all expenses, but it does provide a sufficient amount to make it attractive. We have promoted it and those students who have experienced field camp have benefited greatly. Our students make their own choice as to the school they wish to attend.

The graph below compares the grade received from the field camp to the student's Marshall GPA. A trend line is included in the plot. Fortunately, for the purpose of assessment, we have had students with a range of Marshall GPA's who have participated in a field camp.



There is clearly a strong positive correlation (R^2 = 0.933) between academic performance here at Marshall and performance at field camps directed by other schools. The schools selected by our majors for their field camps include Southern Illinois University, University of Hawaii, University of Nevada, Bowling Green State University, Albion College, Indiana University, and University of Missouri. These are schools that have geology deparments at least twice as large as our department and they recruit students from schools all across the country for their summer field camps. There are sevearl advantages to this assessment instrument:

1) The field camp experience is broad and requires students to draw upon the fundamentals of many core geology courses common to any school;
2) Most students take the field camp in the summer after their junior or senior year and so they can be considered complete or nearly complete products of our program;
3) All of our students who have attended field camp have chosen a different one and so we are able to measure our program against a variety of other programs.

The results are encouraging: our top students do just as well in a mix of students from across the country. Our average students are average among other geology students. None of our students have had their application for field camp denied.

In 2011 we will experiment informally with a new assessment instrument: problems given to stduents from study materials prepared for professional licensure exams in geology. Currently 31 states license geologists; West Virginia is not among these states. However, many Marshall graduates in geology will work in states that do require certification. In addition, many companies in West Virginia who employ geologists encourage or require certification because they consider it a measure of competence and because they do work in other states. The National Association of State Boards of Geology (ASBOG) is responsible for coordinating and standardizing the examinations that are used for certification purposes in those states which do require certification for practicing geologists. Several problems from ASBOG study materials will be administered to geology majors during Assessment Day activities this April (2011).

Faculty Development

Goals:

-active research program
-effective, updated, enthusiastic course delivery

Indicators:

-attendance/participation at CTE workshops and presentations
-attend professional meetings with Quinlan support
-new course development or revision
-Use of technology in teaching and research
-participation in workshops and professional meetings
-Publications in refereed journals
-Grant Applications Submitted/ Grants Awarded
-Course Evaluation

Results:

During 2009-2010, faculty are involved in:
-Unpublished, funded research for NSF and NASA / WVEPSCOR
- Consultation
- Grant writing:

- Present papers at national meetings
- Publications in peer reviewed journals
- Hedrick-funded field camp, offered in the summers of 2008 and 2010.

Student Course Evaluations (N= 558 for Fall 2009 and Spring 2010)

Out of the 22 questions asked on the evaluation form, five were selected to represent teaching effectiveness.

Questions:

8	I believe I learned in this course
11	The instructor was enthusiastic about the course material
12	The instructor encouraged students to ask questions
21	The instructor seemed genuinely interested in wanting me to learn
22	I would recommend this instructor to other students

Since there was a change in the evaluation questions three years ago, earlier data is not included. The values reported are the combined responses of 1 and 2, or excellent and good. In addition to the responses tabulated for the department, the College of Science averages are also included for comparison.

Year	2004 - 2005			2005 - 2006			2006 - 2007			2007 - 2008			2008 - 2009			2009 - 2010		
Question	GLY	COS	% diff.	GLY	COS	% diff.	GLY	COS	% diff.	GLY	COS	% diff.	GLY	COS	% diff.	GLY	COS	% diff.
8	91	85	6	83	86	-3	88	84	4	85	86	-1	82	84	-2	85	86	-1
11	86	88	-2	84	89	-5	89	87	2	88	86	2	87	87	0	83	87	-4
12	90	87	3	86	89	-3	86	86	0	88	88	0	87	87	0	86	88	-3
21	90	86	4	85	88	-3	88	89	-1	88	85	3	86	87	-1	87	86	1
22	87	80	7	78	81	-3	82	80	2	80	77	3	77	80	-3	81	81	0
Average			**3.6**			**-3.4**			**1.4**			**1.4**			**-1.2**			**-1.3**

Approval ratings for both COS and Geology are high, almost always between 80 and 90% for all questions for all years. The differences between Geology and COS are insignificant.

Use of technology

- PowerPoint lectures are used in GLY 110, 150, 200, 201, 423, 427, 451, 456, 457 courses

- A variety of subject specific software is used in upper level GLY courses
- All four faculty use their personal websites for making available PowerPoint presentations, class notes and solutions to lab exercises and tests.
    - http://www.science.marshall.edu/elshazly
      http://www.science.marshall.edu/niemann
      http://www.science.marshall.edu/sanderso
      http://www.science.marshall.edu/martinor

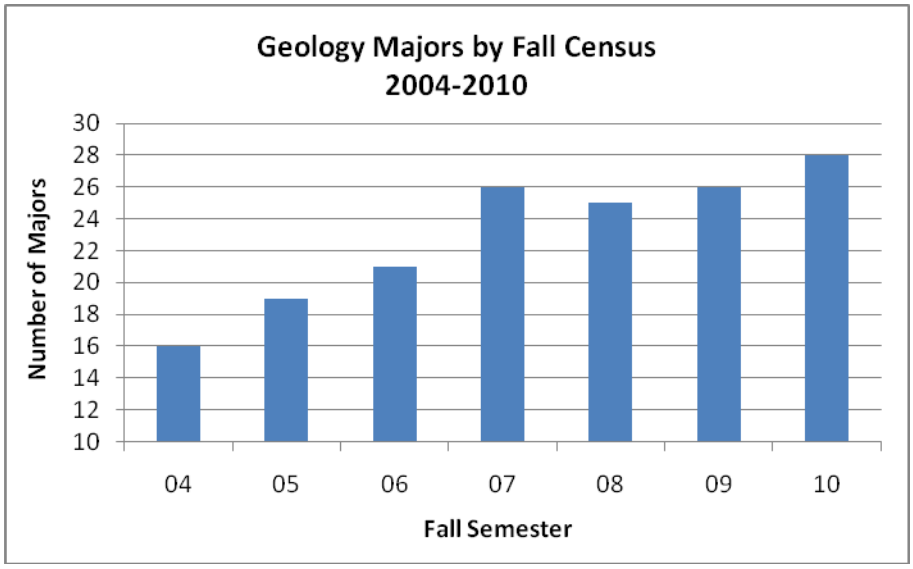
Curriculum Development

Goals: comprehensive, flexible, relevant coursework that adequately prepares graduates for graduate school or entry level professional positions.

Indicators: success rate of graduates in finding employment or entering grad schools
Employer surveys
Graduate Surveys
Input from External Review Board
Anticipated Employment Trends: U.S. Dept of Labor

There were eight geology graduates for the 09-10 academic year. No formal employer or graduate surveys were conducted for graduates in 08-09 or 09-10. However, anecdotal knowledge of the 2009-2010 graduates is that at least four are currently in graduate school, one is employed with a coal company and two are actively seeking employment in the geology field. In 2007-2008, there were seven geology graduates and of those, all seven had geologically related jobs at the time of the 2007-2008 survey. A 10 year survey covering 98-2007 was completed as part of 5(+) year program review. It was found that 85 % of graduates entered geologic profession or graduate school. This is perhaps the ultimate validation of how the geology program at Marshall is performing.

There are currently 28 geology majors identified in BERT. The graph below tracks the number of geology majors for the fall semester over the past seven years. The figures are the combined BA and BS majors. There has consistently been only two to four BA majors. The graph shows that major enrollment has been nearly the same during the past three years; however, this trend is also a conitnuation of significant growth relative to the years 2004-2006.



A new area of emphasis was formally approved for the B.S. Geology program during the spring of 2004. This area was developed response to recent changes and predicted trends in the job market and with input from the department's external advisory board. The area of emphasis in environmental geoscience utilizes an interdisciplinary curriculum which will prepare graduates for careers involving the application of geologic concepts to the solution of environmental problems. These problems include 1) the protection of human health and natural ecosystems from adverse biochemical or geochemical reactions to naturally occurring chemicals or to chemicals and chemical compounds released into the environment by human activities, and 2) the protection of life, safety and well-being of humans from geological processes such as floods, earthquakes, and landslides through land-use planning.

The curriculum for the environmental geoscience area of emphasis has been developed in accordance with guidelines published by Environmental Geoscience Division of AAPG, the U.S. Department of Labor Occupational Outlook Handbook (2003-2004 edition) and with input from the Department's external advisory committee:

Name	Company/Agency	Degree(s)	Current Position
Steve Brewster	U.S. Army Corp Engineers	BS GLY, MU ('83)	Chief of Geology
Charles Montgomery	Novel Geo-Environmental	BS GLY, MU ('92)	Project Engineer
Todd Church	URS Corp (Envir,Geotech)	BS Earth Sc, Penn St	Senior Hydrogeologist
Ed Rothman	Columbia Natural Resources	BS, MS WVU	Geologist, Triana Energy
Kent Adkins	Arcadis G & M	BS GLY, MU ('85)	Project Manager
George Jenkins	WV Dept of Envir. Protection	BS GLY, MS ES	Head Geologist DEP/OMR

All have been very supportive of this initiative.

The department's other area of emphasis is engineering geology which currently four students selecting that option. It requires more math and requires civil engineering courses. One of our geology graduates in this track decided to continue his education here at Marshall and received a civil engineering B.S. this past May. He now works for an international

engineering firm based in Kansas City, Missouri and is currently in Afghanistan. Part of the appeal of this track is that it does not require two years of a foreign language.

In addressing the responsiveness of the department's curriculum to real-world demands in the geology profession, it is instructive to look at the content areas covered on two assessment instruments alluded to earlier: the ACAT exam and the ASBOG exam.

Content Domains for ASBOG Fundamentals of Geology & Practice of Geology Blueprint

Content Domain	Fundamentals	Practice
A. Field Methods & Remote Sensing	29.1 %	35 %
B. Mineralogy, Petrology, Petrography & Geochemistry	13.6%	2.5 %
C. Sedimentology, Stratigraphy, & Paleontology	10.0%	3.8 %
D. Geomorphology	6.4 %	6.3%
E. Structural Geology & Tectonics	9.1 %	2.5 %
F. Geophysics & Seismology	3.6 %	5.0 %
G. Hydrogeology	24.5 %	25 %
H. Engineering Geology	2.7 %	11.3 %
I. Mineral, Petroleum, & Energy Resources	0.9 %	8.8 %

The ACAT exam has the 9 subject areas which receive approximately equal (11% each) weight; R=required course in Marshall's BA/BS Geology Curriculum, E=Elective

Geomorphology	R
Historical Geology	R
Mineralogy	R
Oceanography	E
Paleontology	E
Petrology	E
Physical Geology	R
Stratigraphy	R
Structural Geology	R

All of these subject areas for both ASBOG and ACAT exams are available through the Geology or Physics departments at Marshall. If students wish to be professionally certified, the required courses in the Environmental Geoscience and Engineering Geology
Areas of emphasis would best prepare them for professional certification in nearby states. No problems in obtaining certification have been reported by graduates who wished to obtain it.

Learning Outcomes for Each Course

Course objectives for each course taught in 2009-2010

Course	Title	Goals
GLY 110	General Geology	To gain 1) a basic understanding of the internal and external processes that create and shape the surface of the earth. 2) an appreciation for the wide range of time scales at which earth processes operate 3) an awareness of how these processes can affect our everyday life
GLY 200	Physical Geology	To gain: 1) Develop a basic understanding of how the earth works; 2) Become familiar with the various types of internal and external geologic processes as well as the earth materials that they create and modify through time; 3) Develop an awareness of the impact of man's activities on certain geologic processes and the importance of understanding these interactions to our own well being; this should enable students to make better-informed decisions regarding a number of scientific, technological, societal, and individuals issues; 4) Acquire an understanding of the interconnectedness of all sciences
GLY 201	Historical Geology	The goals are: 1) To provide an understanding of current geologic interpretations regarding the origin of the earth and its physical, chemical, and biological development through time; 2) To develop an awareness of the principles, assumptions, types of evidence, and methodology used to develop historical interpretations from the rock record; 3) To provide an overview of the changing geography of the world through time, with emphasis on geologic events that have shaped the North American continent.
GLY 210L	Earth Materials Lab	1) acquisition of hands-on experience in the description and identification of rocks, minerals and fossils; also to become familiar with the economic uses of various minerals and rocks as well as the value of fossils in understanding the rock record. 2) Acquisition of ability to read topographic maps, recognize landforms, use coordinate systems and map scales, determine slope and construct cross-sectional profiles 3) Development of an understanding of the relationship between geologic processes and the specific earth materials that they create.

GLY 211L	Historical Geology Lab	To gain: 1) Hands on experience in identification of fossil specimens, classification systems, stratigraphic correlation, sedimentary facies and paleoenvironments, geologic map interpretation; 2) field experience using road cuts and formations and collecting fossils. Correlating the material learned in class out in the field in identification specimens.
GLY 212	Mapping	Goals:1) To develop a basic understanding and working knowledge of trigonometry as it relates to mapping. 2) To learn operation of the Brunton Compass, theodolite and GPS instruments and the presentation of their data in map form.
GLY 314	Mineralogy	Goals: 1)To provide a foundation for atomic structures, chemistry, physical properties, classifications, and genesis of the minerals which make up rocks. 2)To develop the capacity to identify and characterize any given mineral; be knowledgeable about specialized techniques that may be required for identification; and to be conversant with the importance that this mineral has in our understanding of the Earth.
GLY 423	Sedimentary Petrology	The goals are for each student to: 1) become familiar with basic optical mineralogic principles and optical properties of sedimentary rocks as seen in thin sections using the petrographic microscope. 2) To develop the capacity to distinguish various types or framework grains, cements, matrix and pore space. 3) To integrate textural and mineralogical attributes into a reconstruction of depositional and diagenetic events.
GLY 427	Fossil Fuels	To develop an understanding of: 1) the composition of coal, coal quality parameters, and coal-forming depositional environments 2) coal mining methods, reserve estimates, causes and nature of coal seam discontinuities, roof rock quality and problems 3) cause and remediation of environmental problems associated with surface and deep mining, and with coal utilization 4) the composition of petroleum and natural gas, the nature of precursors and necessary depositional and diagenetic conditions for their preservation and maturation 5) hydrocarbon migration, and various structural, stratigraphic and combination trapping mechanisms 6) primary, secondary and tertiary recovery methods 7) exploration methods including subsurface stratigraphic and structural analysis 8) the basic elements of well logging; determination of rock type and fluid content from borehole data 9) economic factors controlling petroleum development 10) petroleum and coal geology of West Virginia and vicinity
GLY 455	Hydrogeology	Course objectives: To provide a fundamental understanding of the concepts and principles that govern the occurrence and movement of water on and within the earth and to gain a quantitative working knowledge of surface and groundwater hydrology.
GLY 455L	Hydrogeology Lab	The laboratory will be a series of exercises covering various aspects of the hydrologic cycle and hydrologic properties of earth materials. The

		exercises are designed to illustrate hydrologic principles and to solve hydrologic problems.
GLY 456	Environmental Geology	The goals of this course are for each student to: 1) acquire a basic knowledge of the fundamental principles of environmental geology; 2) become familiar with the various internal and external processes that impact the environment; 3) acquire an understanding of human interactions with the environment; 4) acquire an understanding of mineral and energy resources and how their availability and use impacts the environment. 5) Develop a basic knowledge of how earth system science can be utilized in making better informed decisions regarding scientific, technological, societal, political, and individual environmental issues.
GLY 456L	Environmental Geology Lab	The goals of this course are for each student to: 1) acquire a basic knowledge of the techniques used to investigate or evaluate environmental problems related to geology and geological processes; 2) acquire an understanding of human interactions with the environment; 3) acquire an understanding of mineral and energy resources and how their availability and use impacts the environment. 4) Develop a basic knowledge of how earth system science can be utilized in making better informed decisions regarding scientific, technological, societal, political, and individual environmental issues.
GLY487	Independent Study	A project that allows students conduct in-depth research that utilizes the geologic literature, data collection and analysis, and culminates in a written technical report. Goal is to allow for the pursuit of a research topic that is beyond the scope of an individual course, and simulate problem solving that prepares students for graduate work or entry level professional tasks.
GLY 491-492	Capstone	An independent study or internship research project designed to apply of a wide range of geologic skills to the solution of a geologic problem, culminating in the preparation of an oral and written report.

III. Measuring Instruments

A. Programmatic Instruments

Program Assessment Worksheet
Measuring Instruments

Department: ___Geology

Degree: AAS:_____;Certificate:_____;BA:__X__;BS:__X__;MA:_____;MS:_____;
Specialist:_____; EdD:_____; PhD:_____

Program:___Geology_____ CIP CODE:_SG10, SG20_____

Date Completed:_____12/2/2008_____

*Code: F=Formative Assessments; S=Summative Assessments; VA+Value Added Assessments

Assessment Measures: Local Major Codes in Program:

X= summative assessment	B.A.	B.S.	B.S Area Emphasis Engineering Geology	B.S. Area Emphasis Evironmental Geoscience
***Internal Measures				
1. Written Examinations	X	X	X	X
2. Quizzes	X	X	X	X
3. Term Papers	X	X	X	X
4. Oral Presentations	X	X	X	X
5. Oral Examinations				
6. Discussion Groups				
7. Focus Groups				
8. Pre/Post Tests (GLY 110,150,200)	X	X	X	X
9. Portfolio Assessment				
10. Simulation Studies		X	X	X

11. Standardized Tests				
12. Observation				
13. Departmental Tests				
14. Thesis/Dissertation				
15. Comprehensive Examinations	*	*	*	*
16. Faculty Evaluations				
17 Student Satisfaction Surveys Course evaluations	X	X	X	X
18. Juries				
19. Scientific and Tech Writing Cs			X	X
**External Measures:				
1. Graduate Surveys (5 yr)	X	X	X	X
2. Nationally Normed Exam (ACAT)(**out for 07-08**)	X	X	X	X
3. Employer Surveys (5 yr)	X	X	X	X
4. Field Camp @ outside schools		X		
5. Accrediting Organization	None available			
6. External Advisory Board		*	*	X

* under consideration

B. Course Related Instruments
- Exams
- Term (Research) Papers
- Oral Presentations
- Lab Exercises
- Lab and field Projects/Reports

C.. Compliance with BOT Initiative 3:

"Each academic program must identify and use a quantitatively based means of assessing the knowledge and skills of its graduates against a national standard. Where comparative data are available, the benchmark shall be the national standard and the goal shall be to meet or exceed the national standard. The intent is to measure the skills of a random sample of graduates as a means of assessing the quality of the academic program. The results of the assessment will be included in program review self-study reports and incorporated into the annual program review format beginning with the 1997-1998 academic

year. Campuses will report to the Board of Trustees on the assessment tools to be used for each program by {June 30, 1997}. For those programs were comparative data are not available to establish a benchmark, the campus must establish a benchmark and explain the rationale"

IV. Plans for the Current Year

- expose students to more careers, professional role models, and after-graduation opportunities through a monthly guest speaker program.
- continue use of existing approaches/tools for assessing student outcomes
- continue course-embedded testing at 100-200 level
- continue to upgrade/update courses

-examine reasons for high drop rates in GLY 210L.

- encourage/promote Geology summer field camp with aid of full scholarship
- continue efforts at a more consistent capstone experience through continued implementation of guidelines effective in 2007
- Revival of spring field trip to Big Bend National Park as a way of recruiting and retaining majors.

V. Most Important Thing Learned (by myself)

-Assessment is a good thing, but detailed reports are counterproductive; reporting rather than self-improvement seems to dominate the process.

- The assessment process and requirements are tedious to follow.
- The time it takes to prepare a comprehensive assessment is considerable; it takes time away from teaching and working with students; this is counterproductive. Once a format has established, the assessment does take somewhat less time to complete.
- The assessment process does make faculty (at least myself) more conscious of our purpose and objectives, strengths and weaknesses, and what it takes to be accountable.

COLLEGE OF SCIENCE – B.S. in GEOLOGY MAJOR

Name_____ **Date**_____

Course offerings are subject to change semesters. Please consult each semester's schedule of courses for availability.
A 2.00 GPA is required for graduation.

COMPLETED ***COLLEGE OF SCIENCE SPECIFIC REQUIREMENTS***

_____ **3 hours, Literature**_____

_____ **Minor(s)**_____

COMPLETED ***MAJOR SPECIFIC REQUIREMENTS***

_____ ***Geology Requirements***

	Semester	***Hrs***	***Grade***
GLY 200, Physical Geology (Coreq GLY 210L)	Fall and Spring	3	
GLY 201, Historical Geology (Prereq. GLY 200; Coreq GLY 211L)	Spring	3	
GLY 210L, Earth Materials Lab (Coreq GLY 200)	Fall and Spring	1	
GLY 211L, Hist Geology Lab (Prereq. GLY 210L; Coreq GLY 201)	Spring	1	
GLY 212, Geological Field Mapping (Prereq. GLY 200)	Fall	2	
GLY 313, Structural Geology (Prereq. GLY 200)	Fall, Even years	4	
GLY 314, Mineralogy (Prereq GLY 200; CHM 211, 212, 217 & 218)	Fall, Odd years	4	
GLY 325, Stratigraphy & Sedimentation (Prereq. GLY 201)	Fall, Even years	4	
GLY 421 Petrology (Prereq. GLY 201 & 314) ***OR***	Spring, Even years		
GLY 423 Sedimentary (Prereq. GLY 201 & 314)	Fall, Odd years	4	
GLY 430, Computer Methods in Geology (12 hrs. in GLY)	Spring, Odd years	4	
GLY 451, Geomorphology (Prereq. GLY 200, and 210L)	Fall, Odd years	4	
GLY 491, Capstone (permission)		2	

_____ ***Required by Major Electives – Choose at least 11 hours of advanced GLY courses***

GLY 418, Paleontology (Odd years)	4	_____	GLY 455, Hydrogeology (Odd years)	3	_____
GLY 421, Petrology (Even years)	4	_____	GLY 455L, Hydrogeology Lab (Odd years)	1	_____
GLY 423, Sed. Petrography (Odd years)	4	_____	GLY 456, Environmental (Even years)	3	_____
GLY 425, Geochemistry	3	_____	GLY 456L, Environmental Lab (Even years)	1	_____
GLY 425L, Geochemistry Lab	2	_____	GLY 457, Engineering (Even years)	3	_____
GLY 426, Geophysics (Even years)	4	_____	GLY 457L, Engineering Lab (Even years)	1	_____
GLY 427, Fossil Fuels (Even years)	4	_____			

_____ ***Mathematics Requirements*** MTH 229 Calculus I 5 _____

_____ ***Science Requirements***

CHM 211 & 217, Prin I & Lab 3, 2 _____ _____ CHM 212 & 218, Prin II & Lab 3, 2 _____ _____

Choose one sequence:

BSC 120, Principles of Biology I 4 _____ ***AND*** PHY 201 & 202, Physics I & Lab 3, 1 _____ _____

OR

PHY 201 & 202, Physics I & Lab 3, 1 _____ _____ ***AND*** PHY 203 & 204, Physics II & Lab 3, 1 _____ _____

CATALOG: 2010 – 2011

MARSHALL UNIVERSITY CORE REQUIREMENTS

Must have a ***GRADE*** in ***ALL*** required courses (except for AP credit)

*****A 2.00 GPA is required for graduation*****

COMPLETED ***CORE I, 9 CREDIT HOURS – Must be 100 – 299 level***

_____ **3 hrs, First Year Seminar** _____

_____ **6 hrs, Critical Thinking** _____ _____

COMPLETED ***CORE II, 25 CREDIT HOURS – Must be 100 – 299 level***

_____ **6 hours, Composition** (Grade of **C** or higher required)
ENG101 3 hrs. _____ ***AND*** ENG 102 3 hrs._____ ***OR*** ENG 201H 6 hrs. _____
Must earn a C or better in ENG 102 or ENG 201H in order to graduate.

_____ **3 hours, Communications** CMM 103 _____ CMM 104H _____ ***OR*** CMM 207 _____

_____ **3 hours, Fine Arts** ART 112 _____ MUS 142 _____ ***OR*** THE 112 _____

_____ **3 hours, Humanities** _____
CL 210*, 231, 232, 233, 234, 235, 236, 237, 250
CMM 205, 239, 240
ENG 200*, 202, 203, 206, 209, 210, 211, 212, 213, 215, 220, 225, 231, 235, 236, 240, 241, 242
FRN 240
GER 240
JPN 240
PHL 200, 200H, 201, 250
RST 205, 206, 250
SPN 240

_____ **3 hours, Math** *(MTH 140, MTH 229,* ***OR*** *IST 131 for Science majors)* _____

_____ **4 hours, Natural or Physical Sciences** _____
BSC 104, 105, 120, 121, 228, 250
CHM 211 plus 217, 212 plus 218
GLY 110 plus 210L, 150 plus 150L, 200 plus 210L
ISC 200, 201, 202, 205, 208, 209
IST 111, 131, 224, 230
PHY 101 plus 101L, 201 plus 202, 203 plus 204, 211 plus 202 or 212, 213 plus 204 or 214
PS 109 plus 109L, 110 plus 110L

_____ **3 hours, Social Science** _____
ANT 201*, ANT 201H CMM 213, 255 CJ 200, 211, 221, 231, 241 GEO 100*, 203, 206
HST 101*, 102*, 103*, 103H, 125, 200, 205, 206, 208*, 219, 220, 221, 223, 230*, 230H*, 231*, 231H*, 250, 260, 265
PSC 104, 105, 202, 207, 209, 211, 233 PSY 201, 201H, 223 SOC 200*, 200H*

**Core II courses that have also been approved as Core I (CT) courses*

_____ **3 hours, Multicultural** _____ ***OR*** **International studies** _____

_____ **6 hours, Writing Intensive** _____ _____

_____ **Capstone 2 – 3 hrs** _____

TOTAL HOURS REQUIRED *– AT LEAST* ***120*** *OF WHICH* ***40*** *MUST BE 300 – 499 LEVEL*

Total Hours _____ **300-400 level hours** _____

Catalog Year: 2010 – 2011

COLLEGE OF SCIENCE – B.S. GEOLOGY MAJOR with ENVIRONMENTAL GEOSCIENCE EMPHASIS

Name_____ **Date**_____

Course offerings are subject to change semesters. Please consult each semester's schedule of courses for availability.
A 2.00 GPA is required for graduation.

COMPLETED ***COLLEGE OF SCIENCE SPECIFIC REQUIREMENTS***

_____ 3 hours, Literature_____

COMPLETED ***MAJOR SPECIFIC REQUIREMENTS***

	Geology Requirements	***Semester***	***Hrs***	***Grade***
	GLY 200, Physical Geology (Coreq GLY 210L)	Fall and Spring	3	
	GLY 201, Historical Geology (Prereq. GLY 200; Coreq GLY 211L)	Spring	3	
	GLY 210L, Earth Materials Lab (Coreq GLY 200)	Fall and Spring	1	
	GLY 211L, Hist Geology Lab (Prereq. GLY 210L; Coreq GLY 201)	Spring	1	
	GLY 212, Geological Field Mapping (Prereq. GLY 200)	Fall	2	
	GLY 313, Structural Geology (Prereq. GLY 200)	Fall, Even years	4	
	GLY 314, Mineralogy (Prereq GLY 200; CHM 211, 212, 217 & 218)	Fall, Odd years	4	
	GLY 325, Stratigraphy & Sedimentation (Prereq. GLY 201)	Fall, Even years	4	
	GLY 421 Petrology (Prereq. GLY 201 & 314) ***OR***	Spring, Even years		
	GLY 423 Sedimentary (Prereq. GLY 201 & 314)	Fall, Odd years	4	
	GLY 425, Geochemistry (Prereq GLY 200; CHM 211, 212, 217 & 218; Coreq GLY 425L)		3	
	GLY 425L, Geochemistry Lab (Coreq GLY 425)		2	
	GLY 430, Computer Methods in Geology (12 hrs. in GLY)	Spring, Odd years	4	
	GLY 451, Geomorphology (Prereq. GLY 200, and 210L)	Fall, Odd years	4	
	GLY 455, Hydrogeology (Prereq. GLY 200; Coreq GLY 455L)	Odd years	3	
	GLY 455L, Hydrogeology Lab (Coreq GLY 455)	Odd years	1	
	GLY 456, Environmental (Prereq. GLY 200; Coreq GLY 456L)	Even years	3	
	GLY 456L, Envir Lab (Prereq. GLY 200, 210L, 451, & 451L)	Even years	1	
	GLY 491, Capstone (permission)		2	

	Mathematics Requirements	MTH 229 Calculus I	Fall and Spring	5	

	Non-GLY Requirements				
	BSC 120, Principles of Biology I	Fall and Spring	4		
	CHM 211 & 217, Prin I & Lab (All)	All	3, 2		
	CHM 212 & 218, Prin II & Lab (All)	All	3, 2		
	PHY 201 & 202, Physics I & Lab (Prereqs: MTH 229, 132; **OR** 127/130/140 **and** 122)	All	3, 1		
	PS 410, Remote Sensing		4		
	ENG 354, Scientific & Technical Writing		3		
	GEO 429, Intermediate GIS – Vector Analysis		3		

CATALOG: 2010 – 2011

MARSHALL UNIVERSITY CORE REQUIREMENTS

Must have a ***GRADE*** in ***ALL*** required courses (except for AP credit)

*****A 2.00 GPA is required for graduation*****

COMPLETED ***CORE I, 9 CREDIT HOURS – Must be 100 – 299 level***

_____ **3 hrs, First Year Seminar** _____

_____ **6 hrs, Critical Thinking** _____ _____

COMPLETED ***CORE II, 25 CREDIT HOURS – Must be 100 – 299 level***

_____ **6 hours, Composition** (Grade of **C** or higher required)
ENG101 3 hrs. _____ ***AND*** ENG 102 3 hrs._____ ***OR*** ENG 201H 6 hrs. _____
Must earn a C or better in ENG 102 or ENG 201H in order to graduate.

_____ **3 hours, Communications** CMM 103 _____ CMM 104H _____ ***OR*** CMM 207 _____

_____ **3 hours, Fine Arts** ART 112 _____ MUS 142 _____ ***OR*** THE 112 _____

_____ **3 hours, Humanities** _____
CL 210*, 231, 232, 233, 234, 235, 236, 237, 250
CMM 205, 239, 240
ENG 200*, 202, 203, 206, 209, 210, 211, 212, 213, 215, 220, 225, 231, 235, 236, 240, 241, 242
FRN 240
GER 240
JPN 240
PHL 200, 200H, 201, 250
RST 205, 206, 250
SPN 240

_____ **3 hours, Math** *(MTH 140, MTH 229,* ***OR*** *IST 131 for Science majors)* _____

_____ **4 hours, Natural or Physical Sciences** _____
BSC 104, 105, 120, 121, 228, 250
CHM 211 plus 217, 212 plus 218
GLY 110 plus 210L, 150 plus 150L, 200 plus 210L
ISC 200, 201, 202, 205, 208, 209
IST 111, 131, 224, 230
PHY 101 plus 101L, 201 plus 202, 203 plus 204, 211 plus 202 or 212, 213 plus 204 or 214
PS 109 plus 109L, 110 plus 110L

_____ **3 hours, Social Science** _____
ANT 201*, ANT 201H CMM 213, 255 CJ 200, 211, 221, 231, 241 GEO 100*, 203, 206
HST 101*, 102*, 103*, 103H, 125, 200, 205, 206, 208*, 219, 220, 221, 223, 230*, 230H*, 231*, 231H*, 250, 260, 265
PSC 104, 105, 202, 207, 209, 211, 233 PSY 201, 201H, 223 SOC 200*, 200H*

**Core II courses that have also been approved as Core I (CT) courses*

_____ **3 hours, Multicultural** _____ ***OR*** **International studies** _____

_____ **6 hours, Writing Intensive** _____ _____

_____ **Capstone 2 – 3 hrs** _____

TOTAL HOURS REQUIRED *– AT LEAST* ***120*** *OF WHICH* ***40*** *MUST BE 300 – 499 LEVEL*

Total Hours _____ **300-400 level hours** _____

Catalog Year: 2010 – 2011

COLLEGE OF SCIENCE – B.S. GEOLOGY MAJOR with ENGINEERING GEOLOGY EMPHASIS

Name_____ **Date**_____

Course offerings are subject to change semesters. Please consult each semester's schedule of courses for availability.
A 2.00 GPA is required for graduation.

COMPLETED	*COLLEGE OF SCIENCE SPECIFIC REQUIREMENTS*			
_____	**3 hours, Literature**_____			
COMPLETED	*MAJOR SPECIFIC REQUIREMENTS*			
_____	***Geology Requirements***	***Semester***	***Hrs***	***Grade***
	GLY 200, Physical Geology(Coreq GLY 210L)	Fall and Spring	3	_____
	GLY 201, Historical Geology (Prereq. GLY 200; Coreq GLY 211L)	Spring	3	_____
	GLY 210L, Earth Materials Lab (Coreq GLY 200)	Fall and Spring	1	_____
	GLY 211L, Histl Geology Lab (Prereq. GLY 210L; Coreq GLY 201)	Spring	1	_____
	GLY 212, Geological Field Mapping (Prereq. GLY 200)	Fall	2	_____
	GLY 313, Structural Geology (Prereq. GLY 200)	Fall, Even years	4	_____
	GLY 314, Mineralogy (Prereq GLY 200; CHM 211, 212, 217 & 218)	Fall, Odd years	4	_____
	GLY 325, Stratigraphy & Sedimentation (Prereq. GLY 201)	Fall, Even years	4	_____
	GLY 430, Computer Methods in Geology (12 hrs. in GLY)	Spring, Odd years	4	_____
	GLY 451, Geomorphology (Prereq. GLY 200, and 210L)	Fall, Odd years	4	_____
	GLY 455, Hydrogeology (Prereq. GLY 200; Coreq GLY 455L)	Odd years	3	_____
	GLY 455L, Hydrogeology Lab (Coreq GLY 455)	Odd years	1	_____
	GLY 456, Environmental (Prereq. GLY 200; Coreq GLY 456L)	Even years	3	_____
	GLY 456L, Environmental Lab (Prereq. GLY 200, 210L, 451, & 451L)	Even years	1	_____
	GLY 457, Engineering Geology (Prereq. GLY 200, 210L, 451 & 451L)	Even years	3	_____
	GLY 457L, Engineering Geology (Coreq. GLY 457)	Even years	1	_____
	GLY 491, Capstone (permission)		2	_____
_____	***Engineering Requirements***			
	ENGR 107, Intro to Engineering		3	_____
	ENGR 213, Statics (Prereq MTH 229)		3	_____
	ENGR 216, Mechanics of Materials		3	_____
	CE 322, Soil Mechanics (Prereq. ENGR 216 & GLY 200)		3	_____
_____	***Mathematics Requirements*** MTH 229 Calculus I 5 _____	MTH 230, Calculus II 4 _____		
_____	***Non-GLY Requirements***			
	CHM 211 & 217, Prin I & Lab (All)	3, 2 _____ _____		
	CHM 212 & 218, Prin II & Lab (All)	3, 2 _____ _____		
	PHY 211 & 202, Physics I & Lab	4, 1 _____		
	PHY 213 & 204, Physics II & Lab	4, 1 _____ _____		
	ENG 354, Scientific & Technical Writing	3 _____		

CATALOG: 2010 – 2011

MARSHALL UNIVERSITY CORE REQUIREMENTS

Must have a ***GRADE*** in ***ALL*** required courses (except for AP credit)

*****A 2.00 GPA is required for graduation*****

COMPLETED ***CORE I, 9 CREDIT HOURS – Must be 100 – 299 level***

_____ **3 hrs, First Year Seminar** _____

_____ **6 hrs, Critical Thinking** _____ _____

COMPLETED ***CORE II, 25 CREDIT HOURS – Must be 100 – 299 level***

_____ **6 hours, Composition** (Grade of **C** or higher required)
ENG101 3 hrs. _____ ***AND*** ENG 102 3 hrs._____ ***OR*** ENG 201H 6 hrs. _____
Must earn a C or better in ENG 102 or ENG 201H in order to graduate.

_____ **3 hours, Communications** CMM 103 _____ CMM 104H _____ ***OR*** CMM 207 _____

_____ **3 hours, Fine Arts** ART 112 _____ MUS 142 _____ ***OR*** THE 112 _____

_____ **3 hours, Humanities** _____
CL 210*, 231, 232, 233, 234, 235, 236, 237, 250
CMM 205, 239, 240
ENG 200*, 202, 203, 206, 209, 210, 211, 212, 213, 215, 220, 225, 231, 235, 236, 240, 241, 242
FRN 240
GER 240
JPN 240
PHL 200, 200H, 201, 250
RST 205, 206, 250
SPN 240

_____ **3 hours, Math** *(MTH 140, MTH 229,* ***OR*** *IST 131 for Science majors)* _____

_____ **4 hours, Natural or Physical Sciences** _____
BSC 104, 105, 120, 121, 228, 250
CHM 211 plus 217, 212 plus 218
GLY 110 plus 210L, 150 plus 150L, 200 plus 210L
ISC 200, 201, 202, 205, 208, 209
IST 111, 131, 224, 230
PHY 101 plus 101L, 201 plus 202, 203 plus 204, 211 plus 202 or 212, 213 plus 204 or 214
PS 109 plus 109L, 110 plus 110L

_____ **3 hours, Social Science** _____
ANT 201*, ANT 201H CMM 213, 255 CJ 200, 211, 221, 231, 241 GEO 100*, 203, 206
HST 101*, 102*, 103*, 103H, 125, 200, 205, 206, 208*, 219, 220, 221, 223, 230*, 230H*, 231*, 231H*, 250, 260, 265
PSC 104, 105, 202, 207, 209, 211, 233 PSY 201, 201H, 223 SOC 200*, 200H*

**Core II courses that have also been approved as Core I (CT) courses*

_____ **3 hours, Multicultural** _____ ***OR*** **International studies** _____

_____ **6 hours, Writing Intensive** _____ _____

_____ **Capstone 2 – 3 hrs** _____

TOTAL HOURS REQUIRED *– AT LEAST* ***120*** *OF WHICH* ***40*** *MUST BE 300 – 499 LEVEL*

Total Hours _____ **300-400 level hours** _____

Catalog Year: 2010 – 2011