

Associate in Engineering Science

400

Division: Math & Science

Created: 11/26/2001 3:49:08 P

Revised: 4/20/2004

Associate in Engineering Science

Mission Lake Land College creates and continuously improves an affordable, accessible, and effective learning environment for the lifelong

Goal Provide pre-baccalaureate education consisting of liberal arts, sciences, and pre-professional courses designed to transfer to four-

#	Intended Outcomes and Objectives	Assessment Criteria and Procedures	Assessment Results	Use of Results
1	Demonstrate a working knowledge of college mathematics expected of a math major through calculus and differential equations.	A comprehensive test, from college algebra through calculus and differential equations, was administered to the Calc III class. Students will score an average of 70%.	16 students - most were engineering students - took the test in Spring 2004. Overall average was 58.6%. Areas of strength (above 70%) were composite functions, velocity & acceleration, integration by parts, vectors, separation of variables in differential equations and exponential expressions. Areas of weakness (below 50%) were function transformations, series, work problems, L'Hopital's rule, and homogeneous differential equations.	Since this was the first time the test was administered these results will be used as base-line data. Faculty will review the individual student performance on the test and meet early fall to discuss a plan of action related to each area of weakness.

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2 Identify the basic laws of physics and chemistry including those in mechanics, electricity and magnetism, heat, light, sound, and inorganic chemistry.

Administer general physics and chemistry principals test to PHY142 students at end of spring semester. Criteria: Question analysis will be performed to determine where students are weak. Areas where more than 50% of the students miss the questions will be marked for examination and improvement.

The evaluative exam is a 33 question multiple choice exam and includes questions in the following four areas: Mechanics, Electricity & Magnetism, Waves and Quantum Theory, Chemistry.

Weak areas will be marked for additional classroom emphasis.

Spring 2002
Exam Results (11 students completed the exam)

Average Score: 14.7/33 or 44.5%

Topic	% Correct
Mechanics	51%
Electricity	38%
Waves	41%
Chemistry	49%

SPRING 2003 RESULTS (3 students completed exam)

Average score: 16.3/33

Topic	%Correct
Mechanics	56%
Electricity	43%
Waves	42%
Chemisty	56%

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3 Demonstrate written and oral communication skills

A) Written and Oral: Students in PHY142 will present a lesson, accompanied by a technical research paper, on a topic to their class. Criteria: 70% of students will receive a minimum of 75/100 points on the project. Breakdown on different components of the grade will indicate areas needing more attention.

B) Drafting: Students will interpret mechanical drawings in order to solve problems in Mechanics I. (PHY239) Problems will be evaluated during the semester. Criteria: Ninety percent of the students will correctly interpret the mechanical drawings in order to solve the problems.

A) PHY 142: Written/Oral Report on a Technical Topic

The presentations were scored on a rubric which is utilized by Lake Land's Speech Instructors for informative speeches. The presentations were given scores in the areas of organization, material presented, language, delivery analysis and voice.

SPRING 2002 RESULTS (11 students)

The average score for the report was 80.1/100.

6 of the 11 students, or 55%, scored 75/100 or better.

(10 of the 11 students scored 70/100 or better)

The weakest areas were in organization and choice of material presented.

SPRING 2003 RESULTS (3 students)

The average score was 89/100. All three students scored 75 or better.

The weakest point was "analysis", ie. Smoothly integrating the particulars of the paper with the overall purpose or theme of the paper.

B) Drafting:

A three-dimensional mechanics problem accompanied by a technical drawing was given to students in PHY239 in December 2000, 2001 & 2002. The students' abilities to correctly analyze the dimensions, applied forces and orientation of the object from the

Written and Oral:
Scores on the reports and presentations this semester will be used as a base for future comparison.

Drafting:
The technical drawing course (TEC105) is providing students with the skills needed for the interpretation of engineering drawings.

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Dec. 2000 - 15/16 or 94%
interpreted the drawing correctly

Dec. 2001 - 19/20 or 95%
interpreted the drawing correctly

Dec. 2002 - 14/14 or 100%
interpreted the drawing correctly

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4 Use computers for analysis, research, and communication; program in C language.

A) Computers will be used in several labs for data collection and analysis. Criteria: Completion of the labs indicate the student has utilized the technology. 95% of students must complete the lab and analysis.

B) Graphing calculators and/or Mathematics software: Embedded test questions and homework problems will require the use of the calculators for completion. Criteria: 80% of the students will utilize the calculator to perform the desired computation correctly on a set of calculator/software homework.

C) C programming : Embedded test questions on final exams in COBOL I and C Programming with Applications. 80% of the students taking these exams will score 70% or better.

A) Data Collection with Computer: For the labs requiring data collection with the computers and input devices, 100% of the students in attendance were able to correctly utilize the software to collect and display the experimental data and then complete the lab and write up.

5.B) Graphing Calculators or Math Software:

MAT243: Calculus III - Students utilize both the TI-89 Graphing Calculator and Derive Software to perform calculations. Exam questions were given that require students to use the technology to help solve problems.

SPRING 2002:
22 of 28 students, or 78.6%, utilized the graphing calculator to generate the required Taylor polynomial needed to solve a problem

SPRING 2003

14 of 16 students, or 87.5%, utilized derive to solve a 5 variable system of nonlinear equations in a Lagrange Multiplier problem.

5.C) C Programming:

Computers in Lab Class:
Computers should continue to be utilized for data collection in the labs.

Graphing Calculator and Math Software Usage:
Students are very adept at utilizing the calculators and software. Courses need to continue to allow students to utilize both, especially the physics courses. Care must be taken in future sections of the calculus courses so that the students do not rely so heavily on the technology that they become lazy in the algebra and calculus without them. Testing and evaluation should be used both with and without the availability of technology.

C programming:

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5 Apply the scientific method; design an experiment then collect and analyze data.	Students will conduct weekly labs each semester in PH Y140, PHY141 and PHY142 to gain experience in experimentation, data collection and analysis. Criteria: One lab assignment per semester will be collected in PHY140 and PHY142 and scored on a rubric. Student improvement will be tracked over the three semesters. On the first semester's lab, seventy percent of the students will score 12/15 or better.	PHY140 and PHY142 students were required to design, perform and write up an experiment to solve a given problem during the semester. The labs were graded on a rubric. SPRING 2002 Results: PHY140 - 72% of the students scored 12/15 or higher on the evaluation. PHY142 - 87% of the students scored 12/15 or higher on the evaluation. SPRING 2003 Results: PHY140 - a lab was performed, but not scored on the rubric PHY142 - 100% of the students scored 12/15 or higher on the evaluation. SPRING 2004 Results: PHY140 - 67% of the students scored 80% or higher on lab reports PHY142 - 100% of the students scored 80% or higher on lab reports Students in the third semester of physics(PHY142) scored significantly better than those in the first semester of physics(PHY140), indicating a scientific maturity and an understanding in what it takes to create a "good" lab. A breakdown of the different requirements on the lab indicated that the beginning physics students made most of their errors in the design of the experiment. Many didn't design experiments with directly measurable data---they were "best guessing") or using repeated trials. The PHY140 students had major problems with error analysis, often making meaningless comments like "I think the data is pretty accurate" rather	Formal error analysis has been deemphasized in the physics curriculum so maybe it is not surprising that students have problems in this area. Perhaps what needs to be emphasized is a more informal kind of error analysis, i.e.basically asking "How reliable is my data? If I do the experiment over again, how much variability do I expect in my answer?"
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than trying to supply a quantitative answer. Item analysis in PHY142 indicated that students had markedly improved in terms of the overall notion of what constituted a rigorous experiment. Error analysis, although improved, was still a weakness.

Associate In Science (General)

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Division: Math & Science

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Associate in Science

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Goal Provide pre-baccalaureate education consisting of liberal arts, sciences, and pre-professional courses designed to transfer to four-

#	Intended Outcomes and Objectives	Assessment Criteria and Procedures	Assessment Results	Use of Results
1	Students graduating with a general Associate in Science degree without a specific major will have completed the general education requirements. There are no specific requirements for the remainder of courses necessary to complete the degree except that they must be transfer courses. Thus outcomes assessment for the general Associate in Science program will consist of the General Education Program assessment. See General Education Program assessment (GEN).	See General Education Program assessment (GEN).	See General Education Program assessment (GEN).	See General Education Program assessment (GEN).

Biological Science (Non-Teaching)

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Division: Math & Science

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Goal Provide pre-baccalaureate education consisting of liberal arts, sciences, and pre-professional courses designed to transfer to four-

#	Intended Outcomes and Objectives	Assessment Criteria and Procedures	Assessment Results	Use of Results
1	Evaluate the contributions of biology to the advancement of civilization	Test Questions will be given in BIO100. Question analysis will be performed to determine where students do not meet expectations. Areas where more than 50% of students miss the question will be marked for examination and improvement.	Twenty-five questions were analyzed in Bioscience (BIO 100). Four questions were missed by more than 50% of the students. Questions missed by more than 50% of students involved the following topics: -61% of students missed a question dealing with the scientist who experimented with the products of photosynthesis. -57% of students missed a question dealing with the scientist who discovered the cell nucleus. -54% of students missed a question dealing with the scientist who coined the word "cell" -72% of students missed a question dealing with the definition of a karyotype.	The information collected this year will be shared with instructors responsible for teaching the topics covered by each of the exam components in order to make improvements in instruction and/or delivery methods.

Biological Science (Non-Teaching)

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Division: Math & Science

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Associate in Science

Mission	Lake Land College creates and continuously improves an affordable, accessible, and effective learning environment for the lifelong	Goal	Provide pre-baccalaureate education consisting of liberal arts, sciences, and pre-professional courses designed to transfer to four-
2 Communicate knowledge of biological and physical sciences.	Administer in-house generated tests to second-year students before midterm of spring semester. -Question analysis will be performed to determine where students do not meet expectations. Areas where more than 50% of students miss the question will be marked for examination and improvement.	Fifty second year biology students were given an in-house generated test with questions covering major themes in biology including: Introduction to Biology, Scientific Method, Chemistry, Metric System, Microscope, Cell, Enzymes, Osmosis, Diffusion, Photosynthesis, Respiration, DNA, Protein Synthesis, Mitosis, Meiosis, Genetics, Ecology & Evolution - 42 of 100 questions were missed by at least 50% of students tested - Topics with the most missed questions included: - Photosynthesis (6 of 8 questions missed by at least 50% of students) - Mitosis (4 of 7 questions missed by at least 50% of students) - Diffusion/Osmosis (4 of 8 questions missed by at least 50% of students) - DNA/Protein synthesis (4 of 9 questions missed by at least 50% of students)	The information indicates that there are serious deficiencies in our students' understanding of the following key topics: - Photosynthesis -Mitosis -Diffusion/Osmosis -Ecology -Central Dogma In addition, all topics with the exception of the Metric System and the Cell had at least one question which was missed by at least 50% of the students. The information obtained will be presented to faculty in an effort to improve the instruction in these areas.
3 Perform laboratory work in accordance with correct procedures and safety principles and regulations	In-house safety tests will be given to all BIO100 students. All students must score 100% before they will be allowed to work in the laboratory setting.	All Bioscience (BIO 100) students were given an in-house safety test. All students were required to score 100% on the quiz. Students not scoring 100% were allowed to re-test until each scored	This objective was met for the 2002-2003 academic year.

Biological Science (Non-Teaching)

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4 Apply the scientific method to problem-solving in biology.

Laboratory reports will be collected and scored using a defined rubric.
-Analysis of the reports will be performed. Areas where fewer than 70% of students meet expectations will be marked for improvement.

One hundred thirty-six laboratory reports were collected from students in Bioscience I (BIO 100) and Environmental Science (BIO 130). Laboratory reports were scored using a three-point scale (3 pts.= full met requirements, 2 pts.= minimally met requirements, 1 pt.= did not meet requirements). The required components included: 1) Defining the problem/purpose 2) Forming hypotheses 3) Experimental methods/Data collection 4) Analysis & Conclusion.

79% of students minimally or fully met requirements for Defining the problem/purpose.
75% of students minimally or fully met requirements for Forming hypotheses.
83% of students minimally or fully met requirements for Experimental methods/Data collection.
92% of students minimally or fully met requirements for Analysis/conclusion.

While this objective was met for the 2002-2003 academic year, there is a component of this objective that would benefit from additional consideration. Defining the problem or purpose of laboratory experiments/exercises seems to be the most troublesome aspect of the application of the scientific method for our students. The students that met the requirements in the formation of a hypothesis dropped 7% from last year. This information will be shared with biology instructors in order to make improvements to instruction in the area of the scientific method and laboratory exercises.

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1	Demonstrate a knowledge of the basic principles of "general" chemistry as outlined by the American Chemical Society.	Administer ACS standardized test to CHM 150 students (fall and spring) and CHM151 students (spring). Criteria – Question analysis will be performed to determine where students are weak. Areas where more than 50% of the students miss the questions will be marked for examination and improvement.	<p>Spring 2002 results show that 32 out of 50 questions (64%) were missed by more than 50% of the students when the test was a combination of CHM150 and CHM151 materials.</p> <p>Spring 2003 results show that 37 out of 70 questions (53%) of the questions were missed by more than 50% of the students when the test contained only CHM150 materials.</p>	By using only the first semester materials for testing CHM150 students the performance improved, however, more data is needed to see a prominent trend. Stoichiometry, aqueous chemistry, electronic configuration, and covalent bonding concepts are found to be most missed topics. Since stoichiometry serves the basis of several later concepts, it is decided to deal with this concept in greater intensity and observe the effects along with the enforcement of CHM150 prerequisites. CHM151 students will be given an ACS test that contains only the second semester materials in Spring 2004.
2	Demonstrate a knowledge of the basic principles of organic chemistry as outlined by the American Chemical Society.	Administer ACS standardized test to CHM 244 students at end of spring semester. Criteria – Question analysis will be performed to determine where students are weak. Areas where more than 50% of the students miss the questions will be marked for examination and improvement.	Spring 2002 results - 31 of the 70 were missed by more than 50% of the students. Spring 2003 results show that 36 out of 70 questions (51%) were missed by more than 50% of the students which translates to an average national percentile of 36.	Most missed topics were physical concepts e.g., thermodynamics and kinetics, stereochemistry, oxidation-reduction chemistry, spectroscopy and aromatics. More attention will be paid to these concepts in the form of problem solving.
3	Be aware of safety concerns in conducting lab experiments.	Administer an in-house safety test. Criteria – All students will have to score 100% on the test.	On a ten question safety test the average score in spring 2004 has improved to 9.2 (n=121) over spring 2002 of 8.9 (n=163). Five questions were missed by more than 5% of the students relate to eye wash, use of goggles, knowledge of safety equipment, improper return of excess chemicals, and reporting small lab accidents.	The length of eye wash time question is again the most missed one but down from 49% (2003) to 43% (spring 2004). Next missed question is the safety goggles usage which is also down from 29% (2003) to 10% (2004). Returning excess chemicals to the stock bottle data shows a drop in missing from 10% (2003) to 7% (2004), this number was 20% in 2001. Verbal safety reminder will be continued to offer.

Chemistry

Associate in Science

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Division: Math & Science

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4	Understand the theory and use of modern chemical instruments.	Embedded test questions or embedded tests in CHM 150, 151, 243 or 244. Criteria – 90% of the students will score 70% or higher on the items.	14 students completed the assignment. Nine students scored 6/7 or better 3 students scored 3/7 one student scored 1/7 and one scored 0/7 The two compounds without elemental analysis were missed a total of 6 out of 28 responses. The main source of error was in interpreting proton/carbon NMR as to the position of heteroatoms within a structure.	More opportunity to analyze spectral data in both lab and lecture will be provided. Spectroscopy lectures will be spread out over both semesters. This will allow for more complete discussions of the topics.
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Clinical Laboratory Science

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Division: Math & Science

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#	Intended Outcomes and Objectives	Assessment Criteria and Procedures	Assessment Results	Use of Results
1	See Bioscience (Non-teaching) curriculum 215	See Bioscience (Non-teaching) curriculum 215	See Bioscience (Non-teaching) curriculum 215	See Bioscience (Non-teaching) curriculum 215
2				
3				
4				

Conservation – Pre-Forestry

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2				
3				
4				

Conservation – Pre-Wildlife

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#	Intended Outcomes and Objectives	Assessment Criteria and Procedures	Assessment Results	Use of Results
1	Communicate knowledge of biological and physical science concepts applicable to earth science	Administer existing in-house generated tests with embedded questions in ESC 102 Weather and Climate. Criteria: Areas where more than 50% of students miss the questions will be noted for analysis and improvement.	78 LLC students enrolled in ESC102 Weather and Climate were administered two tests each containing embedded questions relating to biological and physical science concepts. The test format was multiple choice with responses entered on Scranton answer sheets. An item analysis was completed in which the number of students missing a question was recorded. Test 1 contained 23 embedded questions with 78 students scoring an average of 65% thus exceeding the 50% criteria. Additional analysis revealed that 6 of the 23 questions targeted were missed by more than 50% of the students. Test 2 contained 38 embedded questions with the 78 students scoring 73% overall and therefore exceeding the goal. However, it was discovered that more than 50% of the students missed 10 of the 38 questions targeted.	Although students exceeded the goal, improvement could be enhanced by targeting students and problem concepts through additional time devoted to explanations and by developing labs which enrich the lectures.
2	Application in a laboratory setting of biological and physical science concepts applicable to earth science lecture settings.	Laboratory activities exemplifying selected biological and physical science concepts will be evaluated. Criteria: Areas where more than 50% of students fail to make an acceptable application will be noted for analysis and improvement	As of 4-10-02 approximately 78 students have completed nine laboratory activities addressing, in part, biological and physical concepts. Activities were scored, recorded and analyzed. Results indicate that no student scored below the 50% criteria and only three were below 70%.	Success in this area could be attributed to students working in lab groups thus greater opportunity for interaction and exchange of information. No action is needed.
3	Formulate a fundamental understanding of ethical dilemmas in current environmental issues.	Administer existing in-house generated tests with embedded questions. Criteria: Areas where more than 50% of students miss the questions will be noted for analysis and improvement.	This outcomes/objective consisted of four embedded questions concerning ozone depletion. Analysis shows that 68% (53 of 78) students exceeded the 50% criteria.	It would seem that greater success could be achieved by developing ancillary activities enhancing competencies here.

Environmental Science

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Division: Math & Science

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2				
3				
4				

Introduction to GIS

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Division: Math & Science

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Revised: 5/19/2003

Certificate

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Goal

#	Intended Outcomes and Objectives	Assessment Criteria and Procedures	Assessment Results	Use of Results
1	The student will demonstrate general mapping concepts and symbology.	<p>75% of the students will successfully complete a final project in ESC 108, Introduction to Raster GIS. A rubric will be used to determine the weaknesses and strengths among the competencies. This rubric will be based upon student's scores in each outcomes (objectives) area. Students will be measured in each objective area with the goal for the class of obtaining at least an average of at least 75% per objective. Each objective in the final project will be worth 10 points, thus student averages for each objective are referenced and assessed against a baseline of 7.5 or higher. Any objective areas falling below the 7.5 threshold average will be targeted for improvement.</p> <p>The grading rubric is listed below in assessing each objective area for the final project:</p> <p>Each objective is based upon a 10 point grading scale 9 - 10 = A full and accurate skill set displayed 7 - 8 = Missing some minor element for a full and complete objective 5 - 6 = Skill set is partially displayed with at least two elements missing from objective < 5 = Skill set in objective wasn't displayed at all</p>	<p>100% of students completed the final project (N=8). The final project had well defined objectives which were linked to assessment criteria. The five assessment areas are listed below: The student will demonstrate general mapping concepts and symbology.= 100%</p>	
2	The student will access different data structures and import them into a GIS system for analysis.		The student will access different data structures and import them into a GIS system for analysis=100%	

Introduction to GIS

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Division: Math & Science

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Certificate

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Goal

3 The student will work with attribute tables and query different GIS data bases using both attribute and geographic techniques.

The student will work with attribute tables and query different GIS data bases using both attribute and geographic techniques-100%

4 The student will be able to produce and design maps using GIS software.

The student will be able to produce and design maps using GIS software-100%

Two objective areas fell below the criteria set for class averages on each objective (75%). The two areas falling below the (75%) threshold were objectives four and five which are listed below:

The student will be able to produce and design maps using GIS software.
66.67%

Introduction to GIS

Certificate

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Goal

5 The student will communicate effectively in written form.

The student will communicate effectively in written form-100%

The student will communicate effectively in written form. 56.67%

Each assessment area in the final project was based upon a grading rubric with each area worth a total of 10 points, thus the final project in ESC108 (Intro to Raster GIS) was worth a total of 50 points. Class averages for each objective are listed below:

These results indicate that one area needs to be targeted for improvement. Additional activities will be added to the course prior to the final project to assist students in these targeted areas. Potential activities to assist students with objectives four and five are listed below:

The student will demonstrate general mapping concepts and symbology. 83.33%

Additional assignments in GIS map development and production.

The student will access different data structures and import them into a GIS system for analysis. 100.00%

Provide samples to students of well written science papers using GIS terminology.

The student will work with attribute tables and query different GIS data bases using both attribute and geographic techniques. 100%

Provide extra time for the final projects to allow students to send in projects for review and corrections.

The student will be able to produce and design maps using GIS software. 66.67%

The student will communicate effectively in written form. 56.67%

Mathematics

Associate in Science

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Division: Math & Science

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1	Demonstrate a working knowledge of college mathematics expected of a math major through calculus and differential equations.	A comprehensive test, from college algebra through calculus and differential equations, was administered to the Calc III class. Students will score an average of 70%.	16 students (10 differential equation students) took the test in Spring 2004. Overall average was 58.6%. Areas of strength (above 70%) were composite functions, velocity & acceleration, integration by parts, vectors, separation of variables in differential equations and exponential expressions. Areas of weakness (below 50%) were function transformations, series, work problems, L'Hopital's rule, and homogeneous differential equations.	Since this was the first time the test was administered these results will be used as base-line data. Faculty will review the individual student performance on the test and meet early fall to discuss a plan of action related to each area of weakness.
2	Apply appropriate mathematical principles to solve applied problems.	A comprehensive test, from college algebra through calculus and differential equations, was administered to the Calc III class. Students will score an average of 70% on test items involving applied problems.	16 students (10 differential equation students) took the test in Spring 2004. Overall average on applied problems was 57.1%.	Since this was the first time the test was administered these results will be used as base-line data. Faculty will review the individual student performance on the test and meet early fall to discuss a plan of action.

Mathematics

Associate in Science

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Division: Math & Science

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3 Solve applied problems using computer programming skills.

Use embedded test questions* on final exam and a computer programming project in C Programming with Applications . 80% of the students taking these exams will score 80% or better.

MAT151, C Programming for Engineers

FINDINGS:
Fall 2003

10 out of 50 multiple choice problems were selected from the final exam given in December 2003. Problems were selected on the basis of the knowledge of C programming (or of programming in general) that should be acquired by the end of this course. See Notes for details of topics.

Note: Only 10 of 15 students in the class were required to take the final, which probably skews the results in a negative direction.

Only 3 of 10 (30%) scored 80% or better. Most commonly missed questions dealt with function calls and array subscripts, as before, as well as reassigning a value to a variable.

In MAT 151 more time (or better use of time) will be devoted to the commonly missed topics: function calls and array subscripts. A change of emphasis resulting from a new textbook will be monitored.

Mathematics Education

233

Division: Math & Science

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Associate in Science

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Goal Provide pre-baccalaureate education consisting of liberal arts, sciences, and pre-professional courses designed to transfer to four-

#	Intended Outcomes and Objectives	Assessment Criteria and Procedures	Assessment Results	Use of Results
1	See Mathematics assessment report #262.	See Mathematics assessment report #262.	See Mathematics assessment report #262.	See Mathematics assessment report #262.

Physics

Associate in Science

283

Division: Math & Science

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Mission Lake Land College pledges to be responsive to the constantly changing educational and training needs of all students served.

Goal Provide pre-baccalaureate education consisting of liberal arts, sciences, and pre-professional courses designed to transfer to four-

#	Intended Outcomes and Objectives	Assessment Criteria and Procedures	Assessment Results	Use of Results
1	Develop skills in calculus and analytical geometry.	Pre-test, post test questions embedded on exams in Calculus II, III. 80% of the students taking these exams will indicate a 50% improvement on the post test.	See Degree 400 Objective #1.	See Degree 400 Objective #1.
2	Identify the basic laws of physics and chemistry including those in mechanics, electricity and magnetism, heat, light, sound, and inorganic chemistry	Administer general physics and chemistry principals test to PHY142 students at end of spring semester. Criteria: Question analysis will be performed to determine where students are weak. Areas where more than 50% of the students miss the question will be marked for examination and improvement.	See Degree 400 Objective #2.	See Degree 400 Objective #2.
3	Use computers for analysis, research and communication; program in C language.	A) Computers will be used in several labs for data collection and analysis. Criteria: Completion of the labs indicate the student has utilized the technology. 95% of students must complete the lab and analysis. B) Graphing calculators and/or Mathematics software: Embedded test questions and homework problems will require the use of the calculators for completion. Criteria: 80% of the students will utilize the calculator to perform the desired computation correctly on a set of calculator/software homework. C) C programming: Embedded test questions on final exams in COBOL I and C Programming with Applications. 80% of the students taking these exams will score 70% or better	See Degree 400 Objective #4.	See Degree 400 Objective #4.

Physics

Associate in Science

283

Division: Math & Science

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4 Apply the scientific method; design an experiment then collect and analyze data

Students will conduct weekly labs each semester in PHY140, PHY141 and PHY142 to gain experience in experimentation, data collection and analysis. Criteria: One lab assignment per semester will be collected in PHY140 and PHY142 and scored on a rubric. Student improvement will be tracked over the three semesters. On the first semester's lab, 70% of the students will score 12/15 or better.

See Degree 400 Objective #5.

See Degree 400 Objective #5.

Pre-Chiropractic

Associate in Science

269

Division: Math & Science

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Goal Provide pre-baccalaureate education consisting of liberal arts, sciences, and pre-professional courses designed to transfer to four-

#	Intended Outcomes and Objectives	Assessment Criteria and Procedures	Assessment Results	Use of Results
1	See Bioscience (Non-teaching) curriculum 215	See Bioscience (Non-teaching) curriculum 215	See Bioscience (Non-teaching) curriculum 215	See Bioscience (Non-teaching) curriculum 215
2				
3				
4				

Pre-Dentistry

Associate in Science

270

Division: Math & Science

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Goal Provide pre-baccalaureate education consisting of liberal arts, sciences, and pre-professional courses designed to transfer to four-

#	Intended Outcomes and Objectives	Assessment Criteria and Procedures	Assessment Results	Use of Results
1	See Bioscience (Non-teaching) curriculum 215	See Bioscience (Non-teaching) curriculum 215	See Bioscience (Non-teaching) curriculum 215	See Bioscience (Non-teaching) curriculum 215
2				
3				
4				

Pre-Engineering

Associate in Science

285

Division: Math & Science

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Goal Provide pre-baccalaureate education consisting of liberal arts, sciences, and pre-professional courses designed to transfer to four-

#	Intended Outcomes and Objectives	Assessment Criteria and Procedures	Assessment Results	Use of Results
1	See Pre-Engineering assessment report #400.	See Pre-Engineering assessment report #400.	See Pre-Engineering assessment report #400.	See Pre-Engineering assessment report #400.

Pre-Medicine

Associate in Science

272

Division: Math & Science

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Goal Provide pre-baccalaureate education consisting of liberal arts, sciences, and pre-professional courses designed to transfer to four-

#	Intended Outcomes and Objectives	Assessment Criteria and Procedures	Assessment Results	Use of Results
1	See Bioscience (Non-teaching) curriculum 215	See Bioscience (Non-teaching) curriculum 215	See Bioscience (Non-teaching) curriculum 215	See Bioscience (Non-teaching) curriculum 215
2				
3				
4				

Pre-Nursing

Associate in Science

273

Division: Math & Science

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Goal Provide pre-baccalaureate education consisting of liberal arts, sciences, and pre-professional courses designed to transfer to four-

#	Intended Outcomes and Objectives	Assessment Criteria and Procedures	Assessment Results	Use of Results
1	See Bioscience (Non-teaching) curriculum 215	See Bioscience (Non-teaching) curriculum 215	See Bioscience (Non-teaching) curriculum 215	See Bioscience (Non-teaching) curriculum 215
2				
3				
4				

Pre-Pharmacy

Associate in Science

274

Division: Math & Science

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Goal Provide pre-baccalaureate education consisting of liberal arts, sciences, and pre-professional courses designed to transfer to four-

#	Intended Outcomes and Objectives	Assessment Criteria and Procedures	Assessment Results	Use of Results
1	See Bioscience (Non-teaching) curriculum 215	See Bioscience (Non-teaching) curriculum 215	See Bioscience (Non-teaching) curriculum 215	See Bioscience (Non-teaching) curriculum 215
2				
3				
4				

Pre-Physical Therapy

Associate in Science

275

Division: Math & Science

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Goal Provide pre-baccalaureate education consisting of liberal arts, sciences, and pre-professional courses designed to transfer to four-

#	Intended Outcomes and Objectives	Assessment Criteria and Procedures	Assessment Results	Use of Results
1	See Bioscience (Non-teaching) curriculum 215	See Bioscience (Non-teaching) curriculum 215	See Bioscience (Non-teaching) curriculum 215	See Bioscience (Non-teaching) curriculum 215
2				
3				
4				

Pre-Veterinary Medicine

277

Division: Math & Science

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Associate in Science

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Goal Provide pre-baccalaureate education consisting of liberal arts, sciences, and pre-professional courses designed to transfer to four-

#	Intended Outcomes and Objectives	Assessment Criteria and Procedures	Assessment Results	Use of Results
1	See Bioscience (Non-teaching) curriculum 215	See Bioscience (Non-teaching) curriculum 215	See Bioscience (Non-teaching) curriculum 215	See Bioscience (Non-teaching) curriculum 215
2				
3				
4				

Science Education

216

Division: Math & Science

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Associate in Science

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Goal Provide pre-baccalaureate education consisting of liberal arts, sciences, and pre-professional courses designed to transfer to four-

#	Intended Outcomes and Objectives	Assessment Criteria and Procedures	Assessment Results	Use of Results
1	See Bioscience (Non-teaching) curriculum 215	See Bioscience (Non-teaching) curriculum 215	See Bioscience (Non-teaching) curriculum 215	See Bioscience (Non-teaching) curriculum 215
2				
3				
4				
