**Assessment Record**

**Program: Mathematics, Engineering, Physical Sciences Assessment period: Fall 2017 – Summer 2018**

**Program or Department Mission:**

The Department of Mathematics/Engineering/Physical Sciences offers a broad range of courses that service the career programs of the college and that will transfer to baccalaureate degree granting institutions. The department also offers developmental mathematics courses to prepare students for college level mathematics.

**Instructional Program Outcomes & Assessment Plan – AST 220**

# General Education Objective

The student will demonstrate understanding of distance, time scales, and scientific principles needed to comprehend the fundamental ideas of astronomy. The student will use abstract ideas, symbols, and fundamental skills of mathematics to analyze and solve problems.

# Department Outcomes

* Provide freshman and sophomore-level courses in Chemistry, Mathematics, Physics, Physical Sciences, and Astronomy, with emphasis on critical thinking and analytical ability, that are transferable to public institutions of higher learning.
* Offer an appropriate remedial mathematics program accommodating various skill levels.
* Develop and provide courses relevant to the career and professional degree programs of the college.

# Astronomy Course Level Outcomes Assessment Rubric

Level 3: Attempted Problem and Solved Correctly

Level 2: Attempted Problem and Did Not Solve Correctly Level 1: Did Not Attempt Problem

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| **Evaluated Course Objectives**  The General Education Objective is met through the course objectives that require the use of analogy and scientific concepts to understand fundamental elements of astronomy. Student mastery of the specific course objectives to follow will be evaluated by analyzing answers to appropriate questions from the comprehensive final exam. The astronomy final will be a comprehensive multiple-choice exam.  The student will demonstrate knowledge of astronomy by his/her ability to:   1. Use analogy to describe size and distance scales between planets in the solar system, distance between star systems in galaxies, and distance between galaxies or galaxy clusters within the universe. 2. Be to describe the time scales for major cosmic events such as the age of the universe, when galaxies began to form, or when our solar system formed. 3. Demonstrate knowledge of basic scientific principles used by astronomers to understand the composition and the dynamics of the universe. | | | | |
| **Intended Outcomes** | **Means of Assessment** | **Criteria for Success** | **Summary & Analysis of Assessment Evidence** | **Use of Results** |
| AST 220 Objective 1  The student will demonstrate knowledge of astronomy by his/her ability to use analogy to describe size and distance scales between planets in the solar system, distance between star systems in galaxies, and distance between galaxies or galaxy clusters within the universe. | Rubric based assessment of a related common final exam problem that fits the description given in objective 1 | 70% of students learning at a rubric level of 3 | Jefferson Campus  Level 3 85/96 88.5%  Level 2 7/96 7.3%  Level 1 4/96 4.2%  Shelby Campus  Level 3 84/105 80.0%  Level 2 19/105 18.1%  Level 1 2/105 1.9% | 84.1% (169/201)  performed at Level 3 or higher. Up from 81.3% last year. The overall percentage of students that scored at level 3 increased this academic year. Our recommendation is to continue what we are currently doing with this topic. |

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| AST 220 Objective 2  The student will demonstrate knowledge of astronomy by his/her ability to be to describe the time scales for major cosmic events such as the age of the universe, when galaxies began to form, or when our solar system formed. | Rubric based assessment of a related common final exam problem that fits the description given in objective 2 | 70% of students learning at a rubric level of 3 | Jefferson Campus Level 3 82/96  Level 2 10/96  Level 1 4/96  Shelby Campus Level 3 82/105  Level 2 21/105  Level 1 2/105 | 85.4%  10.4%  4.2%  78.1%  20.0%  1.9% | 81.6% (164/201)  performed at Level 3 or higher. Down from 84% last year. The overall percentage of students that scored at level 3 declined this academic year. Our recommendation is to add discussion questions the timing of events since the Big Bang in the chapter review. |
| AST 220 Objective 3 | Rubric based | 70% of students learning | Jefferson Campus | 82.3% | 79.6% (160/201) |
|  | assessment of a | at a rubric level of 3 | Level 3 79/96 | performed at Level 3 or |
| The student will demonstrate knowledge of astronomy by his/her | related common final  exam problem that fits the description given in | Level 2 13/96  Level 1 4/96 | 13.5%  4.2% | higher. Up slightly from  78.2% last year. The overall percentage of students that |
| ability to demonstrate knowledge of basic | objective 3 | Shelby Campus |  | scored at level 3 increased  this academic year. Our |
| scientific principles used | Level 3 81/105 | 77.1% | recommendation is to |
| by astronomers to | Level 2 22/105 | 21.0% | include additional |
| understand the | Level 1 2/105 | 1.9% | demonstrations of the basic |
| composition and the | scientific principles in lab to |
| dynamics of the universe. | help further increase |
| understanding. |

**Program: Mathematics, Engineering, Physical Sciences** **Assessment period: Summer 2018**

**Instructional Program Outcomes & Assessment Plan – CHM105**

# Chemistry Course Level Outcomes Assessment Rubric

Level 4: Student provides a complete and correct solution process that is well organized, with no errors.

Level 3: Student provides a complete solution process that is well organized, but contains minor errors.

Level 2: Student demonstrates understanding of methods required to produce a correct solution, but the solution process lacks expected organization and/or contains errors deemed more significant.

Level 1: Student attempts a solution, but demonstrates little understanding of methods required to produce a correct solution with expected organization.

Level 0: Student does not attempt a solution.

# General Education Objective

Students will use abstract ideas, symbols, and fundamental skills of chemistry to analyze and solve problems.

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| **Departmental Objectives:**   1. Provide freshman and sophomore level courses in Chemistry, Mathematics, Physics, Physical Sciences and Astronomy with emphasis on critical thinking and analytical ability, that are transferable to public institutions of higher learning. 2. Offer an appropriate remedial mathematics program accommodating various skill levels. 3. Develop and provide courses relevant to the career and professional degree programs of the college.   **Evaluated Course Objectives**  The student will demonstrate knowledge of chemistry by his/her ability to   1. Using structural formulas, draw and name three isomers when given the molecular formula. 2. Given a Fischer structure of a monosaccharide, draw both α – and β- Haworth structures 3. Show how α-amino acids form peptide linkages. | | | | |
| **Intended Outcomes** | **Means of Assessment** | **Criteria for Success** | **Summary & Analysis of Assessment Evidence** | **Use of Results** |
| CHM 105 Objective 1  The student will demonstrate knowledge of chemistry by his/her ability to, using structural formulas, draw and name three isomers when given the molecular formula. | Rubric based assessment of related common final exam problems | 70% of students learning at a rubric level of 2 or higher | |  |  |  | | --- | --- | --- | |  | **Campus** | | |  | Jefferson | Total,  % | | Level 4 | 15 | 75% | | Level 3 | 5 | 25% | | Level 2 | 0 | 0% | | Level 1 | 0 | 0% | | Level 0 | 0 | 0% | | Total | 20 |  |   100% Success. Single section taught in Summer on Jefferson Campus | In 2017, 95%  perform at level 2 or higher.  In 2018, 100% perform at level 2 or higher.  This difference is due to the performance of a single student. As in past years, extra class time was spent making sure that students understood these concepts |

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|  | **Campus** | |
|  | Jefferson | Total,  % |
| Level 4 | 11 | 55% |
| Level 3 | 5 | 25% |
| Level 2 | 2 | 10% |
| Level 1 | 2 | 10% |
| Level 0 | 0 | 0% |
| Total 4 | 20 |  |

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| CHM 105 Objective 2  The student will demonstrate knowledge of chemistry by his/her ability to, given a Fischer structure of a monosaccharide, draw both **α** – and **β**- Haworth structures | Rubric based assessment of related common final exam problems | 70% of students learning at a rubric level of 2 or higher | |  |  |  | | --- | --- | --- | |  | **Campus** | | |  | Jefferson | Total,  % | | Level 4 | 8 | 40% | | Level 3 | 3 | 15% | | Level 2 | 3 | 15% | | Level 1 | 3 | 15% | | Level 0 | 3 | 15% | | Total 4 | 20 |  | |  |  |  | | | In 2017, 85%  perform at level 2 or higher. In 2018, 70% perform at level 2 or higher  We went over this topic extensively in class time and study sessions. . |
| CHM 105 Objective 3  The student will demonstrate knowledge of chemistry by his/her ability to show how α- amino acids form peptide linkages. | Rubric based assessment of related common final exam problems | 70% of students learning at a rubric level of 2 or higher |  | | In 2017, 85%  perform at level 2 or higher. In 2018, 90% performed at level 2 or higher. |
| **Plan submission date: 2/7/2018** | | | | **Submitted by: Lisa Nagy** | |

**Assessment Record**

**Program: Mathematics, Engineering, Physical Sciences** **Assessment period: Fall 2017 – Summer 2018**

**Instructional Program Outcomes & Assessment Plan – CHM111**

# Chemistry Course Level Outcomes Assessment Rubric

Level 4: Student provides a complete and correct solution process that is well organized, with no errors.

Level 3: Student provides a complete solution process that is well organized, but contains minor errors.

Level 2: Student demonstrates understanding of methods required to produce a correct solution, but the solution process lacks expected organization and/or contains errors deemed more significant.

Level 1: Student attempts a solution, but demonstrates little understanding of methods required to produce a correct solution with expected organization.

Level 0: Student does not attempt a solution.

# General Education Objective

Students will use abstract ideas, symbols, and fundamental skills of mathematics to analyze and solve problems.

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| **Departmental Objectives:**   1. Provide freshman and sophomore level courses in Chemistry, Mathematics, Physics, Physical Sciences and Astronomy with emphasis on critical thinking and analytical ability, that are transferable to public institutions of higher learning. 2. Offer an appropriate remedial mathematics program accommodating various skill levels. 3. Develop and provide courses relevant to the career and professional degree programs of the college.   **Evaluated Course Objectives**  The student will demonstrate his/her understanding of chemistry by being able to:   1. Carry out calculations relating density, specific gravity, mass, and volume to one another 2. Determine the empirical formula of compound, given the mass percentages of the elements or the analytical data from which these can be calculated, and determine the molecular formula of that compound, given an approximated molecular mass. 3. Given a reaction involving species in solution, relate the volumes or concentrations of two reactant species to the mass of solid precipitated. 4. Use the ideal gas law, determining the moles of a gas sample given its pressure, volume and temperature. 5. Draw the Lewis structure of a molecule or ion and predict its geometry. 6. Draw valid resonance structures including formal charges. 7. Use freezing point depression data to determine the molar mass of a substance. | | | | |
| **Intended Outcomes** | **Means of Assessment** | **Criteria for Success** | **Summary & Analysis of Assessment Evidence** | **Use of Results** |
| CHM 111 Objective 1 The student will demonstrate his/her understanding of chemistry by being able to carry out calculations relating density, specific gravity, mass, and volume to one another | Rubric based assessment of related common final exam problems | 70% of students learning at a rubric level of 2 or higher | |  |  |  |  | | --- | --- | --- | --- | |  | **Campus** | | | |  | Jefferson | Shelby | Total, % | | Level 4 | 11 | 47 | 75% | | Level 3 | 3 | 9 | 16% | | Level 2 | 0 | 2 | 3% | | Level 1 | 0 | 4 | 5% | | Level 0 | 0 | 1 | 1% | | Total | 14 | 63 | 77 |   94% success. | In 2016-17, 96%  performed at level 2 or higher. In 2017-18, 94%  performed at level 2 or higher.  This question involves a concept that students perform in the lab. The mathematics are very simple.  We will continue to perform this as a hands on learning exercise to reinforce learning. |

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| CHM 111 Objective 2 The student will demonstrate his/her understanding of chemistry by being able to determine the empirical formula of compound, given the mass percentages of the elements or the analytical data from which these can be calculated, and determine the molecular formula of that compound, given an approximated molecular mass. | Rubric based assessment of related common final exam problems | 70% of students learning at a rubric level of 2 or higher | |  |  |  |  | | --- | --- | --- | --- | |  | **Campus** | | | |  | Jefferson | Shelby | Total, % | | Level 4 | 9 | 37 | 60% | | Level 3 | 3 | 13 | 21% | | Level 2 | 1 | 8 | 12% | | Level 1 | 1 | 4 | 6% | | Level 0 | 0 | 1 | 1% | | Total | 14 | 63 | 77 |   93% success. | In 2016-17, 87%  performed at level 2 or higher. In 2017-18, 93%  performed at level 2 or higher.  This is a somewhat complex problem, and we go over it at length in all sections. It involves putting together several concepts. Although the steps to solve it can be memorized, student performance reflects their critical thinking abilities. A large number of practice problems were made available to the students. |
| CHM 111 Objective 3 The student will demonstrate his/her understanding of chemistry by being able to relate the volumes or concentrations of two reactant species to the mass of solid precipitated | Rubric based assessment of related common final exam problems | 70% of students learning at a rubric level of 2 or higher | |  |  |  |  | | --- | --- | --- | --- | |  | **Campus** | | | |  | Jefferson | Shelby | Total, % | | Level 4 | 10 | 39 | 64% | | Level 3 | 3 | 14 | 22% | | Level 2 | 0 | 5 | 6% | | Level 1 | 1 | 4 | 6% | | Level 0 | 0 | 1 | 1% | | Total | 14 | 63 | 77 |   93% Success  90% Success | In 2016-17, 90%  performed at level 2 or higher. In 2017-18, 93%  performed at level 2 or higher.  Since the limiting reagent problem is one of the most important concepts in CHM 111, we return to it several times throughout the semester. This concept is stressed heavily, and students are given |

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|  |  |  |  | extra quizzes to reinforce the concept. We will continue the use of homework programs and extra practice quizzes. |
| CHM 111 Objective 4 The student will demonstrate his/her understanding of chemistry by being able to use the ideal gas law, determining the moles of a gas sample given its pressure, volume and temperature | Rubric based assessment of related common final exam problems | 70% of students learning at a rubric level of 2 or higher | |  |  |  |  | | --- | --- | --- | --- | |  | **Campus** | | | |  | Jefferson | Shelby | Total, % | | Level 4 | 11 | 45 | 73% | | Level 3 | 3 | 9 | 16% | | Level 2 | 0 | 5 | 6% | | Level 1 | 0 | 2 | 3% | | Level 0 | 0 | 2 | 3% | | Total | 14 | 63 | 77 |   94% Success  86% Success | In 2016-17, 86%  performed at level 2 or higher. In 2017-18, 94%  performed at level 2 or higher.  During this year, we had the students perform diagnostic exercises in class, which allowed them to determine whether they were using their calculators properly. |

**Assessment Record**

**Program: Mathematics, Engineering, Physical Sciences** **Assessment period: Fall 2017 – Summer 2018**

**Instructional Program Outcomes & Assessment Plan – CHM112**

# Chemistry Course Level Outcomes Assessment Rubric

Level 4: Student provides a complete and correct solution process that is well organized, with no errors.

Level 3: Student provides a complete solution process that is well organized, but contains minor errors.

Level 2: Student demonstrates understanding of methods required to produce a correct solution, but the solution process lacks expected organization and/or contains errors deemed more significant.

Level 1: Student attempts a solution, but demonstrates little understanding of methods required to produce a correct solution with expected organization.

Level 0: Student does not attempt a solution.

# General Education Objective

Students will use abstract ideas, symbols, and fundamental skills of chemistry to analyze and solve problems.

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Departmental Objectives:**   1. Provide freshman and sophomore level courses in Chemistry, Mathematics, Physics, Physical Sciences and Astronomy with emphasis on critical thinking and analytical ability, that are transferable to public institutions of higher learning. 2. Offer an appropriate remedial mathematics program accommodating various skill levels. 3. Develop and provide courses relevant to the career and professional degree programs of the college.   **Evaluated Course Objectives**  The student will demonstrate his/her understanding of chemistry by being able to:   1. Use Le Chatelier's Principle to predict the direction in which a system at equilibrium will shift (if it does) when stresses are applied. 2. Predict ΔS (change in entropy) for many kinds of common changes, both chemical and physical. 3. Determine the percent ionization of a weak mono-protic acid or weak base, given the concentration and Ka or Kb 4. For a given redox reaction, use the Nernst equation to calculate the voltage E of a cell, given E°, and the concentrations of all other species. | | | | | | | | | |
| **Intended Outcomes** | **Means of Assessment** | **Criteria for Success** | **Summary & Analysis of Assessment Evidence** | | | | | | **Use of Results** |
| CHM 112 Objective 1 The student will demonstrate his/her understanding of chemistry by being able to use Le Chatelier's Principle to predict the direction in which a system at equilibrium will shift (if it does) when stresses are applied. | Rubric based assessment of related common final exam problems | 70% of students learning at a rubric level of 2 or higher |  | | | | | | In 2016-17, 93% perform at level 2 or higher. In 2017-18, 93% perform at level 2 or higher. The results are unchanged. This is a qualitative question that assesses understanding of a basic concept. We reinforce this concept with a laboratory exercise. |
|  |  | **Campus** | | |  |
|  | Jefferson | Shelby | Total,  % |
| Level 4 | 16 | 51 | 69% |
| Level 3 | 3 | 16 | 22% |
| Level 2 | 0 | 2 | 3% |
| Level 1 | 1 | 3 | 4% |
| Level 0 | 0 | 2 | 3% |
| Total | 20 | 54 | 74 |
|  |  |  |  | 97% Success | | | |  |  |

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| CHM 112 Objective 2 The student will demonstrate his/her understanding of chemistry by being able to predict ΔS (change in entropy) for many kinds of common changes, both chemical and physical. | Rubric based assessment of related common final exam problems | 70% of students learning at a rubric level of 2 or higher |  |  | **Campus** | | |  | In 2016-17, 84%  perform at level 2 or higher. In 2017-18, 91% perform at level 2 or higher.  This is another qualitative question that assesses understanding of a basic concept th tis late in the semester. We reinforce this concept with a laboratory exercise. |
|  | Jefferson | Shelby | Total,  % |
| Level 4 | 14 | 32 | 62% |
| Level 3 | 3 | 15 | 24% |
| Level 2 | 1 | 2 | 4% |
| Level 1 | 1 | 2 | 4% |
| Level 0 | 1 | 3 | 5% |
| Total | 20 | 54 | 74 |
| 91% success | | | | | |
| CHM 112 Objective 3 The student will demonstrate his/her understanding of chemistry by being able to determine the percent ionization of a weak mono-protic acid or weak base, given the concentration and Ka or Kb | Rubric based assessment of related common final exam problems | 70% of students learning at a rubric level of 2 or higher |  |  | **Campus** | | |  | In 2016-17, 88%  perform at level 2 or higher. In 2017-18, 90% perform at level 2 or higher. This is a multi-step question that assesses ability to complete a complex calculation. We reinforce this concept with a laboratory exercise and parameterized homework problems.  We use newly acquired lab instrumentation for this concept. |
|  | Jefferson | Shelby | Total,  % |
| Level 4 | 15 | 36 | 69% |
| Level 3 | 3 | 11 | 19% |
| Level 2 | 1 | 2 | 4% |
| Level 1 | 1 | 2 | 4% |
| Level 0 | 0 | 3 | 6% |
| Total | 20 | 54 | 74 |
| 90% success | | | | | |

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| CHM 112 Objective 4 The student will demonstrate his/her understanding of chemistry by being able to use the Nernst equation to calculate the voltage E of a cell, given E°, and the concentrations of all other species. | Rubric based assessment of related common final exam problems | 70% of students learning at a rubric level of 2 or higher |  |  | | **Campus** | | |  | In 2016-17, 85%  perform at level 2 or higher. In 2017-18, 91% perform at level 2 or higher.  This question that assesses both complex calculation and critical thinking skills. We reinforce this concept with a laboratory exercise and parameterized homework problems. We are using new laboratory instrumentation to reinforce this concept. |
|  | | Jefferson | Shelby | Total,  % |
| Level 4 | | 16 | 48 | 65% |
| Level 3 | | 3 | 15 | 20% |
| Level 2 | | 0 | 4 | 5% |
| Level 1 | | 1 | 4 | 5% |
| Level 0 | | 0 | 3 | 4% |
| Total | | 20 | 54 | 74 |
|  | | | | | | |
| **Plan submission date: October 3rd, 2018** | | | | | **Submitted by: Lisa Nagy** | | | | | |

**Instructional Program Outcomes & Assessment Plan – CHM221**

# Chemistry Course Level Outcomes Assessment Rubric

Level 4: Student provides a complete and correct solution process that is well organized, with no errors.

Level 3: Student provides a complete solution process that is well organized, but contains minor errors.

Level 2: Student demonstrates understanding of methods required to produce a correct solution, but the solution process lacks expected organization and/or contains errors deemed more significant.

Level 1: Student attempts a solution, but demonstrates little understanding of methods required to produce a correct solution with expected organization.

Level 0: Student does not attempt a solution.

# General Education Objective

Students will use abstract ideas, symbols, and fundamental skills of chemistry to analyze and solve problems.

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| **Departmental Objectives:**   1. Provide freshman and sophomore level courses in Chemistry, Mathematics, Physics, Physical Sciences and Astronomy with emphasis on critical thinking and analytical ability, that are transferable to public institutions of higher learning. 2. Offer an appropriate remedial mathematics program accommodating various skill levels. 3. Develop and provide courses relevant to the career and professional degree programs of the college.   **Evaluated Course Objectives**  The student will demonstrate his/her understanding of chemistry by being able to:   1. Locate chirality centers, assign priorities to substituents, and assign R, S designations to chirality centers. 2. Propose structures for compounds, given their NMR, IR, and mass spectra 3. Calculate the degree of unsaturation of any compound, including those containing N, O, and halogens. | | | | |
| **Intended Outcomes** | **Means of Assessment** | **Criteria for Success** | **Summary & Analysis of Assessment Evidence** | **Use of Results** |
| CHM 221 Objective 1 The student will demonstrate knowledge of organic chemistry by his/her ability to locate chirality centers, assign priorities to substituents, and assign R, S designations to chirality centers. | Rubric based assessment of related common final exam problems | 70% of students learning at a rubric level of 2 or higher | |  |  |  | | --- | --- | --- | |  | **Campus** | | |  | Jefferson | Total, % | | Level 4 | 6 | 75% | | Level 3 | 2 | 25% | | Level 2 | 0 | 0% | | Level 1 | 0 | 0% | | Level 0 | 0 | 0% | | Total | 8 | 8 |   100 % success. Only taught once a year | In 2016-2017, 88%  perform at level 2 or higher. (Virtually no change)  In 2017-2018, 100% perform at level 2 or higher.  This is a qualitative question that assesses spatial ability as well as understanding of the rules of chirality |

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|  | **Campus** | |
|  | Shelby | Total, % |
| Level 4 | 5 | 63% |
| Level 3 | 2 | 25% |
| Level 2 | 0 | 0% |
| Level 1 | 0 | 0% |
| Level 0 | 1 | 13% |
| Total | 8 | 8 |

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| --- | --- | --- |
|  | **Campus** | |
|  | Shelby | Total, % |
| Level 4 | 8 | 100% |
| Level 3 | 0 | 0% |
| Level 2 | 0 | 0% |
| Level 1 | 0 | 0% |
| Level 0 | 0 | 0% |
| Total | 8 | 8 |

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| --- | --- | --- | --- | --- | --- |
| CHM 221 Objective 2 The student will demonstrate knowledge of organic chemistry by his/her ability to propose structures for compounds, given their NMR, IR, and mass spectra | Rubric based assessment of related common final exam problems | 70% of students learning at a rubric level of 2 or higher |  | | In 2016-2017, 88%  perform at level 2 or higher. In 2017-2018, 88% perform at level 2 or higher. Students enjoy solving these problems. |
| CHM 221 Objective 3 The student will demonstrate knowledge of chemistry by his/her ability to calculate the degree of unsaturation of any compound, including those containing N, O, and halogens. | Rubric based assessment of related common final exam problems | 70% of students learning at a rubric level of 2 or higher |  | | In 2016-2017, 100% performed at level 2 or higher. In 2017-2018, 100% perform at level 2 or higher. This concept is reviewed frequently during the semester. The small class size enables discussion. |
| **Plan submission date: October 3rd, 2018** | | | | **Submitted by: Lisa Nagy** | |

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| jscc logo | **Assessment Record** |

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| **Program:** | **Mathematics, Engineering, Physical Sciences** | **Assessment period:** | **Spring 2018 (Single section)** |

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| |  | | --- | | **Program or Department Mission:** |   The Department of Mathematics/Engineering/Physical Sciences offers a broad range of courses that service the career programs of the college and that will transfer to baccalaureate degree granting institutions. The department also offers developmental mathematics courses to prepare students for college level mathematics. |

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| **Instructional Program Outcomes & Assessment Plan – CHM 222**  **Chemistry Course Level Outcomes Assessment Rubric**  Level 4: Student provides a correct solution that is well organized  Level 3: Student provides a solution that is well organized, but with a minor error.  Level 2: Student uses correct approach, but misses a greater portion of the problem.  Level 1: Student attempts a solution, with incorrect approach.  Level 0: Student does not attempt a solution.  **General Education Objective**  Students will use abstract ideas, symbols, and fundamental skills of chemistry to analyze and solve problems.  **Departmental Objectives:**   1. Provide freshman and sophomore level courses in Chemistry, Mathematics, Physics, Physical Sciences and Astronomy with emphasis on critical thinking and analytical ability, that are transferable to public institutions of higher learning. 2. Offer an appropriate remedial mathematics program accommodating various skill levels. 3. Develop and provide courses relevant to the career and professional degree programs of the college.   **Evaluated Course Objectives**  The student will demonstrate knowledge of organic chemistry by his/her ability to  1. Calculate dissociation constants of carboxylic acids, and predict the relative acidities of substituted carboxylic acids.  2. Predict the products of carbonyl condensation reactions.  3. Use carbonyl condensation reactions in synthesis. |

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| **Intended Outcomes** | **Means of Assessment** | **Criteria for Success** | **Summary & Analysis of Assessment Evidence** | **Use of Results** |
| CHM 222 Objective 1  The student will demonstrate knowledge of organic chemistry by his/her ability to calculate dissociation constants of carboxylic acids, and predict the relative acidities of substituted carboxylic acids. | Rubric based assessment of related common final exam problems | 70% of students learning at a rubric level of 2 or higher | |  |  |  | | --- | --- | --- | | Shelby Campus | | | | Level 4 | 5 | 83% | | Level 3: | 0 | 0% | | Level 2 | 0 | 0% | | Level 1 | 1 | 17% | | Level 0 | 0 | 0% | | Total | 6 |  |   83% Success | In 2016-17 100% of students perform at level 2 or higher  In 2017-18, 83% perform at level 2 or higher.  Students seem to be able to apply this topic from CHM 112 |
| CHM 222 Objective 2  The student will demonstrate knowledge of chemistry by his/her ability to predict the products of carbonyl condensation reactions | Rubric based assessment of related common final exam problems | 70% of students learning at a rubric level of 2 or higher | |  |  |  | | --- | --- | --- | | Shelby Campus | | | | Level 4 | 4 | 66% | | Level 3: | 1 | 17% | | Level 2 | 1 | 17% | | Level 1 | 0 | 0% | | Level 0 | 0 | 0% | | Total | 6 |  |   100% Success | In 2016-17, 100% perform at level 2 or higher. In 2017-18, 100% perform at level 2 or higher  Students benefitted from the in-class discussions of this topic. |
| CHM 222 Objective 3  The student will demonstrate knowledge of chemistry by his/her ability to use carbonyl condensation reactions in synthesis | Rubric based assessment of related common final exam problems | 70% of students learning at a rubric level of 2 or higher | |  |  |  | | --- | --- | --- | | Shelby Campus | | | | Level 4 | 4 | 66% | | Level 3: | 1 | 17% | | Level 2 | 0 | 0% | | Level 1 | 1 | 17% | | Level 0 | 0 | 0% | | Total | 10 |  |   83% Success | In 2016-17, 90% performed at level 2 or higher, and in 2017-18, 83% are at level 2 or higher. This is a difficult concept that comes late in the semester.  While it is difficult to compare small populations from semester to semester, it is important to note that students seem to perform better in a traditional class. |

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| **Plan submission date: October 3rd, 2018** | **Submitted by: Lisa Nagy** |

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| **Instructional Program Outcomes & Assessment Plan - MTH 090**  **Mathematics Course Level Outcomes Assessment Rubric**  Level 4: Student provides a complete and correct solution process that is well organized, with no errors.  Level 3: Student provides a complete solution process that is well organized, but contains minor errors.  Level 2: Student demonstrates understanding of methods required to produce a correct solution, but the solution process lacks expected organization and/or contains errors deemed more significant.  Level 1:  Student attempts a solution, but demonstrates little understanding of methods required to produce a correct solution with expected organization.  Level 0: Student does not attempt a solution.  **General Education Objective:**  Students will use abstract ideas, symbols, and fundamental skills of mathematics to analyze and solve problems.  **Evaluated Course Objectives:**  The student will demonstrate his/her ability to make very basic applications of the arithmetic and algebraic skills taught in this course by being able to:  1. Express any given composite number in its prime factored form.  2. Apply the order of operations agreement to computations involving more than one operation.  3. Evaluate algebraic expressions using given numerical values. | | | | |
| **Intended Outcomes** | **Means of Assessment** | **Criteria for Success** | **Summary & Analysis of Assessment Evidence** | **Use of Results** |
| MTH 090 Objective 1  The student will demonstrate his/her ability to make very basic applications of the arithmetic and algebraic skills taught in this course by being able to express any given composite number in its prime factored form. | Rubric based assessment of related common final exam problems | 70% of students learning at a rubric level of 2 or higher | Fall 2017-Spring 2018  Total of 120 Students /7 Sections  Jefferson – 2 sections  Shelby – 2 Sections  Clanton – 3 Sections  Pell City – No Data Reported  71.7% Overall Performed at Level 2 or Higher  Jefferson: 50% at level 2 or higher  Shelby: 58.5% at level 2 or higher  Clanton:90.9% at level 2 or higher  Pell City: No Data  Level 4: 9/24 = 37.5% Jefferson  12/41=29.3 % Shelby  31/55 =56.4% Clanton  No Data = Pell City    Level 3: 3/24 = 12.5% Jefferson  6/41=14.6% Shelby  11/55= 20% Clanton  No Data = Pell City    Level 2: 0/24 =0% Jefferson  6/41=14.6 % Shelby  8/55 =14.5% Clanton  No Data = % Pell City    Level 1: 0/24 = 0% Jefferson  8/41 =19.5% Shelby  5/55 = 9% Clanton  No Data= Pell City  Level 0: 12/24 =50% Jefferson  9/41= 22 %Shelby  0/55 = 0% Clanton No Data = Pell City | Our goal of 70% was exceeded. When comparing last year’s results to this year, there is a slight decrease in the number of students who performed at level 2 or higher for objective 1. This could be because fewer students were assessed compared to last year (239 last year).  The state of Alabama has dropped MTH 090 from the list of course offerings, and a major overhaul has taken place in developmental mathematics; therefore this course is no longer offered at JSCC. |
| MTH 090 Objective 2  The student will demonstrate his/her ability to make very basic applications of the arithmetic and algebraic skills taught in this course by being able to apply the order of operations agreement to computations involving more than one operation. | Rubric based assessment of related common final exam problems | 70% of students learning at a rubric level of 2 or higher | 85.8% of all students are performing at Level 2 or higher  Jefferson: 79.2% at level 2 or higher  Shelby: 75.6% at level 2 or higher  Clanton: 96.3% at level 2 or higher  Pell City: No Data Reported  Level 4:16/24 =66.7% Jefferson  14/41=34.1% Shelby  16/55=29.1% Clanton  No Data = Pell City  Level 3:3/24=12.5% Jefferson  9/41= 22% Shelby  19/55=34.5% Clanton  No Data= Pell City  Level 2: 0/24 =0% Jefferson  8/41=19.5% Shelby  18/55=32.7% Clanton  No Data =Pell City  Level 1: 0/24=0% Jefferson  8/41=19.5% Shelby  1/55=1.8% Clanton  No Data= Pell City    Level 0: 5/24 =20.8% Jefferson  2/41 =4.9 % Shelby  1/55=1.8% Clanton  No Data = Pell City | The goal of 70% was exceeded considerably. When comparing the results to last year, there is a slight increase (2.5%) in the number of students performing at level 2 or higher. |
| MTH 090 Objective 3  The student will demonstrate his/her ability to make very basic applications of the arithmetic and algebraic skills taught in this course by being able to evaluate algebraic expressions using given numerical values.  **Plan Submitted:** | Rubric based assessment of related common final exam problems  **October 4, 2018** | 70% of students learning at a rubric level of 2 or higher | 82.5% of all students are performing at Level 2 or higher  Jefferson: 58.3% at level 2 or higher  Shelby: 90.3% at level 2 or higher  Clanton: 87.3% at level 2 or higher  Pell City: No Data Reported  Level 4: 11/24=45.8% Jefferson  21/41=51.2% Shelby  26/55=47.3% Clanton  No Data=Pell City  Level 3:1/24 =4.2% Jefferson  9/41=22% Shelby  12/55=21.8% Clanton  No Data = Pell City  Level 2:2/24=8.3% Jefferson  7/41=17.1% Shelby  10/55=18.2% Clanton  No Data = Pell City  Level 1:0/24=0% Jefferson  3/41=7.3% Shelby  5/55=9% Clanton  No Data = Pell City  Level 0:10/24=41.7% Jefferson  1/41=2.4% Shelby  2/55=3.6 % Clanton  No Data = Pell City    **Plan Submitted by:** | Again, our goal of 70% of students learning at a rubric level of 2 or higher is exceeded considerably. There is a slight decrease when comparing the results to last year, however, the number of students performing at level 2 or higher is well above 70%.  Nanette Easterling  Nanette Easterling |

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| **Instructional Program Outcomes & Assessment Plan - MTH 098**  **Mathematics Course Level Outcomes Assessment Rubric**  Level 4: Student provides a complete and correct solution process that is well organized, with no errors.  Level 3: Student provides a complete solution process that is well organized, but contains minor errors.  Level 2: Student demonstrates understanding of methods required to produce a correct solution, but the solution process lacks expected organization and/or contains errors deemed more significant.  Level 1:  Student attempts a solution, but demonstrates little understanding of methods required to produce a correct solution with expected organization.  Level 0: Student does not attempt a solution.  **General Education Objective**  Students will use abstract ideas, symbols, and fundamental skills of mathematics to analyze and solve problems.  **Evaluated Course Objectives**  The student will demonstrate his/her understanding of algebraic manipulations, interpretations, and computations by being able to:  1. Solve linear equations, including literal, by applying the properties of equality.  2. Apply the rules of exponents to quantities involving integer exponents.  3. Graph a linear equation.  4. Factor a trinomial. | | | | |
| **Intended Outcomes** | **Means of Assessment** | **Criteria for Success** | **Summary & Analysis of Assessment Evidence** | **Use of Results** |
| MTH 098 Objective 1  The student will demonstrate his/her understanding of algebraic manipulations, interpretations, and computations by being able to solve linear equations, including literal, by applying the properties of equality. | Rubric based assessment of related common final exam problems | 70% of students learning at a rubric level of 2 or higher | Fall 2017-Spring 2018  Total of 295 students/15 Sections  Jefferson – 6 Sections  Shelby-5 Sections  Clanton – 4 Sections  Pell City – Data Incomplete\*  87.1% Overall performed at Level 2 or higher  Jefferson:92.2% at level 2 or higher  Shelby: 78.8% at level 2 or higher  Clanton: 87.9% at level 2 or higher  Level 4:Jefferson-44/116=37.9%  Shelby: =33/80= 41.3%  Clanton:48/99=48.5%    Level 3: Jefferson-27/116=23.3%  Shelby-14/80=17.5%  Clanton-26/99=26.3%      Level 2:Jefferson-36/116=31%  Shelby-16/80=20%  =Clanton-13/99=13.1%    Level 1:Jefferson-8/116=6.9%  Shelby -15/80=18.8%  Clanton-10/99=10.1%    Level 0:Jefferson-1/116= 1%  Shelby-2/80=2.5%  Clanton-2/99=2% | \* There were 2 documents posted on the O Drive from Pell City for MTH 098, however, there was not data for all 4 SLO’s on each document.  For Objective 1 we greatly exceeded our goal of 70% performing at level 2 or higher. When comparing the results to last year we have an increase of almost 5%.  This year the state has made drastic changes in developmental mathematics. A new Co-req model is now in place and is being implemented over this year. Content has shifted from 098 to 100, so the SLO’s for 098 are changing. |
| MTH 098 Objective 2  The student will demonstrate his/her understanding of algebraic manipulations, interpretations, and computations by being able to apply rules of exponents to quantities involving integer exponents. | Rubric based assessment of related common final exam problems | 70% of students learning at a rubric level of 2 or higher | 79.3% Overall performed at Level 2 or higher  Jefferson:85.3% at level 2 or higher  Shelby: 65.1% at level 2 or higher  Clanton: 83.8% at level 2 or higher  Level 4:Jefferson-36/116=31%  Shelby-24/80=30%  Clanton-37/99=37.4%    Level 3:Jefferson-21/116=18.1%  Shelby-13/80=16.3%  Clanton-13/99=13.1%    Level 2:Jefferson-42/116=36.2%  Shelby-15/80=18.8%  Clanton-33/99=33.3%  Level 1:Jefferson-12/116=10.3%  Shelby-27/80=33.8%  Clanton-12/99=12.1%    Level 0:Jefferson-5/116=4.3%  Shelby-1/80=1.2%  Clanton-4/99=4% | We exceeded the goal of 70% for Objective 2 as well and again, there is an increase of almost 5%. This content will still be taught in 098, and we will keep the same objective. We will continue current instructional methods in teaching this objective due to the success of students. |
| MTH 098 Objective 3  The student will demonstrate his/her understanding of algebraic manipulations, interpretations, and computations by being able to graph a linear equation.  MTH 098 Objective 4  The student will demonstrate his/her understanding of algebraic manipulations, interpretations, and computations by being able to factor a trinomial.  **Plan Submission Date:** | Rubric based assessment of related common final exam problems  Rubric based assessment of related common final exam problems.  **October 4, 2018** | 70% of students learning at a rubric level of 2 or higher  70% of students learning at a rubric level of 2 or higher  **Submitted by:** | 81.7% Overall performed at Level 2 or higher  Jefferson:81% at level 2 or higher  Shelby:81.3% at level 2 or higher  Clanton: 82.9% at level 2 or higher  Level 4:Jefferson-47/116=40.5%%  Shelby-53/80=66.3%  Clanton-55/99=55.6%    Level 3:Jefferson-27/116=23.3%%  Shelby-3/80=3.7%  Clanton-7/99=7.1%    Level 2:Jefferson-20/116=17.2%  Shelby-9/80=11.3%  Clanton-20/99=20.2%  Level 1:Jefferson-13/116=11.2%  Shelby-11/80=13.8%  Clanton-9/99=9.1%    Level 0:Jefferson-9/116=7.8%  Shelby-4/80=5%  Clanton-8/99=8.1%    69.8% Overall performed at level 2 or higher  Jefferson: 84.5% at level 2 or higher  Shelby: 57.5% at level 2 or higher  Clanton: 62.7% at level 2 or higher  Level 4:Jefferson-55/116=47.4%  Shelby-37/80=46.3%  Clanton-21/99=21.2%  Level 3:Jefferson-25/116=21.6%  Shelby-3/80=3.7%  Clanton-6/99=6.1%  Level 2:Jefferson-18/116=15.5%  Shelby-6/80=7.5%  Clanton-35/99=35.4%  Level 1:Jefferson-8/116=6.9%  Shelby-30/80=37.5%  Clanton-26/99=26.3%  Level 0:Jefferson-8/116=6.9%  Shelby-4/80=5%  Clanton-11/99=11.1%  **Nanette Easterling** | We again exceeded our goal of 70% for Objective 3 and our rate of success improved 14.2% from last year. This objective was new last year and the percentage of students performing at level 2 or higher was low in comparison to other objectives. The department was encouraged to search and find best practices to aid in teaching this content and in doing so, the rate of success greatly improved. We will continue to teach this content in 098 using the current instructional methods and this objective will remain as we move forward.  Even though we fell slightly below our goal of 70%, there is an improvement of almost 8% in the number of students performing at level 2 or higher (7.6%). Last year a factoring worksheet was created and distributed to all faculty to use as supplemental material to help increase the success rate of students. We are seeing varying success rates across the 3 campuses reporting. The reason for this is not clear, other than speculating that it is the last chapter taught and an instructor may not have the time needed to adequately teach the content.  This particular content is now taught in MTH 100. |

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| **Instructional Program Outcomes & Assessment Plan – MTH 100**  **Mathematics Course Level Outcomes Assessment Rubric**  Level 4: Student provides a complete and correct solution process that is well organized, with no errors.  Level 3: Student provides a complete solution process that is well organized, but contains minor errors.  Level 2: Student demonstrates understanding of methods required to produce a correct solution, but the solution process lacks expected organization and/or contains errors deemed more significant.  Level 1: Student attempts a solution, but demonstrates little understanding of methods required to produce a correct solution with expected organization.  Level 0: Student does not attempt a solution.  **General Education Objective**  Students will use abstract ideas, symbols, and fundamental skills of mathematics to analyze and solve problems.  **Department Outcomes**   * Provide freshman and sophomore-level courses in Chemistry, Mathematics, Physics, Physical Sciences, and Astronomy, with emphasis on critical thinking and analytical ability that are transferable to public institutions of higher learning. * Offer an appropriate remedial mathematics program accommodating various skill levels. * Develop and provide courses relevant to the career and professional degree programs of the college.   **Evaluated Course Objectives**  The student will demonstrate his/her understanding of algebraic manipulations, interpretations, and computations by being able to:  1. Simplify radical expressions and perform operations with radical expressions  2. Find the equation of a line given appropriate information.  3. Perform operations with rational expressions  4. Use The quadratic formula to find solutions to equations | | | | |
| **Intended Outcomes** | **Means of Assessment** | **Criteria for Success** | **Summary & Analysis of Assessment Evidence** | **Use of Results** |
| MTH 100 Objective 1  The student will demonstrate his/her understanding of algebraic manipulations, interpretations, and computations by being able to simplify radical expressions and perform operations with radical expressions | Rubric based assessment of related common final exam problems | 70% of students learning at a rubric level of 2 or higher | Jefferson Campus  Level 4 57/199 28.6%  Level 3 36/199 18.1%  Level 2 35/199 17.6%  Level 1 48/199 24.1%  Level 0 23/199 11.6%  Shelby Campus  Level 4 128/206 62.1%  Level 3 17/206 8.3%  Level 2 21/206 10.2%  Level 1 26/206 12.6%  Level 0 14/206 6.8%  Clanton Campus  Level 4 66/123 53.7%  Level 3 17/123 13.8%  Level 2 24/123 19.5%  Level 1 9/123 7.3%  Level 0 7/123 5.7%  Pell City  Level 4 46/68 48.8%  Level 3 11/68 16.2%  Level 2 5/68 7.4%  Level 1 6/68 8.8%  Level 0 0/68 0%  Online  Level 4 20/41 48.8%  Level 3 3/41 7.3%  Level 2 4/41 9.8%  Level 1 13/41 31.7%  Level 0 1/41 2.4% | **Annual campus-wide total at rubric level 2 or higher:**  **490/726 = 76.9%**  There was a slight decrease in the rate of success of 2.3% compared to 2016-2017 although success rate still met the criteria for success.  Students will continue to be made aware of the availability of tutors in various ways such as email and other media outlets. |
| MTH 100 Objective 2  The student will demonstrate his/her understanding of algebraic manipulations, interpretations, and computations by being able to find the equation of a line when given appropriate information | Rubric based assessment of related common final exam problems | 70% of students learning at a rubric level of 2 or higher | Jefferson Campus  Level 4 67/199 33.7%  Level 3 47/199 23.6%  Level 2 39/199 19.6%  Level 1 30/199 15.1%  Level 0 16/199 8.0%  Shelby Campus  Level 4 100/206 48.5%  Level 3 37/206 18.0%  Level 2 36/206 17.5%  Level 1 17/206 8.3%  Level 0 16/206 7.8%  Clanton Campus  Level 4 61/123 50.0%  Level 3 18/123 14.8%  Level 2 20/123 16.4%  Level 1 18/123 14.8%  Level 0 5/123 4.1%  Pell City  Level 4 29/68 42.6%  Level 3 25/68 36.8%  Level 2 5/68 7.4%  Level 1 9/68 13.2%  Level 0 0/68 0%  Online  Level 4 14/41 34.1%  Level 3 11/41 26.8%  Level 2 5/41 12.2%  Level 1 10/41 24.4%  Level 0 1/41 2.4% | **Annual campus-wide total at rubric level 2 or higher:**  514/636 = 80.8%  There was an increase in the rate of success of 3.3 % compared to 2016-2017 indicating success in current instructional methods.  Students will continue to be made aware of the availability of tutors in various ways such as email and other media outlets. |
| MTH 100 Objective 3  The student will demonstrate his/her understanding of algebraic manipulations, interpretations, and computations by being able to perform operations with rational expressions | Rubric based assessment of related common final exam problems | 70% of students learning at a rubric level of 2 or higher | Jefferson Campus  Level 4 54/199 27.1%  Level 3 45/199 22.6%  Level 2 42/199 21.1%  Level 1 35/199 17.6%  Level 0 23/199 11.6%  Shelby Campus  Level 4 92/206 44.7%  Level 3 35/206 17.0%  Level 2 32/206 15.5%  Level 1 27/206 13.1%  Level 0 20/206 9.7%  Clanton Campus  Level 4 33/123 26.8%  Level 3 32/123 26.0%  Level 2 32/123 26.0%  Level 1 14/123 11.4%  Level 0 12/123 9.8%  Pell City  Level 4 42/68 61.8%  Level 3 15/68 22.1%  Level 2 8/68 11.8%  Level 1 2/68 2.9%  Level 0 1/68 1.5%  Online  Level 4 23/41 56.1%  Level 3 7/41 17.1%  Level 2 4/41 9.8%  Level 1 6/41 14.6%  Level 0 1/41 2.4% | **Annual campus-wide total at rubric level 2 or higher:**  496/637 = 77.9%  There was an increase in the rate of success of 2.9% compared to 2016-2017 indicating success in current instructional methods. Even though this objective continues to be a challenge to most students, the criterial for success was met.  Students will continue to be made aware of the availability of tutors in various ways such as email and other media outlets. |
| MTH 100 Objective 4  The student will demonstrate his/her understanding of algebraic manipulations, interpretations, and computations by being able to use the quadratic formula to find solutions to equations | Rubric based assessment of related common final exam problems | 70% of students learning at a rubric level of 2 or higher | Jefferson Campus  Level 4 70/199 35.2%  Level 3 34/199 17.1%  Level 2 35/199 17.6%  Level 1 31/199 15.6%  Level 0 29/199 14.6%  Shelby Campus  Level 4 67/206 32.5%  Level 3 54/206 26.2%  Level 2 35/206 17.0%  Level 1 31/206 15.0%  Level 0 19/206 9.2%  Clanton Campus  Level 4 33/123 26.8%  Level 3 35/123 28.5%  Level 2 37/123 30.1%  Level 1 5/123 4.1%  Level 0 13/123 10.6%  Pell City  Level 4 18/68 26.5%  Level 3 33/68 48.5%  Level 2 9/68 13.2%  Level 1 6/68 8.8%  Level 0 2/68 2.9%  Online  Level 4 7/41 17.1%  Level 3 10/41 24.4%  Level 2 5/41 12.2%  Level 1 15/41 36.6%  Level 0 4/41 9.8% | **Annual campus-wide total at rubric level 2 or higher:**  482/637 = 75.7%  There was a significant increase in the rate of success as compared to the 2016-2017 academic year (4.1%) indicating success in current instructional methods. The criterial for success is met.  Students will continue to be made aware of the availability of tutors in various ways such as email and other media outlets. |
| **Plan submission date: October 4, 2018** | | | **Submitted by: Yu-ing Hargett** | |

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| **Instructional Program Outcomes & Assessment Plan – MTH 110**  **General Education Objective**  Students will use abstract ideas, symbols, and fundamental skills of mathematics to analyze and solve problems.  **Department Outcomes**   * Provide freshman and sophomore-level courses in Chemistry, Mathematics, Physics, Physical Sciences, and Astronomy, with emphasis on critical thinking and analytical ability, that are transferable to public institutions of higher learning. * Offer an appropriate remedial mathematics program accommodating various skill levels. * Develop and provide courses relevant to the career and professional degree programs of the college.   **Mathematics Course Level Outcomes Assessment Rubric**  Level 4: Student provides a complete and correct solution process that is well organized, with no errors.  Level 3: Student provides a complete solution process that is well organized, but contains minor errors.  Level 2: Student demonstrates understanding of methods required to produce a correct solution, but the solution process lacks expected organization and/or contains errors deemed more significant.  Level 1: Student attempts a solution, but demonstrates little understanding of methods required to produce a correct solution with expected organization.  Level 0: Student does not attempt a solution.  **Evaluated Course Objectives**  The student will demonstrate understanding of concepts, develop competent skills, and demonstrate applications by his/her ability to  1. Perform basic algebraic operations on matrices  2. Use Venn diagram to solve a problem  3. Use Bayes’ Theorem to solve a problem  4. Compute the mean, variance, and standard deviation of a random variable | | | | |
| **Intended Outcomes** | **Means of Assessment** | **Criteria for Success** | **Summary & Analysis of Assessment Evidence**  **Note: Course is not offered at unlisted campuses.** | **Use of Results** |
| MTH 110 Objective 1  The student will demonstrate understanding of concepts, develop competent skills, and demonstrate applications by his/her ability to perform basic algebraic operations on matrices | Rubric based assessment of related common final exam problems | 70% of students learning at a rubric level of 2 or higher | Jefferson Campus  Level 4 4/18 22.2%  Level 3 6/18 33.3%  Level 2 3/18 16.7%  Level 1 2/18 11.1%  Level 0 3/18 16.7%  Shelby Campus  Level 4 33/38 86.8%  Level 3 1/38 2.6%  Level 2 2/38 5.3%  Level 1 2/38 5.3%  Level 0 2/38 0.0%  Clanton Campus  Level 4 9/10 90.0%  Level 3 1/10 10.0%  Level 2 0/10 0%  Level 1 0/10 0%  Level 0 0/10 0%  Online  Level 4 67/76 88.2%  Level 3 5/76 6.6%  Level 2 0/76 0%  Level 1 4/76 5.3%  Level 0 0/76 0% | Overall, 92.3% of students assessed are learning at level 2 or higher indicating success in objective 1 concept instruction. There was a slight increase from the previous year (0.5%).  Continue current instructional methods which included in-class lectures and practice problems for on-campus sections and Power Point lessons as well as numerous written and video examples for online sections |
| MTH 110 Objective 2  The student will demonstrate understanding of concepts, develop competent skills, and demonstrate applications by his/her ability to use Venn diagram to solve a problem | Rubric based assessment of related common final exam problems | 70% of students learning at a rubric level of 2 or higher | Jefferson Campus  Level 4 3/18 16.7%  Level 3 5/18 27.8%  Level 2 4/18 22.2%  Level 1 3/18 16.7%  Level 0 3/18 16.7%  Shelby Campus  Level 4 26/38 68.4%  Level 3 2/38 5.3%  Level 2 6/38 15.8%  Level 1 4/38 10.5%  Level 0 0/38 0%  Clanton Campus  Level 4 8/10 80.0%  Level 3 0/10 0%  Level 2 2/10 20.0%  Level 1 0/10 0%  Level 0 0/10 0%  Online  Level 4 43/76 56.6%  Level 3 4/76 5.3%  Level 2 11/76 14.5%  Level 1 18/76 23.7%  Level 0 0/76 0% | Overall, 80.3% of students assessed are learning at level 2 or higher. A decrease of 3.3% from the previous year was noted. However, the overall success rate is still within acceptable perimeter.  Continue current instructional methods which included in-class lectures and practice problems for on-campus sections and Power Point lessons as well as numerous written and video examples for online sections |
| MTH 110 Objective 3  The student will demonstrate understanding of concepts, develop competent skills, and demonstrate applications by his/her ability to use Bayes’ Theorem to solve a problem | Rubric based assessment of related common final exam problems | 70% of students learning at a rubric level of 2 or higher | Jefferson Campus  Level 4 3/18 16.7%  Level 3 5/18 27.8%  Level 2 3/18 16.7%  Level 1 5/18 27.8%  Level 0 2/18 11.1%  Shelby Campus  Level 4 7/38 18.4%  Level 3 3/38 7.9%  Level 2 12/38 31.6%  Level 1 16/38 42.1%  Level 0 0/38 0%  Clanton Campus  Level 4 2/10 20.0%  Level 3 2/10 20.0%  Level 2 4/10 40.0%  Level 1 2/10 20.0%  Level 0 0/10 0%  Online  Level 4 6/76 7.9%  Level 3 9/76 11.8%  Level 2 9/76 11.8%  Level 1 51/76 67.1%  Level 0 1/76 1.3% | Overall, 45.8% of students assessed are learning at level 2 or higher indicating students’ continued difficulty in learning objective 3 concept.  The success rate is greatly decreased (8.9%) compared to the previous academic year. This decrease may be the result of fewer students taking this class on campus (46.5% as opposed to 61.0% the previous year) since students are more successful in learning this complex concept in person. online students again shown most difficulty in recalling necessary formulas and/or the ability to construct the required tree diagram to complete this objective. Students will be reminded to review the practice/examples and videos implemented in the online classes to help complete the objective. |
| MTH 110 Objective 4  The student will demonstrate understanding of concepts, develop competent skills, and demonstrate applications by his/her ability to compute the mean, variance, and standard deviation of a random variable | Rubric based assessment of related common final exam problems | 70% of students learning at a rubric level of 2 or higher | Jefferson Campus  Level 4 4/18 22.2%  Level 3 3/18 16.7%  Level 2 7/18 38.9%  Level 1 2/18 11.1%  Level 0 2/18 11.1%  Shelby Campus  Level 4 22/38 57.9%  Level 3 1/38 2.6%  Level 2 9/38 23.7%  Level 1 6/38 15.8%  Level 0 0/38 0%  Clanton Campus  Level 4 3/10 30.0%  Level 3 0/10 0%  Level 2 4/10 40.0%  Level 1 3/10 30.0%  Level 0 0/10 0%  Online  Level 4 28/76 36.8%  Level 3 3/76 3.9%  Level 2 20/76 26.3%  Level 1 25/76 32.9%  Level 0 0/76 0% | Overall, 73.2% of students assessed are learning at level 2 or higher (slight decrease of 4.2% from the previous year). However, the criteria for success was met in objective 4 concept instruction.  Continue current instructional methods which included in-class lectures and practice problems for on-campus sections and Power Point lessons as well as numerous written and video examples for online sections. |
| **Plan submission date: October 2, 2018** | | | **Submitted by: Yu-ing Hargett** | |

**Instructional Program Outcomes & Assessment Plan – MTH 112**

# Mathematics Course Level Outcomes Assessment Rubric

Level 4: Student provides a complete and correct solution process that is well organized, with no errors.

Level 3: Student provides a complete solution process that is well organized, but contains minor errors.

Level 2: Student demonstrates understanding of methods required to produce a correct solution, but the solution process lacks expected organization and/or contains errors deemed more significant.

Level 1: Student attempts a solution, but demonstrates little understanding of methods required to produce a correct solution with expected organization.

Level 0: Student does not attempt a solution.

# General Education Objective

Students will use abstract ideas, symbols, and fundamental skills of mathematics to analyze and solve problems.

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| **Evaluated Course Objectives**  The student will demonstrate knowledge of functions and their graphs by his/her ability to   1. Find the inverse of a given function. 2. Use properties of exponents/logarithms to solve given problems. 3. Find the real zeros of a polynomial function. 4. Graph through transformation of basic functions. | | | | |
| **Intended Outcomes** | **Means of Assessment** | **Criteria for Success** | **Summary & Analysis of Assessment Evidence** | **Use of Results** |
| **Assessment of Objective 1** The student will  demonstrate knowledge of functions and their graphs by his/her ability to find the inverse of a given function. | Rubric based assessment of related common final exam problems | 70% of students learning at a rubric level of 2 or higher | Jefferson Campus  Level 4 48/116 41.4%  Level 3 14/116 12.1%  Level 2 24/116 20.7%  Level 1 13/116 11.1%  Level 0 17/116 14.7%  Shelby Campus  Level 4 106/168 63.1%  Level 3 15/168 8.9%  Level 2 12/168 7.1%  Level 1 23/168 13.7%  Level 0 12/168 7.1%  Clanton Campus  Level 4 30/99 30.3%  Level 3 18/99 18.2%  Level 2 11/99 11.1%  Level 1 20/99 20.2%  Level 0 20/99 20.2% | Schoolwide 66.8% (350/524)  performed at Level 2 or higher.  This year showed a decrease of 8.6% from last year. A change in the prerequisite course for Math 112 may have had the effect that students entering this course are less prepared than in previous years. Another change has occurred in the prerequisite course this year 2018-2019. We will continue to monitor performance this year and seek to make changes after we observe performance with the current curriculum. |

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|  |  |  | Pell City  Level 4 17/31 54.8%  Level 3 11/31 35.5%  Level 2 3/31 9.7%  Level 1 0/31 0%  Level 0 0/31 0%  Online  Level 4 16/110 14.5%  Level 3 13/110 11.8%  Level 2 12/110 10.9%  Level 1 25/110 22.7%  Level 0 44/110 40.0% |  |
| **Assessment of Objective 2** The student will  demonstrate knowledge of functions and their graphs by his/her ability to use properties of exponents/logarithms to solve given problems. | Rubric based assessment of related common final exam problems | 70% of students learning at a rubric level of 2 or higher | Jefferson Campus  Level 4 37/116 31.9%  Level 3 18/116 15.5%  Level 2 28/116 24.1%  Level 1 17/116 14.7%  Level 0 16/116 13.8%  Shelby Campus  Level 4 91/168 54.2%  Level 3 8/168 4.8%  Level 2 13/168 7.7%  Level 1 47/168 28.0%  Level 0 9/168 5.4%  Clanton Campus  Level 4 16/99 16.2%  Level 3 4/99 4.0%  Level 2 28/99 28.3%  Level 1 35/99 35.4%  Level 0 16/99 16.2% | Schoolwide 60.5% (317/524)  performed at level 2 or higher. A decrease of 11.2% from last year.  This year showed a decrease of 11.2% from last year. A change in the prerequisite course for Math 112 may have had the effect that students entering this course are less prepared than in previous years. Another change has occurred in the prerequisite course this year 2018-2019. We will continue to monitor performance this year and seek to make |

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|  |  |  | Pell City  Level 4 16/31 51.6%  Level 3 6/31 19.4%  Level 2 6/31 19.4%  Level 1 3/31 9.7%  Level 0 0/31 0%  Online  Level 4 13/110 11.8%  Level 3 2/110 1.8%  Level 2 31/110 28.2%  Level 1 35/110 31.8%  Level 0 29/110 26.4% | make changes after we observe performance with the current curriculum. |

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| **Assessment of Objective 3** The student will  demonstrate knowledge of functions and their graphs by his/her ability to find the zeros of a polynomial function. | Rubric based assessment of related common final exam problems | 70% of students learning at a rubric level of 2 or higher | Jefferson Campus  Level 4 36/116 31.0%  Level 3 29/116 25.0%  Level 2 28/116 24.1%  Level 1 17/116 14.7%  Level 0 6/116 5.2%  Shelby Campus  Level 4 48/168 28.6%  Level 3 35/168 20.8%  Level 2 30/168 17.9%  Level 1 38/168 22.6%  Level 0 17/168 10.1%  Clanton Campus  Level 4 23/99 23.2%  Level 3 22/99 22.2%  Level 2 20/99 20.2%  Level 1 19/99 19.2%  Level 0 15/99 15.2%  Pell City  Level 4 7/31 22.6%  Level 3 12/31 38.7%  Level 2 11/31 35.5%  Level 1 1/31 3.2%  Level 0 0/31 0%  Online  Level 4 9/110 8.2%  Level 3 17/110 15.5%  Level 2 17/110 15.5%  Level 1 215/110 19.1%  Level 0 46/110 41.8% | Schoolwide 65.6% (344/524)  performed at Level 2 or higher.  This year showed a decrease of 7.4% from last year. A change in the prerequisite course for Math 112 may have had the effect that students entering this course are less prepared than in previous years. Another change has occurred in the prerequisite course this year 2018-2019. We will continue to monitor performance this year and seek to make changes after we observe performance with the current curriculum. |

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| **Assessment of Objective 4** The student will  demonstrate knowledge of functions and their graphs by his/her ability to graph transformations of basic functions. | Rubric based assessment of related common final exam problems | 70% of students learning at a rubric level of 2 or higher | Jefferson Campus  Level 4 39/116 33.6%  Level 3 31/116 26.7%  Level 2 20/116 17.2%  Level 1 14/116 12.1%  Level 0 12/116 10.3%  Shelby Campus  Level 4 100/168 59.5%  Level 3 22/168 13.1%  Level 2 23/168 13.7%  Level 1 20/168 11.9%  Level 0 3/168 1.8%  Clanton Campus  Level 4 46/99 46.5%  Level 3 19/99 19.2%  Level 2 30/99 30.3%  Level 1 1/99 1.0%  Level 0 3/99 3.0%  Pell City  Level 4 25/31 80.6%  Level 3 5/31 16.1%  Level 2 1/31 3.2%  Level 1 0/31 0%  Level 0 0/31 0%  Online  Level 4 24/110 21.8%  Level 3 24/110 21.8%  Level 2 37/110 33.6%  Level 1 15/110 13.6%  Level 0 10/110 9.1% | Schoolwide 85.1% (446/524)  performed at Level 2 or higher.  This year showed a decrease of 1.2% from last year. Instructional methods are meeting our success goal of 70%  performing at Level 2 or higher. |
| **Plan submission date: 10/4/2018** | | | **Submitted by: Peggy Thrasher**  **Yu-ing Hargett** | |

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| **Instructional Program Outcomes & Assessment Plan – MTH 113**  **Mathematics Course Level Outcomes Assessment Rubric**  Level 4: Student provides a complete and correct solution process that is well organized, with no errors.  Level 3: Student provides a complete solution process that is well organized, but contains minor errors.  Level 2: Student demonstrates understanding of methods required to produce a correct solution, but the solution process lacks expected organization and/or contains errors deemed more significant.  Level 1: Student attempts a solution, but demonstrates little understanding of methods required to produce a correct solution with expected organization.  Level 0: Student does not attempt a solution.  **General Education Objective**  Students will use abstract ideas, symbols, and fundamental skills of mathematics to analyze and solve problems.  **Evaluated Course Objectives**  The student will demonstrate understanding of concepts, develop competent skills, and demonstrate applications by his/her ability to  1. Graph a given trigonometric function  2. Find the values for trigonometric functions using a right triangle.  3. Perform algebraic operations on vectors.  4. Convert and use the trigonometric form of a complex number.  5. Convert an equation from polar form to rectangular form. | | | | |
| **Intended Outcomes** | **Means of Assessment** | **Criteria for Success** | **Summary & Analysis of Assessment Evidence** | **Use of Results** |
| MTH 113 Objective 1  Graph a given trigonometric function | Rubric based assessment of related common test problems | 70% of students learning at a rubric level of 2 or higher | Jefferson  Level 4: 10/13 = 76.9%  Level 3: 0/13 = 0.0%  Level 2: 0/13 = 0.0%  Level 1: 3/13 = 23.1%  Level 0: 0/13 = 0.0%  Clanton  Level 4: 2/15 = 13.3%  Level 3: 1/15 = 6.7%  Level 2: 10/15 = 66.7%  Level 1: 2/15 = 13.3%  Level 0: 0/15 = 0.0%  Shelby  Level 4: 34/94 = 36.2%  Level 3: 13/94 = 13.8%  Level 2: 14/94 = 14.9%  Level 1: 27/94 = 28.7%  Level 0: 6/94 = 6.4% | 84/122 68.9% of the students assessed performed at level 2 or higher. This is down from the 98/127 76.6% of students performed at level 2 or above last year. Graphing still seems to be a difficult topic for a great number of our students. A suggestion might be to break the question down into parts. The students could identify the period, amplitude, phase shift, and vertical shift, then graph the function or choose the graph of the function. This might help us establish which part of graphing trig functions is giving our students the most difficulty. |
| MTH 113 Objective 2  Find the values for trigonometric functions using a right triangle. | Rubric based assessment of related common test problems | 70% of students learning at a rubric level of 2 or higher | Jefferson  Level 4: 10/13 = 76.9%  Level 3: 1/13 = 7.7%  Level 2: 0/13 = 0.0%  Level 1: 1/13 = 7.7%  Level 0: 1/13 = 7.7%  Clanton  Level 4: 8/15 = 53.3%  Level 3: 2/15 = 13.3%  Level 2: 4/15 = 26.7%  Level 1: 0/15 = 0.0%  Level 0: 1/15 = 6.7%  Shelby  Level 4: 51/94 = 54.3%  Level 3: 17/94 = 18.1%  Level 2: 15/94 = 16.0%  Level 1: 10/94 = 10.6%  Level 0: 1/94 = 1.1% | 108/122 88.5% of the students that were assessed performed at level 2 or higher. This is slightly up from the 112/128 87.5% of students that scored at level 2 or higher in the pervious year. The increase is not significant from last year to this year. It bears noticing that most of the students in the class on the Jefferson campus got this question correct. Maybe collaboration between the math 113 instructors might help raise the success rate on the other campuses. It would be interesting to see how this topic is taught on the Jefferson campus. |
| MTH 113 Objective 3  Perform algebraic operations on vectors. | Rubric based assessment of related common test problems | 70% of students learning at a rubric level of 2 or higher | Jefferson  Level 4: 13/13 = 100%  Level 3: 0/13 = 0.0%  Level 2: 0/13 = 0.0%  Level 1: 0/13 =0.0%  Level 0: 0/13 = 0.0%  Clanton  Level 4: 11/15 = 73.3%  Level 3: 1/15 = 6.7%  Level 2: 1/15 = 6.7%  Level 1: 1/15 = 6.7%  Level 0: 1/15 = 6.7%  Shelby  Level 4: 72/94 = 76.6%  Level 3: 10/94 = 10.6%  Level 2: 7/94 = 7.4%  Level 1: 3/94 = 3.2%  Level 0: 2/94 = 2.1% | 114/122 94.4% of the students assessed performed at level 2 or higher. This is not a significant increase from the 119/128 93% that scored at level 2 or higher last year. This is not a difficult topic for our students. Our suggestion is still to urge students to check their work on these types of questions. |
| MTH 113 Objective 4  Convert and use the trigonometric form of a complex number. | Rubric based assessment of related common test problems | 70% of students learning at a rubric level of 2 or higher | Jefferson  Level 4: 8/13 = 61.5%  Level 3: 1/13 = 7.7%  Level 2: 2/13 = 15.4%  Level 1: 0/13 = 0.0%  Level 0: 2/13 = 15.4%  Clanton  Level 4: 4/15 = 26.7%  Level 3: 2/15 = 13.3%  Level 2: 3/15 = 20.0%  Level 1: 5/15 = 33.3%  Level 0: 1/15 = 6.7%  Shelby  Level 4: 25/94 = 26.6%  Level 3: 13/94 = 13.8%  Level 2: 5/94 = 5.3%  Level 1: 27/94 = 28.7%  Level 0: 24/94 = 25.5% | 63/122 51.6% of the students that were assessed scored at a level 2 or higher. This is down from the 81/128 63.3% of students that scored at level 2 or higher. Even though this topic is generally taught at the end of the semester, the students seem to struggle with this on the final exam. The question requires a lot of steps to answer it one hundred percent correctly. Maybe the question can be simplified without changing the objective. |
| MTH 113 Objective 5  Convert an equation from polar form to rectangular form. | Rubric based assessment of related common final exam problems | 70% of students learning at a rubric level of 2 or higher | Jefferson  Level 4: 5/13 = 38.5%  Level 3: 1/13 = 7.7%  Level 2: 1/13 = 7.7%  Level 1: 4/13 = 30.8%  Level 0: 2/13 = 15.4%  Clanton  Level 4: 4/15 = 26.7%  Level 3: 0/15 = 0.0%  Level 2: 4/15 = 26.7%  Level 1: 3/15 = 20.0%  Level 0: 4/15 = 26.7%  Shelby  Level 4: 60/94 = 63.8%  Level 3: 4/94 = 4.3%  Level 2: 4/94 = 4.3%  Level 1: 20/94 = 21.3%  Level 0: 6/94 = 6.4% | 83/122 68% of the students that were assessed performed at level 2 or higher. This is slightly down from 90/128 70.3% of students that scored at level 2 or higher last year. Our suggestion is giving the students a formula sheet for polar to rectangular trig equation conversions. |
| **Plan submission date:** | | | **Submitted by: Corey Kline** | |

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| **Instructional Program Outcomes & Assessment Plan – MTH 116**  **Mathematics Course Level Outcomes Assessment Rubric**  Level 4: Student provides a complete and correct solution process that is well organized, with no errors.  Level 3: Student provides a complete solution process that is well organized, but contains minor errors.  Level 2: Student demonstrates understanding of methods required to produce a correct solution, but the solution process lacks expected organization and/or contains errors deemed more significant.  Level 1: Student attempts a solution, but demonstrates little understanding of methods required to produce a correct solution with expected organization.  Level 0: Student does not attempt a solution.  **General Education Objective**  Students will use abstract ideas, symbols, and fundamental skills of mathematics to analyze and solve problems.  **Evaluated Course Objectives**  The student will demonstrate knowledge of functions and their graphs by his/her ability to  1. Solve a linear equation in one variable  2. Calculate the volume of a solid object or container  3. Calculate percentage | | | | |
| **Intended Outcomes** | **Means of Assessment** | **Criteria for Success** | **Summary & Analysis of Assessment Evidence** | **Use of Results** |
| **Assessment of Objective 1**  Solve a linear equation in one variable | Rubric based assessment of related common final exam problems | 70% of students learning at a rubric level of 2 or higher | Jefferson Campus  Level 4 8/12 66.67%  Level 3 0/12 0.00%  Level 2 3/12 25.00%  Level 1 0/12 0.0%  Level 0 1/12 8.33%  Shelby Campus  Level 4 18/47 38.29%  Level 3 0/47 0.0%  Level 2 21/47 34.68%  Level 1 8/47 17.03%  Level 0 0/47 0.00% | 84.75% of the students performed at level 2 or higher. This is down from the 90.8% that performed at level 2 or higher last year. And down further still from the from 93% that achieved at level 2 two years ago.  Difficulties with student performance for this objective persist.  A cursory look at the student demographic of the online classes, that comprise the bulk of the data, indicates an increase in mature students that have been away from school for a long time. It would be beneficial to investigate with greater detail if this is indeed a factor for the lower aggregates. |
| **Assessment of Objective 2**  Calculate the volume of a solid object or container |  |  | Jefferson Campus  Level 4 6/12 50.00%  Level 3 0/12 0.00%  Level 2 4/12 33.33%  Level 1 0/12 0.00%  Level 0 2/12 16.67%  Shelby Campus  Level 4 25/47 53.19%  Level 3 0/47 0.0%  Level 2 18/ 47 38.29%  Level 1 3/47 6.38%  Level 0 0/47 0.00% | 89.83% of the students performed at level 2 or higher. This is up from the 87.4% that performed at level 2 or higher last year. And up from 77.5% two years ago.  Improvement in performance may be attributed to the addition of solved examples of similar problem type and emphasis on the use and conversion of units in performing the calculations. |
| **Assessment of Objective 3**  Calculate percentage. |  |  | Jefferson Campus  Level 4 7/12 58.33%  Level 3 0/12 0.0%  Level 2 3/12 25.00%  Level 1 0/12 0.0%  Level 0 2/12 16.67%  Shelby Campus  Level 4 26/47 55.32%  Level 3 0/47 0.0%  Level 2 17/47 36.17%  Level 1 4/47 8.51%  Level 0 0/47 0.00% | 89.83 performed at level 2 or higher. Performance for this objective is nearly identical as the 90.8% that performed at level 2 or higher last year. However, this is still a significant improvement from 2 years ago, where 84.5% of the students achieved at level 2 or higher.  Supplemental material will be provided in the form of solved examples and notes to include in the lecture and performance results for the next cycle will be compared to the current to assess efficacy. |
| **Plan submission date: 10/8/18** | **Submitted by: K. Theodorou** | |  |  |
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| **Instructional Program Outcomes & Assessment Plan – MTH 120**  **General Education Objective**  Students will use abstract ideas, symbols, and fundamental skills of mathematics to analyze and solve problems.  **Department Outcomes**   * Provide freshman and sophomore-level courses in Chemistry, Mathematics, Physics, Physical Sciences, and Astronomy, with emphasis on critical thinking and analytical ability, that are transferable to public institutions of higher learning. * Offer an appropriate remedial mathematics program accommodating various skill levels. * Develop and provide courses relevant to the career and professional degree programs of the college.   **Mathematics Course Level Outcomes Assessment Rubric**  Level 4: Student provides a complete and correct solution process that is well organized, with no errors.  Level 3: Student provides a complete solution process that is well organized, but contains minor errors.  Level 2: Student demonstrates understanding of methods required to produce a correct solution, but the solution process lacks expected organization and/or contains errors deemed more significant.  Level 1: Student attempts a solution, but demonstrates little understanding of methods required to produce a correct solution with expected organization.  Level 0: Student does not attempt a solution.  **Evaluated Course Objectives**  The student will demonstrate understanding of concepts, develop competent skills, and demonstrate applications by his/her ability to  1. Find an equation of the tangent line to the graph of a given function at a specified point  2. Solve a related rates problem  3. Find the absolute extrema of a given function  4. Solve an initial value problem  5. Determine the Consumers’ and Producers’ Surplus | | | | |
| **Intended Outcomes** | **Means of Assessment** | **Criteria for Success** | **Summary & Analysis of Assessment Evidence**  **Notes: Course is not offered at unlisted campuses** | **Use of Results** |
| MTH 120 Objective 1  The student will demonstrate understanding of concepts, develop competent skills, and demonstrate applications by his/her ability to find an equation of the tangent line to the graph of a given function at a specified point | Rubric based assessment of related common final exam problems | 70% of students learning at a rubric level of 2 or higher | Online  Level 4 9/37 24.3%  Level 3 4/37 10.8%  Level 2 8/37 21.6%  Level 1 16/37 43.2%  Level 0 0/37 0% | Overall, 56.8% of students assessed are learning at level 2 or higher, a 12.5% decrease from the previous year (69.3%). It is noted that majority of the students are transient students during the summer of 2018 (81% of data are derived from the summer semester) with various math background, some of which are very weak while 100% of the students from the fall semester (mostly Jeff State students) are learning at level 2 or higher.  Continuous monitoring of student performance is required to complete further assessment. |
| MTH 120 Objective 2  The student will demonstrate understanding of concepts, develop competent skills, and demonstrate applications by his/her ability to solve a related rates problem | Rubric based assessment of related common final exam problems | 70% of students learning at a rubric level of 2 or higher | Online  Level 4 2/37 5.4%  Level 3 1/37 2.7%  Level 2 24/37 64.9%  Level 1 10/37 27.0%  Level 0 0/37 0% | Overall, 73% of students assessed are learning at level 2 or higher in learning objective 2 concept, a slight decrease (3.9%) from the previous year. However, the result still met the criteria for success.  Replacement of common final problem for this objective should be considered to accurately assess student learning of this topic. |
| MTH 120 Objective 3  The student will demonstrate understanding of concepts, develop competent skills, and demonstrate applications by his/her ability to find the absolute extrema of a given function | Rubric based assessment of related common final exam problems | 70% of students learning at a rubric level of 2 or higher | Online  Level 4 4/37 10.8%  Level 3 5/37 13.5%  Level 2 15/37 40.5%  Level 1 13/37 35.1%  Level 0 0/37 0% | Overall, 64.8% of students assessed are learning at level 2 or higher (down 12.2% from previous year) in learning objective 3 concept.  It is once again noted that majority of the students are transient students during the summer of 2018 (81% of data are derived from the summer semester) with various math background, some of which are very weak while 100% of the students from the fall semester (mostly Jeff State students) are learning at level 2 or higher.  Continuous monitoring of student performance is required to complete further assessment. |
| MTH 120 Objective 4  The student will demonstrate understanding of concepts, develop competent skills, and demonstrate applications by his/her ability to solve an initial value problem | Rubric based assessment of related common final exam problems | 70% of students learning at a rubric level of 2 or higher | Online  Level 4 14/37 37.8%  Level 3 1/37 2.7%  Level 2 8/37 21.6%  Level 1 14/37 37.8%  Level 0 0/37 0% | Overall, 62.1% of students assessed are learning at level 2 or higher which was a decrease from the previous year (down 14.8%).  It is noted again that majority of the students are transient students during the summer of 2018 (81% of data are derived from the summer semester) with various math background, some of which are very weak while 85.7% of the students from the fall semester (mostly Jeff State students) are learning at level 2 or higher.  Continuous monitoring of student performance is required to complete further assessment. |
| MTH 120 Objective 5  The student will demonstrate understanding of concepts, develop competent skills, and demonstrate applications by his/her ability to  determine the Consumers’ and Producers’ Surplus | Rubric based assessment of related common final exam problems | 70% of students learning at a rubric level of 2 or higher | Online  Level 4 5/37 13.5%  Level 3 1/37 2.7%  Level 2 5/37 13.5%  Level 1 26/37 70.3%  Level 0 0/37 0% | 29.7% of students assessed are learning at level 2 or higher indicating students’ continued difficulty in learning objective 5 concept. The success rate is decreased from the previous academic year (down from 15%). However, most students demonstrated inability to recall necessary formulas to complete this objective due to fatigue since the material was presented in later chapters.  The importance of working through the related homework will be emphasized to help students better retain the formulas and complete the objective. |
| **Plan submission date: October 2, 2018** | | | **Submitted by: Yu-ing Hargett** | |

**Instructional Program Outcomes & Assessment Plan – MTH 227**

**Mathematics Course Level Outcomes Assessment Rubric**

Level 4: Student provides a complete and correct solution process that is well organized, with no errors.

Level 3: Student provides a complete solution process that is well organized, but contains minor errors.

Level 2: Student demonstrates understanding of methods required to produce a correct solution, but the solution process lacks expected organization and/or contains errors deemed more significant.

Level 1: Student attempts a solution, but demonstrates little understanding of methods required to produce a correct solution with expected organization.

Level 0: Student does not attempt a solution.

**General Education Objective**

Students will use abstract ideas, symbols, and fundamental skills of mathematics to analyze and solve problems.

**Evaluated Course Objectives**

The General Educational Objective is met through the course objectives which require use of mathematical concepts, notations, and manipulations necessary in students’ field of study. Student mastery of the specific course objectives that follow will be evaluated by analyzing solutions for appropriate problems from the comprehensive final exam. The final exam will not be a multiple-choice exam. Students are required to show all of their work and will be graded on the quality of their technique, notation, and accuracy.

The student will demonstrate knowledge of calculus by his/her ability to

1. Find the equation of a plane.
2. Compute the directional derivative of a function.
3. Set up and evaluate a double integral.

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| **Intended Outcomes** | **Means of Assessment** | **Criteria for Success** | **Summary & Analysis of Assessment Evidence** | **Use of Results** |
| MTH 227 Objective 1  The student will demonstrate knowledge of the methods presented in this course by his/her ability to find the equation of a plane. | Rubric based assessment of related common final exam problems | 70% of students learning at a rubric level of 2 or higher | Jefferson Campus  Level 4 12/21 57.1%  Level 3 4/21 19.0%  Level 2 3/21 14.3%  Level 1 1/21 4.8%  Level 0 1/21 4.8%  Shelby Campus  Level 4 9/21 42.9%  Level 3 8/21 38.1%  Level 2 4/21 19.0%  Level 1 0/21 0.0%  Level 0 0/21 0.0% | 95.2% (40/42) performed at Level 2 or higher. Up slightly from 90.3% last year. The overall percentage of students that scored at level 2 or higher increased slightly this academic year. Our recommendation is to continue what we are currently doing with this topic. |

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| MTH 227 Objective 2  The student will demonstrate knowledge of the methods presented in this course by his/her ability to compute the directional derivative of a function. | Rubric based assessment of related common final exam problems | 70% of students learning at a rubric level of 2 or higher | Jefferson Campus  Level 4 11/21 52.4%  Level 3 6/21 28.6%  Level 2 3/21 14.3%  Level 1 0/21 0.0%  Level 0 1/21 4.7%  Shelby Campus  Level 4 13/21 62.0%  Level 3 4/21 19.0%  Level 2 4/21 19.0%  Level 1 0/21 0.0%  Level 0 0/21 0.0% | 97.6% (41/42) performed at Level 2 or higher. Up from 93.5% last year. The overall percentage of students that scored at level 2 or higher increased this academic year. Our recommendation is to continue what we are currently doing with this topic. |

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| MTH 227 Objective 3  The student will demonstrate knowledge of the methods presented in this course by his/her ability set up and evaluate a double integral. | Rubric based assessment of related common final exam problems | 70% of students learning at a rubric level of 2 or higher | Jefferson Campus  Level 4 11/21 56.2%  Level 3 5/21 25.0%  Level 2 2/21 12.5%  Level 1 2/21 06.3%  Level 0 1/21 00.0%  Shelby Campus  Level 4 9/21 42.8%  Level 3 6/21 28.6%  Level 2 6/21 28.6%  Level 1 0/21 0.0%  Level 0 0/21 0.0% | 93.5% (39/42) performed at Level 2 or higher. Up from 91% last year. The overall percentage of students that scored at level 2 or higher increased this academic year. Our recommendation is to continue what we are currently doing with this topic. |

**Instructional Program Outcomes & Assessment Plan – MTH 238**

**Mathematics Course Level Outcomes Assessment Rubric**

Level 4: Student provides a complete and correct solution process that is well organized, with no errors.

Level 3: Student provides a complete solution process that is well organized, but contains minor errors.

Level 2: Student demonstrates understanding of methods required to produce a correct solution, but the solution process lacks expected organization and/or contains errors deemed more significant.

Level 1: Student attempts a solution, but demonstrates little understanding of methods required to produce a correct solution with expected organization.

Level 0: Student does not attempt a solution.

**General Education Objective**

Students will use abstract ideas, symbols, and fundamental skills of mathematics to analyze and solve problems.

**Evaluated Course Objectives**

The General Educational Objective is met through the course objectives which require use of mathematical concepts, notations, and manipulations necessary in students’ field of study. Student mastery of the specific course objectives that follow will be evaluated

by analyzing solutions for appropriate problems from the comprehensive final exam. The final exam will not be a multiple-choice exam. Students are required to show all of their work and will be graded on the quality of their technique, notation, and accuracy.

The student will demonstrate knowledge of the methods presented in this course by his/her ability to

1. Use an integrating factor to solve a first order linear equation.
2. Solve second order linear homogeneous equations with constant coefficients.
3. Use the Laplace transform to solve a given initial valve problem.

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| **Intended Outcomes** | **Means of Assessment** | **Criteria for Success** | **Summary & Analysis of Assessment Evidence** | **Use of Results** |
| MTH 238 Objective 1  The student will demonstrate knowledge of the methods presented in this course by his/her ability to use an integrating factor to solve a first order linear equation. | Rubric based assessment of related common final exam problems | 70% of students learning at a rubric level of 2 or higher | Jefferson Campus  Level 4 4/7 57.1%  Level 3 3/7 42.9%  Level 2 0/7 0.0%  Level 1 0/7 0.0%  Level 0 0/7 0.0%  Shelby Campus  Level 4 6/13 46.1%  Level 3 5/13 38.5%  Level 2 1/13 7.7%  Level 1 0/13 0.0%  Level 0 1/13 7.7% | 95.0% (19/20)  performed at Level 2 or higher. Up from 85% last year. The overall percentage of students that scored at level 2 or higher increased during this academic year. Our recommendation is to continue what we are currently doing with this topic. |

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| MTH 238 Objective 2  The student will demonstrate knowledge of the methods presented in this course by  his/her ability to solve second order linear homogeneous equations with constant coefficients. | Rubric based assessment of related common final exam problems | 70% of students learning at a rubric level of 2 or higher | Jefferson Campus  Level 4 3/7 42.9%  Level 3 4/7 57.1%  Level 2 0/7 0.0%  Level 1 0/7 0.0%  Level 0 0/7 0.0%  Shelby Campus  Level 4 7/13 53.8%  Level 3 4/13 30.8%  Level 2 0/13 0.0%  Level 1 2/13 15.4%  Level 0 0/13 0.0% | 90.0% (18/20) performed at Level 2 or higher. Up from 85% last year. The overall percentage of students that scored at level 2 or higher increased this academic year. Our recommendation is to continue what we are currently doing with this topic. |

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| MTH 238 Objective 3  The student will demonstrate knowledge of the methods presented in this course by his/her ability to use the Laplace transform to solve a given initial valve problem. | Rubric based assessment of related common final exam problems | 70% of students learning at a rubric level of 2 or higher | Jefferson Campus  Level 4 3/7 42.9%  Level 3 3/7 42.9%  Level 2 1/7 14.2%  Level 1 0/7 0.0%  Level 0 0/7 0.0%  Shelby Campus  Level 4 6/13 46.2%  Level 3 4/13 30.8%  Level 2 2/13 15.4%  Level 1 1/13 7.7%  Level 0 0/13 0.0% | 95.0% (19/20) performed at Level 2 or higher.  Down from 85% last year. The overall percentage of students that scored at level 2 or higher declined this academic year. Our recommendation is to continue what we are currently doing with this topic. |

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| **Instructional Program Outcomes & Assessment Plan – MTH 265**  **Mathematics Course Level Outcomes Assessment Rubric**  Level 4: Student provides a complete and correct solution process that is well organized, with no errors.  Level 3: Student provides a complete solution process that is well organized, but contains minor errors.  Level 2: Student demonstrates understanding of methods required to produce a correct solution, but the solution process lacks expected organization and/or contains errors deemed more significant.  Level 1: Student attempts a solution, but demonstrates little understanding of methods required to produce a correct solution with expected organization.  Level 0: Student does not attempt a solution.  **General Education Objective**  Students will use abstract ideas, symbols, and fundamental skills of mathematics to analyze and solve problems.  **Evaluated Course Objectives**  The General Educational Objective is met through the course objectives which require use of mathematical concepts, notations, and manipulations necessary in students’ field of study. Student mastery of the specific course objectives that follow will be evaluated  by analyzing solutions for appropriate problems from the comprehensive final exam. The final exam will not be a multiple choice exam. Students are required to show all of their work and will be graded on the quality of their technique, notation, and accuracy. The student will demonstrate knowledge of the methods presented in this course by his/her ability to   1. Calculating variance and standard deviation for a set of sample data 2. Estimating an interval for the true mean from a set of sample data 3. Set up and conduct a statistical test for the mean |

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| **Intended Outcomes** | **Means of Assessment** | **Criteria for Success** | **Summary & Analysis of Assessment Evidence** | **Use of Results** |
| MTH 265 Objective 1  Calculating variance and standard deviation for a set of sample data | Rubric based assessment of 1 related common final exam problem | 70% of students learning at a rubric level of 2 or higher | Shelby Online  Level 4 -97 /152 63.82%  Level 3 - 0/152 0.00%  Level 2 - 39/152 25.66%  Level 1 - 11/152 7.24%  Level 0 - 5/152 3.29%  Jefferson/Shelby Video Conference  Level 4 - 6/18 33.33%  Level 3 - 0/18 0.00%  Level 2 -10/18 55.56%  Level 1 - 2/18 11.11%  Level 0 - 0/18 0.00% | 89.4% of the students scored at level 2 or higher. This is down from 96.1% of the students scoring at level 2 or higher last year. And down from the 93% success 2 years ago.  The critical difference in the success is shown in the online classes. We have been using Hawkes learning instead of Webassign this year for the online stats. The students seem to struggle more with the style of learning on Hawkes but we think that the students actually grasp concepts more thoroughly using this software. We are considering going back to WebAssign for the online statistics classes. |
| MTH 265 Objective 2  Estimating an interval for the true mean from a set of sample data | Rubric based assessment of 1 related common final exam problem | 70% of students learning at a rubric level of 2 or higher | Shelby Online  Level 4 - 107/152 70.39%  Level 3 - 15/152 9.8%  Level 2 - 23/152 15.13%  Level 1 - 7/152 4.60%  Level 0 - 0/152 0.00%  Jefferson/Shelby Video Conference  Level 4 - 9/18 50%  Level 3 - 0/18 0.00%  Level 2 -5 /18 26.78%  Level 1 -3 /18 16.67%  Level 0 - 1/18 5.56% | 93.5 of the students that were evaluated scored at level 2 or higher. This is slightly down from the 94.4 % of the students that achieved success last year, but it is still an improvement on the 88.8% that achieved success two years ago. We have noticed that changing the software did not seem to affect the success in our online classes too dramatically. We believe that this particular topic is not difficult for the students to grasp as a whole and they usually have great success on this objective. We believe that the students that did not do well on this objective simply did not try. |
| MTH 265 Objective 3  Set up and conduct a statistical test for the mean | Rubric based assessment of 1 related common final exam problem. | 70% of students learning at a rubric level of 2 or higher | Shelby  Level 4 - 95/152 62.5%  Level 3 - 13/152 8.55%  Level 2 - 17/152 11.18%  Level 1 - 24/152 15.79%  Level 0 - 3/152 5.2%  Jefferson/Shelby Video Conference  Level 4 - 7/18 38.89%  Level 3 - 3/18 16.67%  Level 2 - 4/18 22.22%  Level 1 -3 /18 0.00%  Level 0 -1 /18 5.56% | 81.8% of the students tested achieved at level 2 or higher this is down from 94.8% assessed 2 years ago. This is a difficult concept, in itself, but again; changing the instructional material has likely affected the success of this student learning outcome.  We would still like to further explore using the Hawkes Learning program for some of the stats courses. |

Prepared by C.Kline and K. Theodorou

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| **Course Student Learning Outcomes & Assessment Plan PHY 201 General Physics with Trigonometry**  General Education Outcome  1. Provide freshman and sophomore-level courses in Chemistry, Mathematics, Physics, Physical Sciences, and Astronomy, with emphasis on critical thinking and analytical ability, that are transferable to public institutions of higher learning.  2. Offer an appropriate developmental mathematics program accommodating various skill levels.  3. Develop and provide courses relevant to the career and professional degree programs of the college.  Department Level Student Learning Outcomes   1. Students will acquire content knowledge of the physical sciences and mathematics. 2. Students will develop problem solving and critical thinking skills. 3. Students will be prepared to use mathematics in other disciplines.   Course Objective Assessed  The student will demonstrate fundamental skills of physics and mathematics to solve problems by his/her ability to   1. Understand Newton’s laws and attendant concepts will apply these in appropriate situations. 2. Understand energy and momentum and be able to apply these concepts to describing the behavior of system of particles. 3. Understand and be able to apply principles relating to the macroscopic properties of matter (State and apply Archimedes’ Principle and Bernoulli’s relation in problem situations.   The rubric used follows the assessment results. |

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|  | 3 points | 2 points | 1 points | 0 points |
| **Physics approach** | The physics approach is appropriate and complete | The physics approach contains minor omissions or errors | Some concepts and principles of the physics approach are missing/or inappropriate | Most physics approach is missing and/or inappropriate |
| **Specific Application of physics** | The specific application of physics is appropriate and complete | The specific application of physics contains minor omissions or errors | Parts of the specific application of physics are missing and/or contain errors | Most of the specific application of physics is missing and/or contains errors |
| **Mathematical procedure** | The mathematical procedures are appropriate and complete | Appropriate mathematical procedures are used with minor omissions or errors | Parts of the mathematical procedures are missing and/or contains errors | Most of the mathematical procedures are missing and/or contain errors |
| **Logical progress** | The entire solution is clear, focused and logically connected | The solution is clear and focused with minor inconsistencies | Parts of the solution are unclear, unfocused, and/or inconsistent | Most of the solution parts are unclear, unfocused, and/or inconsistent |

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| **Instructional Program Outcomes & Assessment Plan** | | | | |
| **Intended Outcomes** | **Means of Assessment** | **Criteria for Success** | **Summary & Analysis of Assessment Evidence** | **Use of Results** |
| Summary of Fall 2016 & Spring 2017 PHY 201 Objectives 1-3 | Rubric based assessment of related final exam problems. | At least 70% of students will produce solutions at rubric level 2 or higher. | |  | | --- | |  |   Number of Students Assessed  Fall 2017 — 1 section / 17 Students, Spring 2018 – 1 section /5  20 final exam questions related to the three objectives were assessed, and the number of solutions at each rubric level identified.   * 40 responses to problems related to objective 1 were assessed. * 37 responses to problems related to objective 2 were assessed. * 59 responses to problems related to objective 3 were assessed.   Level 3 – 77 (56.6%)  Level 2 - 9 (6.6%)  Level 1 – 32 (23.5%)  Level 0 – 18 (13.2%)  63.2% of solutions related to PHY201 objectives 1-3 were assessed at rubric level 2 or higher. | 63.2% of solutions related to PHY201 objectives 1-3 were assessed at rubric level 2 or higher which is not close to the success criteria set by the department. This is slightly better than the previous assessment of 60.8%. To improve the situation as it was noted in the last assessment, there is a need to:  1. Make sure that the students taking the course have the required pre-requisite mathematics courses.  2. Ensure that the assessment focuses on the goal of students developing problem solving, conceptual understanding and critical thinking skills rather than calculational skills.  Instructor’s comments are incorporated in the individual objectives which follow below.  Also, it is worthwhile to mention that, as a pilot this course was combined with PHY 213S which is calculus based of the same concepts. Some colleges do this combination to deal with the enrollment. None of the courses will make it alone. This was not our situation. PHY 213S was making it on its own. There was a request from a few students for PHY 201 and therefore we combined. In the beginning it was going smoothly. Later, there was some difficulty because of the miss-match of the concepts in the textbooks. Even if the principle author in both books is the same, there is some rearrangement of the topics in PHY 201 which caused some difficulty on the part of the instructor. As far as what the students think, we must wait for the transcript of their evaluations of the course. Having said that, this instructor does not recommend this combination. |
| PHY 201 Objective 1  1. Understand Newton’s laws and attendant concepts will apply these in appropriate situations. | Rubric based assessment of related final exam problems. | |  | | --- | |  | | | |   At least 70% of students will produce solutions at  Rubric level 2 or higher | Fall 2017 – Spring 2018  Number of Students Assessed  Fall 2017-Spring 2018, 2 sections / 22 Students  40 responses to related final exam questions were assessed, and the number of solutions at each rubric level identified.  Level 3 — 26 (65%)  Level 2 — 0 (0.0%)  Level 1— 7 (17.5%)  Level 0 — 7 (17.5%)  65% of solutions related to PHY 201 objective 1 were assessed at rubric level 2 or higher. | 65% of solutions related to PHY 201 objective 1 were assessed at rubric level 2 or higher which is close to the criteria for success.  35% at levels 0 and 1 combined, is very high. Fundamental ideas of the 2nd law of Newton must be emphasize. At least 5 multi-steps problems using Newton’s Laws of motion with emphasis on the use of the results of Physics Education Research must be worked out every term. |
| 2. Understand energy and momentum and be able to apply these concepts to describing the behavior of system of particles. | Rubric based assessment of related final exam problems. | At least 70% of students will produce solutions at  Rubric level 2 or higher | Fall 2017 – Spring 2018  Number of Students Assessed  Fall 2017-Spring 2018, 2 sections / 22 Students  37 responses to related final exam questions were assessed, and the number of solutions at each rubric level identified.  Level 3 — 27(72.9%)  Level 2 — 1(2.7%)  Level 1— 8 (29.6%)  Level 0 — 1 (2.7%)  75.7% of solutions related to PHY 201 objective 1 were assessed at rubric level 2 or higher. | 75.7% of solutions related to PHY 201 objective 2 were assessed at rubric level 2 or higher.  Even though the goal is met, it is necessary to review Energy & Momentum around the end of the term. Students have tendency to forget the concepts discussed earlier in the term. |
| 3. Understand and be able to apply principles relating to the macroscopic properties of matter (State and apply Archimedes’ Principle and Bernoulli’s relation in problem situations. | Rubric based assessment of related final exam problems. | At least 70% of students will produce solutions at  Rubric level 2 or higher | Fall 2017 - Spring 2018  Number of Students Assessed  Fall 2017-Spring 2018, 2 sections / 20 Students  59 responses to related final exam questions were assessed, and the number of solutions at each rubric level identified.  Level 3 — 24 (40.7%)  Level 2 —8 (13.5%)  Level 1—17 (28.8%)  Level 0 — 10 (16.9%)  54.2% of solutions related to PHY 201 objective 1 were assessed at rubric level 2 or higher. | 54.2% of solutions related to PHY 201 objective 3 were assessed at rubric level 2 or higher which is nowhere near the expected criteria for success. This is slightly better than last period’s results.  Must be able to cover the concepts of Bernoulli’s principle. Again, high percentages at levels 0 and 1 must be improved.  The missing improvement in this goal is that in order to have students to understand better Bernoulli’s principle a set of 10 problems were given for them to work out.  This was done for the smaller group in the spring 2018. It made a big difference but because the group was small, it did not make a big difference in the aggregate. This activity should be followed in the future offerings. |
| **Plan submission date: 9/25/2018** | | | **Submitted by: Ali Yazdi** | |

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| **Course Student Learning Outcomes & Assessment Plan PHY 202 General Physics with Trigonometry**  General Education Outcome  1. Provide freshman and sophomore-level courses in Chemistry, Mathematics, Physics, Physical Sciences, and Astronomy, with emphasis on critical thinking and analytical ability, that are transferable to public institutions of higher learning.  2. Offer an appropriate developmental mathematics program accommodating various skill levels.  3. Develop and provide courses relevant to the career and professional degree programs of the college.  Department Level Student Learning Outcomes   1. Students will acquire content knowledge of the physical sciences and mathematics. 2. Students will develop problem solving and critical thinking skills. 3. Students will be prepared to use mathematics in other disciplines.   Course Objective Assessed  The student will demonstrate fundamental skills of physics and mathematics to solve problems by his/her ability to   1. Understanding of waves and oscillations. 2. Ability to apply Kirchhoff’s Rules. 3. Understand the concepts of Electric and Magnetic fields. 4. Understand the basic principles of reflection and refraction in Geometrical Optics.   The rubric used follows the assessment results. |

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|  | 3 points | 2 points | 1 points | 0 points |
| **Physics approach** | The physics approach is appropriate and complete | The physics approach contains minor omissions or errors | Some concepts and principles of the physics approach are missing/or inappropriate | Most physics approach is missing and/or inappropriate |
| **Specific Application of physics** | The specific application of physics is appropriate and complete | The specific application of physics contains minor omissions or errors | Parts of the specific application of physics are missing and/or contain errors | Most of the specific application of physics is missing and/or contains errors |
| **Mathematical procedure** | The mathematical procedures are appropriate and complete | Appropriate mathematical procedures are used with minor omissions or errors | Parts of the mathematical procedures are missing and/or contains errors | Most of the mathematical procedures are missing and/or contain errors |
| **Logical progress** | The entire solution is clear, focused and logically connected | The solution is clear and focused with minor inconsistencies | Parts of the solution are unclear, unfocused, and/or inconsistent | Most of the solution parts are unclear, unfocused, and/or inconsistent |

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| **Instructional Program Outcomes & Assessment Plan** | | | | | | |
| **Intended Outcomes** | | **Means of Assessment** | **Criteria for Success** | | **Summary & Analysis of Assessment Evidence** | **Use of Results** |
| Summary of Fall 2017 & Spring 2018 PHY 201 Objectives 1-3 | | Rubric based assessment of related final exam problems. | At least 70% of students will produce solutions at rubric level 2 or higher. | | |  | | --- | |  |   Number of Students Assessed  Fall 2017 — 0 section  Spring 2018 – 1 section /5  20 final exam questions related to the three objectives were assessed, and the number of solutions at each rubric level identified.   * 5 responses to problems related to objective 1 were assessed. * 5 responses to problems related to objective 2 were assessed. * 20 responses to problems related to objective 3 were assessed. * 9 responses to problems related to objective 4 were assessed.   Level 3 – 13(33.3%)  Level 2 - 8 (20.5%)  Level 1 – 10 (25.6%)  Level 0 – 8 (20.5%)  53.8% of solutions related to PHY202 objectives 1-3 were assessed at rubric level 2 or higher. | 53.8% of solutions related to PHY202 objectives 1-3 were assessed at rubric level 2 or higher which is not close to the success criteria set by the department. To improve the situation, there is a need to:  1. Make sure that the students taking the course have the required pre-requisite mathematics courses.  2. Ensure that the assessment focuses on the goal of students developing problem solving, conceptual understanding and critical thinking skills rather than calculational skills.  Instructor’s comments are incorporated in the individual objectives which follow below.  This small group of 5 is not statistically a desirable sample to measure the criteria for success. However, it is helpful to make the necessary changes for future offerings.  **The time that was spent on the thermodynamics concepts were excessive. In the future, less time should be devoted on these topics and more on Electricity, Magnetism and Light.** |
| PHY 202 Objective 1  1. Understanding of waves and oscillations. | | Rubric based assessment of related final exam problems. | |  | | --- | |  | | | |   At least 70% of students will produce solutions at  Rubric level 2 or higher | | Fall 2017 – Spring 2018  Number of Students Assessed  Fall 2017 — 0 section  Spring 2018 – 1 section /5  5 responses to related final exam questions were assessed, and the number of solutions at each rubric level identified.  Level 3 — 3 (60%)  Level 2 — 0 (0.0%)  Level 1— 2 (40%)  Level 0 — 0 (0%)  60% of solutions related to PHY 202 objective 1 were assessed at rubric level 2 or higher. | 60% of solutions related to PHY 202 objective 1 were assessed at rubric level 2 or higher which is close to the criteria for success.  40% at levels 0 and 1 combined, is very high.  At least 5 multi-steps problems using waves and oscillations with emphasis on the use of the results of Physics Education Research must be worked out every term. |
| 2. Ability to apply Kirchhoff’s rules. | | Rubric based assessment of related final exam problems. | At least 70% of students will produce solutions at  Rubric level 2 or higher | | Fall 2017 – Spring 2018  Number of Students Assessed  Fall 2017 — 0 section  Spring 2018 – 1 section /5  5 responses to related final exam questions were assessed, and the number of solutions at each rubric level identified.  Level 3 — 0(0%)  Level 2 — 1(20%)  Level 1— 2(40%)  Level 0 — 2 (40%)  20% of solutions related to PHY 202 objective 1 were assessed at rubric level 2 or higher. | 20% of solutions related to PHY 201 objective 2 were assessed at rubric level 2 or higher.  It is necessary to review Kirchhoff’s rules at the end of the term. Students have tendency to forget the concepts discussed earlier in the term. At least 3 problems should be worked out to demonstrate the application of these rules. |
| 3. Understanding of the concepts of Electric and Magnetic Fields. | | Rubric based assessment of related final exam problems. | At least 70% of students will produce solutions at  Rubric level 2 or higher | | Fall 2017 - Spring 2018  Number of Students Assessed  Fall 2017 — 0 section  Spring 2018 – 1 section /5  20 responses to related final exam questions were assessed, and the number of solutions at each rubric level identified.  Level 3 — 4 (20%)  Level 2 —4 (20%)  Level 1—6 (30%)  Level 0 — 6 (30%)  40% of solutions related to PHY 202 objective 1 were assessed at rubric level 2 or higher. | 40% of solutions related to PHY 201 objective 3 were assessed at rubric level 2 or higher which is nowhere near the expected criteria for success.  Must be able to cover the concepts of Electric and Magnetic field more extensively by working at least 4 problems using each concept. High percentages at levels 0 and 1 (60) must be improved. |
| 1. Student learning outcome #4   Understand the basic principles of reflection and refraction in Geometrical Optics. | Rubric based assessment of related final exam problems. | | | At least 70% of students will produce solutions at  Rubric level 2 or higher | Number of Students Assessed  Fall 2017 — 0 section  Spring 2018 – 1 section /5  9 responses to related final exam questions were assessed, and the number of solutions at each rubric level identified.  Level 3 —6 (66.7%)  Level 2 —3 33.3%)  Level 1—0 (0%)  Level 0 — 0 (0%)  100% of solutions related to PHY 202 objective 1 were assessed at rubric level 2 or higher. | Basic ideas of principles of reflection and refraction in Geometrical Optics is well understood. This is supported by the responses to the questions in the final of 100% at level 2 or higher. |
| **Plan submission date: 9/26/2018** | | | | | **Submitted by: Ali Yazdi** | |

# Instructional Program Outcomes & Assessment Plan – PHY 214S

**Physics Course Level Outcomes Assessment Rubric**

Level 3: Attempted Problem and Solved Correctly (full credit)

Level 2: Attempted Problem and Did Not Solve Correctly, Some Understanding of Problem Solution (at least half credit) Level 1: Did Not Attempt Problem or Failed to Show Understanding of Problem Solution (less than half credit)

# General Education Objective

The student will demonstrate understanding of the equations and principles that govern electric fields, magnetic fields, and electrical circuits.

# Evaluated Course Objectives

The General Educational Objective is met through the course objectives which require use of mathematical concepts, notations, and manipulations necessary in students’ field of study. Student mastery of the specific course objectives that follow will be evaluated by analyzing solutions for appropriate problems from the comprehensive final exam. The final exam will not be a multiple-choice exam. Students are required to show all of their work and will be graded on the quality of their technique, notation, and accuracy. The rubric above was used to evaluate the problems during the previous year including fall of 2017 through summer 2018.

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| The student will demonstrate knowledge of electromagnetic theory by his/her ability to:   1. Solve problems that involve electric fields. 2. Solve problems that involve magnetic fields. 3. Solve problems that involve electric circuits. | | | | |
| **Intended Outcomes** | **Means of Assessment** | **Criteria for Success** | **Summary & Analysis of Assessment Evidence** | **Use of Results** |
| PHY 214S Objective 1  The student will demonstrate knowledge of electromagnetic theory by his/her ability to solve problems that involve electric fields. | Rubric based assessment of related common final exam problems | 70% of students learning at a rubric level of 2 or higher | Jefferson Campus  Level 3 11/25 44.0%  Level 2 10/25 40.0%  Level 1 4/25 16.0%  Shelby Campus No Class Offered | 84.0% (21/25)  performed at Level 2 or higher. Up from 79.2% last year. The overall percentage of students that scored at level 2 or higher increased. Our recommendation is to continue what we are currently doing with this topic. |

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| PHY 214S Objective 2 | Rubric based assessment of related common final exam problems | 70% of students learning at a rubric level of 2 or higher | Jefferson Campus | 52.0%  32.0%  16.0% | 84.0% (21/25)  performed at Level 2 or higher. Down from 95.8% last year. The overall percentage of students that scored at level 2 or higher decreased slightly this academic year. Our recommendation is to offer |
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| The student will demonstrate knowledge of electromagnetic theory by his/her ability to solve problems that involve magnetic fields. | Level 3 13/25  Level 2 8/25  Level 1 4/25  Shelby Campus No Class Offered |
| some additional practice |
| problems on magnetic |
| fields. |
| PHY 214S Objective 3 | Rubric based | 70% of students learning | Jefferson Campus | 60.0% | 92.0% (23/25) |
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| The student will | Level 3 15/25 |
| demonstrate knowledge of electromagnetic theory by his/her ability to solve problems that involve electric circuits. | assessment of related  common final exam problems | at a rubric level of 2 or  higher | Level 2 8/25  Level 1 2/25  Shelby Campus No Class Offered | 32.0%  8.0% | performed at Level 2 or  higher. Up from 87.5% last year. The overall percentage of students that scored at level 2 or higher increased during this academic year. Our recommendation is to |
| continue what we are |
| currently doing with this |
| topic. |