

## SLOs for PSME Division- Active Only

| Course/Service Owning Unit | Student Learning Outcome (SLO) Name  | Student Learning Outcome (SLO)  |
|----------------------------|--|---|
| Dept - (PSME) Astronomy    | ASTR10_SLO_1   | Appraise the benefits to society of astronomical research concerning stars and stellar systems.   |
|                            | ASTR10_SLO_2   | Evaluate the impact on Earth's characteristics of the evolution of stars and stellar systems.   |
|                            | ASTR10_SLO_3   | Evaluate astronomical news items or theories about stellar astronomy based upon the scientific method.  |
|                            | ASTR15L_SLO_1  | Evaluate claims about the nature of the physical universe using the scientific method of hypothesis testing.  |
|                            | ASTR15L_SLO_2  | Compare and contrast the histories of solar-system bodies (e.g. moons, planets, asteroids, comets, meteorites) by integrating data from spacecraft and Earth-based observatories. |
|                            | ASTR4_SLO_1  | Appraise the benefits to society of planetary research and exploration.   |
|                            | ASTR4_SLO_2  | Compare and contrast the development of planetary systems and of the major planet types, including those factors that have led to Earth's unique characteristics.                 |
|                            | ASTR4_SLO_3  | Evaluate astronomical news items or theories concerning solar system astronomy based upon the scientific method.  |
|                            | Dept - (PSME) Chemistry  | CHEM10_SLO_3  |
| CHEM10_SLO_4               |  | Demonstrate an understanding of the scientific method by performing laboratory experiments  |
| CHEM12A_SLO_5              |  | Predict products in reactions of alkanes, haloalkanes, and alkenes by applying concepts from General Chemistry  |
| CHEM12A_SLO_6              |  | Generate logical stepwise reaction mechanisms for simple organic reactions  |
| CHEM12A_SLO_7              |  | Construct molecular structures from IR and <sup>1</sup> H NMR data  |
| CHEM12B_SLO_5              |  | Construct logical multi-step syntheses for organic molecules incorporating a variety of functional groups.  |
| CHEM12B_SLO_6              |  | Use molecular orbital theory and resonance to explain reactions of conjugated dienes, benzene and other molecules with conjugated p systems                                       |
| CHEM12B_SLO_7              |  | Construct molecular structures of increasingly complex molecules from IR, <sup>1</sup> H NMR, and <sup>13</sup> C NMR data  |
| CHEM12C_SLO_5              |  | Generate logical multi-step syntheses for increasingly complex organic molecules incorporating a wider variety of functional groups   |
| CHEM12C_SLO_6              |  | Apply concepts demonstrated in previous organic reactions to understand the behavior of biologically important molecules and concepts in Biochemistry                             |
| CHEM1A_SLO_4               |  | Solve problems related to balanced chemical equations and illustrate the principles of stoichiometry.   |
| CHEM1A_SLO_5               |  | Demonstrate an understanding of the scientific method by performing laboratory experiments.   |
| CHEM1B_SLO_5               |  | Solve problems related to chemical equilibrium.   |
| CHEM1B_SLO_6               |  | Demonstrate an understanding of the fundamental principles of kinetics, equilibrium, and thermodynamics by performing appropriate laboratory experiments.                         |
| CHEM1C_SLO_4               |  | Combine principles of equilibrium and thermodynamics and solve problems related to electrochemical systems.   |
| CHEM1C_SLO_5               |  | Analyze unknown inorganic salts qualitatively and identify the cations and anions present in them.  |
| CHEM30A__SLO_6             |  | Identify the differences between elements and compounds and describe the chemical bonding in compounds- ionic vs. covalent.   |
| CHEM30A_SLO_4              | Solve stoichiometric problems pertaining to reactions between acids and bases. |   |

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|                            | CHEM30B_SLO_1                       | Differentiate the general reactions of the principle organic functional groups.  |
|                            | CHEM30B_SLO_2                       | Evaluate the major classes of biological compounds from a chemical perspective.  |
|                            | CHEM50_SLO_1                        | Assess the fundamental concepts of modern atomic and molecular theory.   |
|                            | CHEM50_SLO_2                        | Evaluate the standard classes of chemical reactions.   |
|                            | CHEM50_SLO_3                        | Demonstrate a fundamental understanding of mathematical concepts pertaining to chemical experimentation and calculations.  |
| Dept - (PSME) Engineering  | ENGR10_SLO_1                        | The student will be able to analyze, graph and develop a formula for a given data set.   |
|                            | ENGR10_SLO_2                        | The student will be able to write technical documentation both written and orally.   |
|                            | ENGR10_SLO_3                        | The student will work collaboratively on an engineering team.  |
|                            | ENGR35_SLO_1                        | The student will be able to analyze two- and three-dimensional force systems on rigid bodies in static equilibrium using vector and scalar analysis methods.   |
|                            | ENGR37_SLO_1                        | The student will be able to analyze circuits containing resistive, capacitive, inductive passive elements, along with op-amps interconnected to voltage and current sources.   |
|                            | ENGR37_SLO_2                        | The student will be able to use circuit laws and network theorems to solve DC steady state circuits, RC, RL, and RLC DC circuit transients and sinusoidal AC steady state circuits.                                  |
| Dept - (PSME) Geology      | GEOL10_SLO_1                        | Apply the principles of scientific methodology to evaluate hypotheses on how the earth works as an integrated system.  |
|                            | GEOL10_SLO_2                        | Use data and observations to track and predict changes in the Earth system resulting from dynamic Earth Processes.   |
|                            | GEOL10_SLO_3                        | Use observations from the crust and lithosphere of the Earth to determine geologic history at hand-sample, outcrop, local, and regional scales.  |
|                            | GEOL10_SLO_4                        | Apply scientific methodology and geologic principles to analyze the impact of the Earth system on humanity, from specific natural hazards and the availability, use, and distribution of Earth resources.            |
|                            | GEOL20_SLO_1                        | Apply the principles of scientific methodology to test hypotheses as to how the Earth's oceans work as an integrated system.   |
|                            | GEOL20_SLO_2                        | Use observations and data to characterize the dynamic Earth processes that act to shape the ocean floor and analyze the record of these processes within marine sediments and oceanic crust.                         |
|                            | GEOL20_SLO_3                        | Analyze the dynamic movement of the water column of the oceans, through an application of the physical principles of ocean currents, waves, and tides and their effect on coastal systems and processes.             |
|                            | GEOL20_SLO_4                        | Apply scientific methodology and the principles of oceanography to analyze the impact of the ocean system on humanity, from specific natural hazards and the availability, use, and distribution of ocean resources. |
| Dept - (PSME) Mathematics  | MATH10_SLO_1                        | Organize, analyze, and utilize appropriate methods to draw conclusions based on sample data by constructing and/or evaluating tables, graphs, and numerical measures of characteristics of data.                     |
|                            | MATH10_SLO_2                        | Identify, evaluate, interpret and describe data distributions through the study of sampling distributions and probability theory.  |

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|                            | MATH10_SLO_3                        | Collect data, interpret, compose and defend conjectures, and communicate the results of random data using statistical analyses such as interval and point estimates, hypothesis tests, and regression analysis. |
|                            | MATH11_SLO_1                        | Identify, evaluate, and utilize appropriate linear and probability optimization models and communicate results.   |
|                            | MATH11_SLO_2                        | Compare, evaluate, judge, make informed decisions, and communicate results about various financial opportunities by applying the mathematical concepts and principles of the time value of money.               |
|                            | MATH114_SLO_1                       | Evaluate real-world situations and distinguish between and apply exponential, logarithmic, rational, and discrete function models appropriately.  |
|                            | MATH114_SLO_2                       | Analyze, interpret, and communicate results of exponential, logarithmic, rational, and discrete models in a logical manner from four points of view - visual, formula, numerical, and written.                  |
|                            | MATH12_SLO_1                        | Use correct notation and mathematical precision in the evaluation and interpretation of derivatives and integrals.  |
|                            | MATH12_SLO_2                        | Evaluate, solve, interpret and communicate business and social science applications using appropriate differentiation and integration methodologies.  |
|                            | MATH1A_SLO_1                        | Analyze and synthesize the concepts of limits, continuity, and differentiation from a graphical, numerical, analytical and verbal approach, using correct notation and mathematical precision.                  |
|                            | MATH1A_SLO_2                        | Evaluate the behavior of graphs in the context of limits, continuity and differentiability.   |
|                            | MATH1A_SLO_3                        | Recognize, diagnose, and decide on the appropriate method for solving applied real world problems in optimization, related rates and numerical approximation.   |
|                            | MATH1B_SLO_1                        | Analyze the definite integral from a graphical, numerical, analytical, and verbal approach, using correct notation and mathematical precision.  |
|                            | MATH1B_SLO_2                        | Formulate and use the Fundamental Theorem of Calculus.  |
|                            | MATH1B_SLO_3                        | Apply the definite integral in solving problems in analytical geometry and the sciences.  |
|                            | MATH1C_SLO_1                        | Graphically, analytically, numerically and verbally analyze infinite sequences and series from the perspective of convergence, using correct notation and mathematical precision.                               |
|                            | MATH1C_SLO_2                        | Apply infinite sequences and series in approximating functions.   |
|                            | MATH1C_SLO_3                        | Synthesize and apply vectors, polar coordinate system and parametric representations in solving problems in analytic geometry, including motion in space.   |
|                            | MATH1D_SLO_1                        | Graphically and analytically synthesize and apply multivariable and vector-valued functions and their derivatives, using correct notation and mathematical precision.   |
|                            | MATH1D_SLO_2                        | Use double, triple and line integrals in applications, including Green's Theorem, Stokes' Theorem and Divergence Theorem.   |
|                            | MATH1D_SLO_3                        | Synthesize the key concepts of differential, integral and multivariate calculus.  |
|                            | MATH201_SLO_1                       | Place, via test at Placement Office, into a mathematics course above Math 210.  |
|                            | MATH202_SLO_1                       | Place, via test at Placement Office, into a mathematics course above Math 212.  |
|                            | MATH203_SLO_1                       | Place, via test at Placement Office, into a mathematics course above Math 114.  |
|                            | MATH210_SLO_1                       | Demonstrate and apply a systematic and logical approach to solving arithmetic and geometric problems.   |
|                            | MATH210_SLO_2                       | Demonstrate and apply the knowledge and skills required to select the correct introductory formulas, procedures, and concepts from algebra and geometry and use them to solve problems.                         |

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|                            | MATH212_SLO_1                       | Evaluate real-world situations and distinguish between and apply linear and quadratic function models appropriately.  |
|                            | MATH212_SLO_2                       | Analyze, interpret, and communicate results of linear and quadratic models in a logical manner from four points of view - visual, formula, numerical, and written.  |
|                            | MATH212_SLO_3                       | Demonstrate an appreciation and awareness of applications in their daily lives.   |
|                            | MATH217_SLO_1                       | Organize, analyze, and utilize appropriate methods to draw conclusions based on sample data by constructing and/or evaluating tables, graphs, and numerical measures of characteristics of data.                      |
|                            | MATH217_SLO_2                       | Analyze and describe data distributions through the study of probability theory.  |
|                            | MATH217_SLO_3                       | Evaluate real-world situations and apply linear, quadratic and exponential function models appropriately.   |
|                            | MATH22_SLO_1                        | Critique a mathematical statement for its truth value, defend choice by formulating a mathematical proof or constructing a counterexample.  |
|                            | MATH22_SLO_2                        | Analyze and apply patterns of discrete mathematical structures to demonstrate mathematical thinking.  |
|                            | MATH23_SLO_1                        | Organize, analyze, and utilize appropriate methods to draw conclusions based on sample data by constructing and/or evaluating tables, graphs, and numerical measures of characteristics of data.                      |
|                            | MATH23_SLO_2                        | Use calculus based mathematics to construct, analyze, apply, and simulate probability and sampling distributions in theory and applications, and to justify appropriate statistical analyses and inferential methods. |
|                            | MATH23_SLO_3                        | Collect data, interpret, compose and defend conjectures, and communicate the results of random data using statistical analyses such as interval and point estimates, hypothesis tests, and regression analysis.       |
|                            | MATH241_SLO_1                       | Analyze and develop linear, polynomial, exponential, logarithmic and implicit function models.  |
|                            | MATH241_SLO_2                       | Communicate concepts and solutions for problems both verbally and in writing.   |
|                            | MATH242_SLO_1                       | Analyze and develop trigonometric models.   |
|                            | MATH242_SLO_2                       | Communicate concepts and solutions for problems both verbally and in writing.   |
|                            | MATH243_SLO_1                       | Analyze and develop trigonometric, matrix, and discrete models for problems within two- and three- dimensional Cartesian or polar coordinate systems.   |
|                            | MATH243_SLO_2                       | Communicate concepts and solutions for problems both verbally and in writing.   |
|                            | MATH2A_SLO_1                        | Construct and evaluate differential equation models to solve application problems.  |
|                            | MATH2A_SLO_2                        | Classify, solve and analyze differential equation problems by applying appropriate techniques and theory.   |
|                            | MATH2B_SLO_1                        | Construct and evaluate linear systems/models to solve application problems.   |
|                            | MATH2B_SLO_2                        | Solve problems by deciding upon and applying appropriate algorithms/concepts from linear algebra.   |
|                            | MATH2B_SLO_3                        | Apply theoretical principles of linear algebra to define properties of linear transformations, matrices and vector spaces.  |
|                            | MATH41_SLO_1                        | Investigate, evaluate, and differentiate between algebraic and transcendental functions in their graphic, formulaic, and tabular representations.   |
|                            | MATH41_SLO_2                        | Synthesize, model, and communicate real-life applications and phenomena using algebraic and transcendental functions.   |
|                            | MATH42_SLO_1                        | Formulate, construct, and evaluate trigonometric models to analyze periodic phenomena, identities, and geometric applications.  |

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|                            | MATH43_SLO_1                        | Analyze, investigate, and evaluate linear systems, vectors, and matrices related to two or three dimensional geometric objects.   |
|                            | MATH43_SLO_2                        | Graph and analyze regions/curves represented by inequalities or trigonometric, polar, and parametric equations, including conic sections.   |
|                            | MATH43_SLO_3                        | Analyze, develop, and evaluate formulas for sequences and series; Justify those formulas by mathematical induction.   |
|                            | MATH44_SLO_1                        | Analyze contemporary mathematical problems, apply problem solving techniques using a variety of methods, and communicate the results mathematically through a variety of forms.   |
|                            | MATH44_SLO_2                        | Demonstrate and correctly apply basic mathematical techniques in at least five of the following ten areas: symmetry, graph theory, fractals and chaos theory, topology, number theory, geometry, combinatorics, methods of social choice, probability and statistics, economics and personal finance. |
|                            | MATH44_SLO_3                        | Examine and evaluate myths and realities about the contemporary discipline of mathematics and its practitioners.  |
|                            | MATH46_SLO_1                        | Analyze mathematical problems from elementary mathematics, apply problem solving techniques using a variety of methods, solve these problems individually and in groups, and communicate results mathematically through a variety of forms.   |
|                            | MATH46_SLO_2                        | Utilize ideas from number theory, distinguish types and properties of numbers, and employ mathematical rules for operating on rational and irrational numbers using verbal, symbolic, geometric, and numerical methods.   |
|                            | MATH46_SLO_3                        | Examine and evaluate myths and realities about the contemporary discipline of mathematics and its practitioners.  |
|                            | MATH46_SLO_4                        | Identify and discuss developments in the history of elementary mathematics from a variety of cultures.  |
|                            | MATH77_SLO_1                        | Investigate an area of special interest and demonstrate an appropriate level of understanding and expertise.  |
| Dept - (PSME) Meteorology  | MET10_SLO_1                         | Analyze and explain the objective techniques used by synoptic meteorologists and climatologists to forecast our planet's weather and to predict future changes in our planet's climate. .   |
|                            | MET10_SLO_2                         | Assess and critique the impact of meteorology and climatology as sciences on local, national and international economic, environmental, ethical and political issues including climate change.  |
| Dept - (PSME) Physics      | PHYS10_SLO_1                        | Critically examine new, previously un-encountered problems, analyzing and evaluating their constituent parts, to construct and explain a logical solution utilizing, and based upon, the fundamental laws of physics in general.  |
|                            | PHYS2A_SLO_1                        | Critically examine new, previously un-encountered problems, analyzing and evaluating their constituent parts, to construct and explain a logical solution utilizing, and based upon, the fundamental laws of mechanics  |
|                            | PHYS2A_SLO_2                        | Gain confidence in taking precise and accurate scientific measurements, with their uncertainties, and then with calculations from them, analyze their meaning as relative, in an experimental context, to the verification and support of physics theories.   |
|                            | PHYS2B_SLO_1                        | Critically examine new, previously un-encountered problems, analyzing and evaluating their constituent parts, to construct and explain a logical solution utilizing, and based upon, the fundamental laws of electricity and magnetism.   |
|                            | PHYS2B_SLO_2                        | Gain confidence in taking precise and accurate scientific measurements, with their uncertainties, and then with calculations from them, analyze their meaning as relative, in an experimental context, to the verification and support of physics theories.   |
|                            | PHYS2C_SLO_1                        | Critically examine new, previously un-encountered problems, analyzing and evaluating their constituent parts, to construct and explain a logical solution utilizing, and based upon, the fundamental laws of optics, thermodynamics,  |

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|                            | PHYS2C_SLO_1                        | fluids, and modern physics.   |
|                            | PHYS2C_SLO_2                        | Gain confidence in taking precise and accurate scientific measurements, with their uncertainties, and then with calculations from them, analyze their meaning as relative, in an experimental context, to the verification and support of physics theories. |
|                            | PHYS4A_SLO_1                        | Critically examine new, previously un-encountered problems, analyzing and evaluating their constituent parts, to construct and explain a logical solution utilizing, and based upon, the fundamental laws of mechanics.                                     |
|                            | PHYS4A_SLO_2                        | Gain confidence in taking precise and accurate scientific measurements, with their uncertainties, and then with calculations from them, analyze their meaning as relative, in an experimental context, to the verification and support of physics theories. |
|                            | PHYS4B_SLO_1                        | Critically examine new, previously un-encountered problems, analyzing and evaluating their constituent parts, to construct and explain a logical solution utilizing, and based upon, the fundamental laws of electricity and magnetism.                     |
|                            | PHYS4B_SLO_2                        | Gain confidence in taking precise and accurate scientific measurements, with their uncertainties, and then with calculations from them, analyze their meaning as relative, in an experimental context, to the verification and support of physics theories. |
|                            | PHYS4C_SLO_1                        | Critically examine new, previously un-encountered problems, analyzing and evaluating their constituent parts, to construct and explain a logical solution utilizing, and based upon, the fundamental laws of waves, fluids, optics, and thermodynamics.     |
|                            | PHYS4C_SLO_2                        | Gain confidence in taking precise and accurate scientific measurements, with their uncertainties, and then with calculations from them, analyze their meaning as relative, in an experimental context, to the verification and support of physics theories. |
|                            | PHYS4D_SLO_1                        | Critically examine new, previously un-encountered problems, analyzing and evaluating their constituent parts, to construct and explain a logical solution utilizing, and based upon, the fundamental laws of modern physics.                                |
|                            | PHYS4D_SLO_2                        | Gain confidence in taking precise and accurate scientific measurements, with their uncertainties, and then with calculations from them, analyze their meaning as relative, in an experimental context, to the verification and support of physics theories. |
|                            | PHYS50_SLO_1                        | Critically examine new, previously un-encountered problems, analyzing and evaluating their constituent parts, to construct and explain a logical solution utilizing, and based upon, the fundamental laws of mechanics                                      |