

**APPENDIX D: Draft Rubrics for Assessment of Learning Outcomes for
General Education Courses**

(From: <https://provost.nmsu.edu/state-wide-gen-ed/>)

General Education Learning Outcomes

Essential Skill: Communication

Courses in this area should begin to prepare students for communication in subsequent college courses and in the workplace, personal and social spheres, and civic life. The courses should prepare students to become versatile communicators who can respond to a diverse range of situations with appropriate written, oral, visual, or digital texts and performances. At the completion of the Communication component of the General Education curriculum, students should aim for, at minimum, the Developing level for each component skill. By practicing disciplinary communication skills in courses within a major field of study, undergraduates should reach the Proficiency level by the end of a baccalaureate degree program.

Component Skill	Emerging	Developing	Proficient	Assessment Suggestions
Genre and Medium Awareness, Application, and Versatility: Identify and communicate in various genres and mediums (oral, written, and digital) using strategies appropriate for the rhetorical situations (i.e., attending to audience, purpose, and context)	Students communicate in various genres and mediums.	Students communicate in several genres and mediums, demonstrating awareness that different genres and mediums have different limitations and strengths.	Students communicate effectively in several genres and mediums, demonstrate awareness of limitations and strengths of each, and evaluate the effectiveness of their communications with regard to appropriateness to the rhetorical situation.	To demonstrate genre awareness, application, and versatility, students are asked to communicate well in genres such as a lab report, an essay, a white paper, a research proposal, a reflective response to readings, a marketing brochure and in varied mediums such as oral presentations, websites, written document.
Strategies for Understanding and Evaluating Messages: Apply strategies such as reading for main points; seeking key arguments, counter-arguments, rebuttals; locating supportive documentation for arguments; reading with a specific stakeholder lens; applying a theoretical lens (e.g. cultural, political, economic) to understand and evaluate messages in terms of the rhetorical situation (audience, purpose, and context).	Students use more than one for understanding and evaluating messages. They describe the central idea of a message.	Students use several strategies to understand and evaluate messages. They demonstrate awareness that different rhetorical situations may require different strategies.	Students use a wide range of strategies for understanding and evaluating messages. They also evaluate the effectiveness of strategies they use for interpreting messages in different rhetorical situations.	Use writing or speaking to convey their interpretation of materials and to assess what they have heard, read, or seen after applying strategies for evaluating messages such as reading for main points; seeking key arguments, counter-arguments, rebuttals; locating supportive documentation for arguments; reading with a specific stakeholder lens; applying a theoretical lens (e.g. cultural, political, economic). Examples of materials for assessing: Portfolio, presentation, writing assignment, oral presentation, digital assignment. To assess developing and proficient levels, students' work should include reflections in which students evaluate their choices and overall performance.
Evaluation and Production of Arguments: Evaluate the authority of sources in their own arguments and those of others; distinguish among supported claims, unsupported claims, facts, inferences, and opinions. In arguments, integrate support for their own claims with information from sources that are used and cited ethically and appropriately (using a major citation system such as MLA and APA).	Students understand that sources have varied validity and authority and that claims can be facts, opinions, inferences, and supported or unsupported.	Students evaluate a source's authority; distinguish among facts, opinions, and inferences; and identify claims that are supported and unsupported.	Students identify and develop claims that are supported by evidence and reasoning; evaluate and integrate arguments of others into their own written and spoken arguments.	Assess for student understanding of the authority (e.g., credibility, soundness) of what they read, hear, or see. Assess students' oral or written work in which they produce arguments of their own after evaluating others' relevant arguments. To demonstrate skills in producing arguments employing others' sound arguments, students effectively employ others' material within their own well-argued texts or presentations. Examples of materials for assessing: Portfolio, presentation, writing assignment, oral presentation, digital assignment.

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Suggestions for assessment

Written documents and oral and electronic presentations should prepare students for or resemble those that graduates of the department or program typically perform for their work or lives. For instance, if assessment of recent graduates from a finance program determines that its alumni take jobs requiring them to address their communications almost exclusively to lay audiences for the purpose of recommending sound, personalized investment strategies, then students' ability to deliver effective performances in that genre, for that audience, and about similar ill-structured problems (with no single "right" answer) would be an appropriate measure of the competency.

Draft

General Education Learning Outcomes

Essential Skill: Critical Thinking

Critical thinking is the intellectual process of evaluating information, explanations, and arguments. This process is common among disciplines. Proficient critical thinkers are able to apply informed and reasoned thinking to problems in their fields.

Because of the process-oriented nature of critical thinking, a course that teaches the skill of critical thinking needs to cover, at least to some extent, all four component skills below, each of which is intimately and logically connected with the others. It is not simply inconsistent with critical thinking to formulate one's conclusions and then go looking for supportive evidence afterward. As students collect and assess evidence, they must have some understanding of the logical relation between the evidence they are collecting and the conclusions they are trying to reach or the problems they are trying to solve. However, it is entirely consistent that some courses place more emphasis on a particular subskill or subskills. A history course emphasizing archival research might place particular emphasis on the evidence acquisition subskill, and a philosophy course might place more emphasis on the reasoning subskill.

Component Skill	Emerging	Developing	Proficient	Assessment Suggestions
Problem Setting: Delineate a problem or question.	Students state problem/question appropriate to the context.	Students state and define an open ended problem/question appropriate to the context.	Students state, define, and describe components of an open ended problem/question appropriate to the context.	Formulate an experiment or research question Create a concept map Define a situation that can be addressed by a proof Describe a problem that will be developed into a paper Create a problem statement based on a topic of interest Identify perspectives and views on a problem
Evidence Acquisition: Identify and gather the information/data necessary to address the problem or question.	Students gather evidence addressing the problem/question from a mix of sources.	Students gather evidence addressing the problem/question from sources appropriate to the context while demonstrating some awareness of acquisition process, including personal assumptions.	Students gather an appropriate scope and depth of evidence sufficient to address a problem/question in context while demonstrating awareness of acquisition process, including personal assumptions.	Develop an annotated bibliography Collect qualitative and/or quantitative data
Evidence Evaluation: Evaluate evidence/data for credibility (e.g. bias, reliability, validity), probable truth, and relevance to a situation.	Students are able to describe appropriate sources.	Students are sometimes able to evaluate credibility and relevance of sources in addition to demonstrating some awareness of the evaluation process, including personal assumptions	Students are able to evaluate credibility and relevance of sources in addition to demonstrating an awareness of the evaluation process, including personal assumptions.	Differentiate relevant from irrelevant information Differentiate fact from opinion Assess and defend authority and credibility of data or other evidence Identify minority opinions and critical information Assess agreement among authorities
Reasoning/Conclusion: Develop conclusions, solutions,	Students can sometimes identify common logical flaws. Students	Students can identify common logical flaws. Students can	Students can identify common logical fallacies. Students can	Assess an argument regarding whether the premises support

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Component Skill	Emerging	Developing	Proficient	Assessment Suggestions
and outcomes that reflect an informed, well-reasoned evaluation.	can sometimes describe weak and strong arguments.	sometimes differentiate weak and strong arguments. Students can sometimes identify and employ evidence and reasoning to build an argument and reach probable conclusions/solutions based on the evidence.	differentiate weak and strong arguments. Students can identify and employ evidence and reasoning to build an argument and reach probable conclusions/solutions based on the evidence.	the conclusion Assess certainty or probability that a conclusion is true Formulate a recommendation or persuasive argument supported by credible evidence Develop a conclusion based on experiments or data gathered

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Essential Skill: Information & Digital Literacy

Courses that cover information and digital literacy as a skill should begin to prepare students for upper division college courses, the workplace, and civic life. Information literacy spans across genres and content within the general education core and is not tied to a specific media or format. A course focused on information and digital literacy as an essential skill should encompass three of the four component skills. At the completion of the Information & Digital Literacy component of the General Education curriculum, students should aim for, at minimum, the Developing level for each component skill.

Component Skill	Emerging	Developing	Proficiency	Assessment Suggestions
Authority and Value of Information: Recognize the interdependent nature of the authority and value of information and use this knowledge ethically when selecting, using, and creating information.	Students recognize that information is produced by individuals and communities who may or may not be reliable and who may have a particular point of view; recognize that new knowledge builds upon existing knowledge, give credit through attribution, and do not plagiarize.	Students use established criteria to evaluate information, formats, and sources and to differentiate between reliable and convenient information; make informed choices regarding online actions in awareness of issues related to privacy and the commodification of personal information; safeguard personal information of self and others.	Students evaluate types of authorities and integrate new perspectives and alternative authoritative voices; recognize that citing preserves authority and gives credit through proper attribution; students apply an appropriate citation style	Author's credentials evaluation Source authority evaluation Citation formatting exercise Quoting, paraphrasing, and summarizing exercise Privacy exercise Copyright fair use application Speech or debate Essay Annotated bibliography Research paper
Digital Literacy: Understand, communicate, compute, create, and design in digital environments.	Students know current and common digital vocabulary; understand how to use common digital devices; troubleshoot basic problems associated with operating digital devices	Students select and use appropriate applications to create and effectively communicate; use common digital education and social communication platforms; use current computational tools.	Students demonstrate fluency using common digital education and social communication platforms; design effective digital media; demonstrate fluency in using current computational tools including identifying errors or misleading information.	Digital vocabulary test Demonstration of how to use common devices Demonstration of solving basic problems Presentation project; Communication project Typing test; Computation project Input creation test such as talk to text Digital error analysis – demonstration or report Design project – audio, visual, or both
Information Structures: Select, use, produce, organize, and share information employing appropriate information formats, collections, systems, and applications.	Students articulate basic features and functions of common information formats, collections, systems, and applications; search collections and systems using keywords and simple search strategies.	Students select and use information formats, collections, systems, and applications that best match information needs; search collections and systems using advanced iterative search strategies and techniques.	Students use applications to create and organize useful content in appropriate information formats and systems; recognize and explain how information is communicated using distinct formats created for a purpose and recognize that information systems organize and disseminate formats.	Close reading, format comparison, format evaluation, primary and secondary source comparison, speech, essay, lab report, web site, blog, news article, critique, business report, literature review, research paper, database and academic collection comparison, academic collection selection exercise, research journal. Personal information system, development of file systems, calendars, contacts, or citation management systems.
Research as Inquiry: Engage in an iterative process of inquiry that defines a problem or poses a question and through research generates a reasonable solution or answer.	Students recognize that research is an iterative, non-linear, creative process that leads to new knowledge and requires curiosity, reflection, critical thinking, and persistence.	Students define a problem or pose a question and find and evaluate relevant information; recognize that scholarship is a conversation that occurs over time among communities engaged in research.	Students define an appropriate scope of investigation, formulate research questions, and reframe research questions based on new information; analyze, evaluate, and synthesize ideas gathered from multiple sources to draw reasonable conclusions.	Research question formulation, thesis statement formulation, search statement construction, concept map, information cycle exercise, information evaluation, search result evaluation, critical reading, research journal.

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Essential Skill: Personal and Social Responsibility

The following rubric describes the progression in skill level and understanding that students should demonstrate as they develop their personal and social responsibility skills in general education classes. It is suggested that a course designated as teaching personal and social responsibility skills include outcomes related to two of the rubric's component skill areas. The rubric is intended to provide guidance to faculty members designing courses and assessment tools for evaluating student learning of personal and social responsibility skills; it should not be viewed as establishing expectations for a certain level of achievement at the end of a single general education course.

Component Skill	Emerging	Developing	Proficient	Assessment
Intercultural reasoning and intercultural competence	Students describe a range of personal and social justice issues as they relate to specific contexts.	Students develop strategies for working with one's own and others' perspectives and ethnocentrism.	Students evaluate personal and social justice issues as they relate to specific contexts and compare and contrast multiple solutions across social and cultural relationships.	Presentations, case studies, projects, papers, online discussions, blogs
Sustainability and the natural and human worlds	Students explain the impact our actions have on the sustainability of the natural and human worlds.	Students examine the relationship among environmental, socio-cultural, political, and economic systems as they interact with and affect the sustainability of the natural and human worlds.	Students analyze specific local or global issues and develop strategies for creating just, sustainable systems in the natural and human world.	Papers, projects, presentations, case studies, online discussions, blogs
Ethical reasoning	Students recognize a variety of ethical theories and place them in specific contexts.	Students describe ethical issues in specific contexts and explain the relationship between ethics and ethical systems and moral norms.	Students compare a range of ethical perspectives and propose an ethical solution based on one or more of those perspectives.	Papers, projects, presentations, online discussions, blogs, case studies
Collaboration skills, teamwork and value systems	As a group member, students demonstrate shared ethical obligations and intercultural sensitivity.	Students demonstrate personal and mutual accountability and make use of individual strengths in meeting group objectives.	Students effectively complete a group project, reflect on the impact and effectiveness of teamwork, and, based on that reflection, describe ways to improve future collaborative work.	Papers and reports, group projects that culminate in a presentation, paper, or other product; evaluation of or reflection paper on teamwork collaboration, including a self-assessment.
Civic discourse, civic knowledge and engagement – local and global	Students explain diverse positions on issues, values, or practices and present one's own position on a specific problem related to one or more of the issues, values, or practices studied.	Students demonstrate the ability to participate in respectful civic dialogue that shares differing perspectives and recognize that there are multiple valid responses to local and global issues.	Students critically inquire into and deduce from evidence the organizational, cultural, economic, or political factors that hinder or support solutions to local and global problems.	Discussions, projects, blogs, debates, papers incorporating and responding to multiple perspectives

Sources: the WICHE Passport rubrics, PDQ, LEAP Value Rubrics, and the Carnegie Foundation. Examples of assessments are described in the "Passport Learning Outcomes and Proficiency Criteria" that could be used to measure the achievement of personal and social responsibility skills in discipline-specific contexts (see http://www.wiche.edu/passport/interstate_passport_components.)

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Essential Skill: Quantitative Reasoning

Quantitative reasoning involve representing and communicating quantitative information, analyzing and formulating quantitative arguments, and solving quantitative contextual problems. Contextual problems are “word problems” situated within a context relevant to the course content (e.g. economics, psychology, chemistry) or otherwise accessible to students. They may model aspects of real-world problems while maintaining an appropriate level of complexity for general education students.

Students in quantitative reasoning courses will be expected to demonstrate competency at the proficiency level for all three component skills.

Component Skill	Emerging	Developing	Proficient	Assessment Suggestions
Communication/Representation of Quantitative Information: Express quantitative information symbolically, graphically, and in written or oral language.	Students explain the meaning of graphics, numbers, or algebraic symbols within a given context.	Emerging skill descriptions plus: Students translate mathematical graphics and symbolism into written or oral language; translate written or oral language into mathematical symbols and graphics.	Developing skill descriptions plus: Students integrate written and symbolic mathematical constructs in describing particular contexts.	Exam Laboratory report Project Critique of media articles Written assignment: <ul style="list-style-type: none"> • report • paper • letter • article
Analysis of Quantitative Arguments: Interpret, analyze and critique information or a line of reasoning presented by others.	Students summarize quantitative arguments presented by others.	Emerging skill descriptions plus: Students differentiate and describe the parts of a quantitative argument presented by others; compare the conclusions of a quantitative argument with conclusions from other reliable sources.	Developing skill descriptions plus: Using appropriate techniques of mathematical proof or statistical analysis, students evaluate each component of a quantitative argument for mathematical validity and demonstrate whether an overall quantitative argument is valid, invalid, or questionable.	
Application of Quantitative Models: Apply appropriate quantitative models to real-world or other contextual problems.	Students identify, describe, and classify quantitative information needed to address contextual problems.	Emerging skill descriptions plus: Students identify appropriate mathematical or statistical models to represent quantitative information in contextual problems; apply those models to generate numeric predictions.	Developing skill descriptions plus: Students assess the validity of numeric predictions and correct unreasonable findings; analyze and interpret results; use them in a quantitative argument to support a position or line of reasoning or solve a contextual problem.	

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Content Area: Creative & Fine Arts

Student Learning Outcomes in creative and performing arts courses in the NM General Education Core must address any combination of two out of three of the component skills below. The skill level reached by the end of the course should be at least in the Developing criteria column, although some courses will be able to achieve Proficiency. Proficiency corresponds to the level anticipated for a Fine Arts major at graduation. This rubric is intended for use at the individual course level and is designed for application across a broad range of coursework. The Assessment column is intended to provide samples of possible assessment but is not an exhaustive list.

Component Skill	Emerging	Developing	Proficient	Assessment Suggestions
Understanding Art in Society: Respect for how diverse human values and experiences contribute to the making and uses of art.	Students describe how one or more works of art, are made or used by a culture.	Students analyze how cultural context and medium inform the production and reception of a work of art.	Students identify the roles of several works of art in society and some of the effects of gender, race, religion, class, sexuality, economic status and medium upon their production and reception.	Portfolio Essays Visual and oral presentations explore or contrast works of art or performance EXAMPLE: An essay on the commonality or difference in two works of art in the same or different genre.
Engaging in Arts Theory/Criticism/History: Understand the political, economic, religious, and historic bases of the arts through research, discourse, and creation via writing, performance, or studio practice.	Students use some key terminology and principles in discussion and writing to assess a creative work in its relation to culture(s).	Students use some key terminology, principles, and research to discuss and critique works of art to distinguish how the work is connected to the culture(s) that produced them.	Students use key terminology, principles, research, to critique works of art or performances and to present a cogent analysis of the cultural context.	Analytic Essays Creative Writing In Class Presentations Vocabulary Quiz EXAMPLE: Presentation that critiques work of art based on medium, technique, historic, and/or cultural relevance EXAMPLE: Creative essay that connects historical relevance of a topic to a work of art
Creating Art: Employ best practices and medium appropriate techniques to create or perform a work of art.	Students demonstrate and employ a basic understanding of best practices to create or perform a work of art through the use of a few appropriate techniques.	Students demonstrate comprehension of techniques and best practices by evaluating and selecting from a range of techniques to create or perform a work of art.	Students produce a work of art or a performance based on critical selection and application of best practice techniques and cultural knowledge.	Creation of art work employing high level/best practice- identified techniques and/or performance practices. EXAMPLE: Student performance of a musical masterwork. EXAMPLE: Student performance of an original dance (choreography) EXAMPLE: A student-written play, creative fiction, screenplay, poem

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Content Area: Humanities

Levels of emerging, developing, and proficient indicate a progression across increasing levels of coursework. Students in humanities courses are not expected to reach proficiency levels as stated in the rubric after an introductory course; however, instructors are encouraged to design coursework that exposes students to these concepts and prepares them to analytically apply them while students continue their studies in humanities.

Component Knowledge	Emerging	Developing	Proficient	Assessment Suggestions
Comparative Cultural Knowledge: Identify the distinctive qualities, influences, and impact of systems of thought, practices, or cultural works: why, where, and when they emerged, for whom they have been influential, and how they have contributed to conflict, identity, and experience.	Students recall, recognize, classify and explain aspects of the cultural knowledge presented in the course.	Students question, examine, and compare aspects of the cultural knowledge presented in the course.	Students appraise, analyze, and critique aspects of the cultural knowledge presented in the course.	Exams Projects Portfolios Papers
Intercultural Awareness: Investigate how systems of thought, cultural practices, beliefs, and works shape individual and collective experiences, produce meaning, and influence interpretation of societies in the past or present.	Students recall, recognize, classify and explain the intercultural influences presented in the course.	Students question, examine, and compare the intercultural influences presented in course.	Students appraise, analyze, and critique the intercultural influences presented in the course.	Exams Projects Portfolios Papers

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Content Area: Mathematics & Statistics

Courses in mathematics or statistics fulfill the general education requirement if they meet the Emerging, Developing, and Proficient column descriptions given by the appropriate rubric shown in the following pages. For example, programs in science, technology, engineering, and mathematics would use the College Algebra rubric, as would any calculus-based program, for students that test into or below College Algebra.

The mathematics or statistics general education requirement may also be satisfied by mathematics or statistics courses above the level shown in the rubrics. For example, if a student begins college with a course in Calculus I, this implies sufficient knowledge of College Algebra. Calculus I may therefore be used to fulfill the general education requirement without having to reference the College Algebra rubric.

General Education Outcomes: Survey of Mathematics

Core Competency	Emerging	Developing	Proficient	Assessment Suggestions
Graphical Representations: Construct and analyze graphs and/or data sets.	Students gather and organize information; Understand the purpose and use of various graphical representations such as tables, line graphs, tilings, networks, bar graphs, etc.	Emerging skill descriptions plus: Students interpret results through graphs, lists, tables, sequences, etc.	Developing skill descriptions plus: Students draw conclusions from data or various graphical representations.	<ul style="list-style-type: none"> • Test/quiz questions • Routine use of an accepted Classroom Assessment Technique (CAT) • Oral presentation by student • Written presentation by student • Student-created portfolio • Capstone project • Peer review • Student self-assessment • Group research and presentation on a real-life problem analyzed/solved by using mathematics • Student journal • Individual or group projects • Cooperative learning activities • Pre/post test
Expressions & Equations: Evaluate expressions. Use and solve various kinds of equations.	Students understand the purpose of formulas and use appropriate formulas within a mathematical application.	Emerging skill descriptions plus: Students solve equations within a mathematical application.	Developing skill descriptions plus: Students check answers to problems and determine the reasonableness of results.	
Mathematical & Statistical Language: Write mathematical explanations using appropriate definitions and symbols.	Students show an understanding of a mathematical application both orally and in writing.	Emerging skill description plus: Students describe solutions of mathematical problems in the context of the problems.	Developing skill descriptions plus: Students define mathematical concepts in the student's own words.	
Problem Solving: Solve problems in mathematical contexts.	Students translate mathematical information into symbolic form.	Emerging skill description plus: Students gather and organize relevant information for a given application.	Developing skill descriptions plus: Students draw conclusions and communicate the findings and create an effective problem solving strategy.	

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General Education Outcomes: College Algebra

Core Competency	Emerging	Developing	Proficient	Assessment Suggestions
Graphical Representations: Construct and analyze graphs and/or data sets.	Students sketch the graphs of linear, quadratic, higher-order polynomial, rational, absolute value, exponential, logarithmic, and radical functions.	Emerging skill description plus: Students determine the key features of a function such as domain/range, intercepts, and asymptotes.	Developing skill descriptions plus: Students construct graphs using a variety of techniques including plotting points, using properties of basic transformations of functions, and by using key characteristics of functions such as end behavior, intercepts and asymptotes.	<ul style="list-style-type: none"> • Pre/post test • Test/quiz questions • Routine use of an accepted Classroom Assessment Technique (CAT) • Oral presentation by student • Written presentation by student • Student-created portfolio • Capstone project • Peer review • Student self-assessment • Group research and presentation on a real-life problem analyzed/solved by using algebra
Expressions & Equations: Evaluate expressions. Use and solve various kinds of equations.	Students solve quadratic equations using techniques such as factoring, completing the square, the square root method, and the quadratic formula and solve equations algebraically to answer questions about graphs, and use graphs to estimate solutions to equations.	Emerging skill descriptions plus: Students solve equations using inverse operations for powers/roots, exponents/logarithms and other arithmetic operations.	Developing skill descriptions plus: Students use the equation of a function to determine its domain, to perform function operations, and to find the inverse of a function.	
Mathematical & Statistical Language: Write mathematical explanations using appropriate definitions and symbols.		Students communicate mathematical information using proper notation and verbal explanations.	Developing skill description plus: Students describe the implications of key features of a function with respect to its graph and/or in relation to its real-world context.	
Problem Solving: Solve problems in mathematical contexts.	Students memorize key features of commonly used functions including domain, range, and graphical representation.	Emerging skill description plus: Students solve application problems, including those requiring maximization or minimization, of quadratic functions and exponential growth & decay problems. Apply knowledge of functions to identify an appropriate type of function to solve application problems.	Developing skill descriptions plus: Students interpret the results of application problems in terms of their real world context. Solve contextual problems by identifying the appropriate type of function given the context and by creating a formula based on the information given.	

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General Education Outcomes: Statistics

Core Competency	Emerging	Developing	Proficient	Assessment Suggestions
Graphical Representations: Construct and analyze graphs and/or data sets.	Students organize and display data and concepts using common statistical graphics, e.g. frequency distributions, box and whisker plots, etc.	Emerging skill description plus: find percentile points and ranks for a frequency distribution.	Developing skill descriptions plus: Students graph data distributions using the correct format for graphs, to include: histograms, frequency polygons, box plots and scatter plots and draw appropriate inferences.	<ul style="list-style-type: none"> • Pre/post test • Test/quiz questions • Routine use of an accepted Classroom Assessment Technique (CAT) • Oral presentation by student • Written presentation by student • Student-created portfolio • Capstone project • Peer review • Student self-assessment • Group research and presentation on a real-life problem analyzed/solved by using statistics
Expressions & Equations: Evaluate expressions. Use and solve various kinds of equations.	Students compute mean, median, mode, and standard deviation; and determine basic probabilities and probabilities associated with the standard normal curve.	Emerging skill descriptions plus: Students calculate and interpret the least squares regression equation and the linear correlation coefficient; compute sampling distributions of sample means; compute the mean and standard deviation of sample means; calculate test statistics; and calculate probabilities using the standard normal distribution and relate them to areas under the curve.	Developing skill descriptions plus: Students calculate probabilities using compound probability rules and the binomial distribution and its properties; calculate margin of error given sample size and sample size given margin of error; and construct confidence intervals for population means and proportions.	
Mathematical & Statistical Language: Write statistical explanations using appropriate definitions and symbols.	Students use Z-scores appropriately; construct probability distributions; write confidence intervals; define parameters and statistic; distinguish between population and samples, and parameters and statistics; use statistical vocabulary appropriately; distinguish between qualitative and quantitative data; and give examples of independent and dependent variables.	Emerging skill descriptions plus: Students understand the Central Limit Theorem and when to apply it; write null and alternate hypotheses; understand the concept of significance level and P values; explain and evaluate statistics used in the real world (from a news article, research project, etc.); distinguish between descriptive and inferential statistics; and explain the difference between correlation and causation.	Developing skill descriptions plus: Students apply the steps for inference/hypothesis testing; describe the basic elements of sampling and experimental design; describe the relationship between the sampling distribution and the population distribution; use the Central Limit Theorem to approximate the probability distribution and calculate probabilities; and explain why a test can lead us to reject the null hypothesis.	
Problem Solving: Solve problems in statistical contexts.	Students determine appropriate methods to display data; compare measures using Z-scores; identify and analyze outliers; and determine whether a statistical test is appropriate under stated conditions.	Emerging skill descriptions plus: Students use least-square regression equations to predict values; select appropriate sampling techniques; interpret basic probabilities; identify null and alternative hypotheses; and interpret the meaning of the coefficient of determination.	Developing skill descriptions plus: Students determine if random variables are continuous or discrete; choose and construct appropriate hypothesis tests for population means and proportions; determine if the binomial distribution can be approximated with the normal distribution; and perform and interpret statistical tests and determine whether data is statistically significant.	

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Content Area: Science

This rubric describes the progression in understanding that students should demonstrate as they advance through science courses. It is intended to provide guidance to faculty members designing courses and assessment tools and should not be viewed as establishing expectations for a certain level of achievement at the end of a single general education science course. Faculty members are encouraged to use the rubric to establish the level of understanding, for each component of knowledge, they would like to see students achieve in their course.

Component Knowledge	Emerging	Developing	Proficiency	Assessment Suggestions
Scientific Literacy	Students recognize the difference between scientific and non-scientific concepts and processes; describe appropriate application of the scientific method in arguments.	Students describe the relevance of scientific concepts and processes required for personal decision making, participation in civic and cultural affairs, and economic productivity; students read, evaluate and can effectively analyze the validity of scientific arguments from the popular press.	Students ask, find, and determine valid answers to scientific questions derived from curiosity about everyday experiences; analyze relevant scientific issues underlying national and local decisions and express positions that are scientifically and technologically informed; evaluate the quality of scientific information on the basis of its source and the methods used to generate it; pose and evaluate arguments based on evidence and apply conclusions from such arguments appropriately.	<ul style="list-style-type: none"> • Written lecture summaries • Short-answer exams • Essay exams • Research/term paper • Pre-lab reports • Lab notebooks • Lab reports • Presentations
Scientific Reasoning	Students explain how the scientific method is implemented and formulate questions about nature and generate hypotheses; differentiate between a theory and an hypothesis.	Students contrast scientific explanations for natural phenomena from other ways of knowing or arriving at conclusions and judgments; explain that scientific understanding is tentative and subject to falsification.	Students apply the scientific method by formulating questions about nature, generating hypotheses, and testing hypotheses using experiments and comparisons.	
Experimental Techniques, Methods, and Design	Students recognize that observation, measurement, and experimentation play roles in the scientific approach to knowledge; understand visual and tabular representations of scientific data.	Students execute appropriate experimental designs; produce visual and tabular representations of scientific data; apply simple statistical descriptors to characterize experimental data sets.	Students create appropriate experimental designs; generate and analyze data using appropriate statistical techniques and use the results to evaluate hypotheses; create persuasive arguments, both written and oral, based on data.	

General Education Learning Outcomes

Content Area: Social & Behavioral Sciences

This rubric describes social and behavioral science courses in general education (e.g., anthropology, economics, psychology, political sciences, sociology, ethnic and cultural studies) and may include interdisciplinary courses. Courses centered on developing essential skills (communications, critical thinking, and personal and social responsibility) will be assessed using the core competencies listed below with the understanding that no one course would be sufficient in meeting overall proficiency. This rubric serves as a general guideline and institutions are free to add to the assessed skills. No component stands alone, as student inquiry, evaluation, and creation is shaped by information formats, structures, and authority.

Component Skill	Emerging	Developing	Proficiency	Assessment Suggestions
Social Behaviors: Identify, describe and explain how social behaviors are influenced by factors ranging from biological processes to social structures and institutions.	Students demonstrate the ability to identify and describe human and social behaviors.	Students demonstrate the ability to identify and describe human and social behaviors and to identify the appropriate theoretical bases that inform the field of study. Primarily descriptive, but student recognizes relationship between theory and methodological considerations.	Students demonstrate the ability to analyze and evaluate relationships between theory and methodological considerations as applied to the study of human and social behaviors.	Essays, examinations requiring analysis of information, problem-based applications, qualitative/quantitative research projects, experiments; oral presentations, collaborative projects (stressing interrelated communication, skill)
Beliefs, Assumptions and Values: Articulate how beliefs, perceptions, and values are influenced by factors such as politics, geography, economics, culture, biology, history, and social institutions in the context of the self, society, and the cultural/physical environments.	Students demonstrate the ability to identify and describe how beliefs, perceptions, and values influence, and are influenced by, external factors in multiple contexts.	Students demonstrate the ability to identify and explain how human and social behaviors are influenced by the environments in which those behaviors develop. Primarily descriptive, but student can accurately identify and discuss the influence of social, cultural and biological factors.	Students demonstrate the ability to analyze and evaluate relationships between theory and methodological considerations as applied to how beliefs, perceptions, and values influence, and are influenced by, external factors in multiple contexts.	Comparative & problem- based essays, examinations requiring analysis of information, research projects
Social and Ethical Issues: Identify, describe, explain, and evaluate relevant issues, ethical dilemmas, and moral arguments related to social and behavioral sciences	Students demonstrate the ability to identify relevant and necessary factors to consider as part of understanding a social or ethical issue, dilemma, or argument.	Students demonstrate the ability to identify relevant and necessary factor(s) to analyze and evaluate a social or ethical issue, dilemma, or argument. This may include identifying methodologies, perspectives/theories, and data that may apply to understanding that issue, as informed by the field of study.	Students demonstrate the ability to analyze and evaluate a social or ethical issue, dilemma, or argument. This may include identifying methodologies, perspectives, theories, and data that may apply to understanding that issue, as informed by the field of study.	Problem-based projects, research projects, essays, examinations requiring analysis of information, fieldwork

Outcomes have been adapted from discipline organizations with overarching goals from LEAP principles (www.aacu.org/leap/essential-learning-outcomes) and measured by AAC&U's *Values Rubrics* (www.aacu.org/leap/essential-learning-outcomes).