GENERAL EDUCATION LEARNING GOALS*

NATURAL SCIENCES

Learning Goal: Students will gain an understanding of the methods scientists use to explore natural phenomena, including

- Methods of observation, hypothesis, measurement and data collection, experimentation, employment of mathematical analysis, and evaluation of evidence; and
- Application of scientific data, concepts, and models in one of the natural sciences.

Measurable Learning Outcomes: Students are able to

- Use appropriate observational methods to identify the characteristics and measures of a subject-specific sample / phenomenon.
- Develop a written report in which they (1) identify the hypothesis underlying the experimental design, (2) identify the specific prediction(s) being tested, and (3) assess the true-false consequences of the prediction(s) relative to the proposed hypothesis.
- Choose and conduct the measurements necessary to address a described experimental design, and describe and explain the need for variable controls, precision, equipment utilization and measurement technique, and data formatting.
- Present an analysis of the appropriateness of an experimental design for the testing of a hypothesis either as (1) a creative activity or (2) an analysis of that which has been put into practice by others, in either case addressing elements of experimental design, e.g., underlying prediction, feasibility of conclusive detection, measurement strategy, experimental set up, etc.
- Apply mathematics to the computation and analysis of experimental data for the purpose of making quantitative connections between such data and the experimental hypothesis, including skills related to the application of subject-specific computational algorithms, processing and interpretations of graphs, and statistical processing of data samples.
- Draw conclusions on the basis of the evidence provided by experiment, by (1) isolating the data findings of an experiment that are pertinent to a laboratory question, (2) interpreting those findings in a manner that relates them to the question, (3) formulating a resolution to the question reasoned from those findings, (4) assessing the reliability of conclusions on the basis of an experiment’s limits of precision and scope, and (5) suggesting provisions for extending the precision and scope to strengthen the ability of an experiment to address its hypothesis.
- Describe applications of scientific data, concepts and models to a specific scientific discipline.

SOCIAL SCIENCES

Learning Goal: Students will gain an understanding of the methods social scientists use to explore social phenomena, including

1. Observation.
2. Hypothesis development.
4. Experimentation.
5. Evaluation of evidence.

*Source: 2004 NCC-GEAR Report

**Measurable Learning Outcomes:** *Students are able to*

- Collect direct observations of the phenomena relevant to a research question, drawn from such social science practices as field observation, participant observation, clinical evaluation, critical evaluation, and content analysis, without alteration of those phenomena from their “natural” state.
- Develop or evaluate one or more hypotheses with attention to proper form; predictive capability; linkage to relevant theory, empirical results or literature; research purpose and/or capacity for empirical testing within the methodological traditions of the discipline.
- Understand the strengths and weaknesses; organization and management; validity and reliability; relevance, feasibility and ethical concerns, especially confidentiality, of different methods of measurement and data collection methods appropriate to the social science discipline.
- Understand the significance of experiment as it applies to the social science discipline; its strengths and weaknesses; its relationship to other research methods; its main components as well as ethical concerns.
- Understand methods for evaluating the relevance, extent and quality of evidence; and/or evaluating the propriety of conclusions based on evidence.
- Understand the significance, strengths, and weaknesses of mathematical/statistical analysis and tools; the form and quality of the data relating to these methods; the relationship between the methods of analysis and the research question; the interpretation of the results of different methods of analysis, and the determination of conclusions based on interpretative analysis.

**HISTORY, POLITICAL SCIENCE, GEOGRAPHY**

**American History**

**Learning Goal:** *Students will demonstrate knowledge of a basic narrative of American History, including*

- Political, economic, social, and cultural aspects, as appropriate; and
- The unity and diversity of American society.

**Measurable Learning Outcomes:** *Students are able to identify the political / economic / social / cultural roots of*

- European voyages of exploration in the fifteenth and sixteenth centuries, early immigration to and settlement of different colonies/regions in British North America.
- Slavery in British North America.
- The American Revolution.
- The U.S. Constitution.
- Development of the two party system.
- U.S. industrialization.
- The Jacksonian period as the political Era of the Common Man.
- The Westward Movement and Indian Removal.
- Pro-slavery and anti-slavery factions.
- The Civil War.

*Source: 2004 NCC-GEAR Report*
And to demonstrate knowledge of the distinctive unity and diversity of American society by their ability to describe

- The diverse ethnic and religious groups in colonial and nineteenth-century America.
- Slave life in different regions of the U.S.
- The life and issues of different classes / groups of women.
- The ongoing interaction between Native Americans and European Americans.
- The life and issues of the major immigration groups.

**Western Civilization**

*Learning Goal: Students will*

- Demonstrate knowledge of the development of the distinctive features of the history, institutions, economy, society, culture, etc., of Western Civilization.
- Relate the development of Western Civilization to that of other regions of the world.

*Measurable Learning Outcomes: Students are able to describe the following in relation to their impact on the development of Western Culture:*

- Religion in the Middle Ages;
- Greek philosophy and Roman values;
- Germanic culture and law; and
- The Renaissance intellectuals, the Protestant reformers, the scientific revolution, and the Enlightenment intellectuals.

**Other World Civilizations**

*Learning Goal: Students will demonstrate knowledge of one of the following:*

1. A broad outline of world history; or
2. Distinctive features of the history, economy, society, culture, etc., of one non-Western civilization.

*Measurable Learning Outcomes: Students are able to*

- Describe the development of principal regions of the world in their relevant historical contexts and time frames.
- Identify major international conflicts and their significance in shaping the world/region.
- Compare and contrast the major world socio-economic and political systems: Communism and Capitalism.
- Identify major cultural and social issues influencing world/regional development (e.g., human rights, Christianity).
- Identify major world leaders and personalities influencing world/regional development.
THE ARTS

Learning Goal: Students will demonstrate an understanding of at least one principal form of artistic expression and the creative process inherent therein.

Measurable Learning Outcomes: Students are able to

- Identify / define the technical components (principles, methods) and aesthetic components (perspectives, values) associated with the development of works within the subject field.
- Analyze works within the subject field with respect to their technical, conceptual and aesthetic components.
- Interpret works within the subject field with respect to their historical, cultural and social contexts.
- Exhibit creativity / originality in the application of techniques involved in the development of works appropriate to the subject field.
- Exhibit an appreciation of and literacy/fluency in the art form.

MATHEMATICS

STANDARDS AND RUBRICS FOR ASSESSING GENERAL EDUCATION IN MATHEMATICS
WRITTEN BY THE DISCIPLINE PANEL IN MATHEMATICS – (09/08/05)

Learning Outcome #1: Students will demonstrate the ability to interpret and draw inferences from mathematical models such as formulas, graphs, tables, and schematics.

Rubric:
Level--Completely Correct (CC)
- The student demonstrates the ability to interpret the variables, parameters, and/or other specific information given in the model.
- The student uses the model to draw inferences about the situation being modeled in a manner that is correct and evident.
- The interpretation(s) and inference(s) completely and accurately represent the model or answers the question(s).

Level--Generally Correct (GC)
- The student demonstrates the ability to interpret the variables, parameters, and/or other specific information given in the model. The interpretation may contain minor flaws.
- The student uses the model to draw inferences about the situation being modeled in a manner that may contain some minor flaw(s).
- The interpretation(s) and/or inference(s) are incomplete or inaccurate due to a minor flaw, such as a computational or copying error or mislabeling.

Level--Partially Correct (PC)
- The student makes no appropriate attempt to interpret the variables, parameters, and/or other specific information given in the model due to major conceptual misunderstandings.
- The student attempts to use the model to make the required inference(s) and/or interpretation(s) but lacks a clear understanding of how to do so.
- The interpretation(s) and/or inference(s) are incomplete or inaccurate due to a major conceptual flaw.

*Source: 2004 NCC-GEAR Report*
**Learning Outcome #2:** Students will demonstrate the ability to represent mathematical information symbolically, visually, numerically and verbally.

**Rubric:**

**Level--Completely Correct (CC)**
- The student fully understands the mathematical information and employs the appropriate representation(s) to display the mathematical information.
- The student correctly and accurately employs all the appropriate and required aspects of the representation to display the information.
- The representation of the given information is correct and accurate. The student uses the correct format, mathematical terminology, and/or language. Variables are clearly defined, graphs are correctly labeled and scaled, and the representation is otherwise complete as required.

**Level--Generally Correct (GC)**
- The student understands most of the important aspects of the mathematical information and employs the appropriate representation(s) to display the mathematical information with possibly minor flaws such as a simple misreading of the problem or copying error or mislabeling.
- The student correctly and accurately employs most of the appropriate and required aspects of the representation to display the information. The representation is lacking in a minor way such as a simple misreading of the problem or copying error or mislabeling.
- There is a misrepresentation of the information due to a minor computational/copying error. The student uses mostly correct format, mathematical terminology, and/or language. Variables are clearly defined, graphs are correctly labeled and scaled, but the representation is incomplete in some minor way.

**Level--Partially Correct (PC)**
- The student does not fully understand the important aspects of the mathematical information and employs the appropriate representation(s) to display the mathematical information with major conceptual flaws.
- The student shows some knowledge of how to employ most of the appropriate and required aspects of the representation to display the information. The representation is lacking in a major way.
- The representation(s) show some reasonable relation to the information but contains major flaws. The student uses some correct format, mathematical terminology, and/or language. Variables are clearly defined, graphs are correctly labeled and scaled, but the representation is incomplete in some major conceptual way.

**Level--Incorrect Solution (IC)**
- The student cannot represent the mathematical information in the representation(s) required.
- The student completely misinterprets and/or misrepresents the information.
- The representation(s) is incomprehensible or unrelated to the given information. The process of developing the representation is entirely incorrect.
- The student’s response does not address the question in any meaningful way.
- There is no response at all.

**Learning Outcome #3:** *Students will demonstrate the ability to employ quantitative methods such as, arithmetic, algebra, geometry, or statistics to solve problems.*

**Rubric:**

*Level--Completely Correct (CC)*
- The student demonstrates a full understanding of the problem and/or can identify a specific numeric, algebraic, geometric, or statistical method(s) that is needed to solve the problem.
- The student uses the method(s) to solve the problem. The plan for the solution is clear, logical and evident.
- The solution is accurate and complete.

*Level--Generally Correct (GC)*
- The student demonstrates some understanding of the problem and/or can identify the specific arithmetic, algebraic, geometric or statistical method(s) needed to solve the problem.
- The student uses the method(s) to solve the problem. The plan for the solution is clear, logical and evident but is lacking in a minor way such as a simple misreading of the problem or copying error.
- The solution is generally correct but may contain a minor flaw(s).

*Level--Partially Correct (PC)*
- The student demonstrates only a slight understanding of the problem. The student has difficulty identifying the specific arithmetic, algebraic, geometric or statistical method(s) needed to solve the problem.
- The student attempts to use a method(s) that will solve the problem, but the method itself or the implementation of it, is generally incorrect. The plan is not evident or logical.
- The solution contains some correct aspects though there exists a major conceptual flaw(s).

*Level--Incorrect Solution (IC)*
- The student demonstrates no understanding of the problem and/or he/she cannot identify the specific arithmetic, algebraic, geometric or statistical method(s) needed to solve the problem.
- The student cannot to use a method(s) that will solve the problem. Little or no work is shown that in any way relates to the correct solution of the problem.
- The student’s response does not address the question in any meaningful way.
- There is no response at all.

**Learning Outcome #4:** *Students will demonstrate the ability to estimate and check mathematical results for reasonableness.*

**Rubric:**

*Level--Completely Correct (CC)*
- The student can estimate and justify a mathematical result to a problem.
- The student can articulate a justification for the estimate and the estimate has been found using a clearly defined, logical plan.
- The student’s response is complete and accurate.

*Source: 2004 NCC-GEAR Report*
Level--Generally Correct (GC)
- The student can estimate and justify a mathematical result to a problem but the estimate or justification contains a minor flaw such as a simple misreading of the problem or computational or copying error or mislabeling.
- The student can articulate a justification for the estimate but the student’s justification and/or estimate has been found was lacking in some minor way.
- The student’s response addresses all aspects of the question but is lacking in some minor way.

Level--Partially Correct (PC)
- The student can estimate and justify a mathematical result to a problem but the estimate or justification contains a major conceptual flaw.
- The student can articulate a justification for the estimate but the student’s justification and/or estimate has been found was lacking in some major conceptual way.
- The student’s response addresses some aspect of the question correctly but is lacking in a significant way.

Level--Incorrect Solution (IC)
- The student cannot estimate and/or justify a mathematical result to a problem.
- The student’s justification is not supported by any logic plan.
- The student’s response does not address the question in any meaningful way.
- There is no response at all.

Learning Outcome #5: Students will demonstrate the ability to recognize the limits of mathematical and statistical methods.

Rubric:

Level--Completely Correct (CC)
- Student clearly articulates the assumptions/simplifications made in developing a mathematical/statistical model or implementing method(s) or technique(s).
- Student provides an accurate description how the results from the model might differ from the real life situation it models.

Level--Generally Correct (GC)
- Student articulates most of the assumptions/simplifications made in developing a mathematical/statistical model or implementing method(s) or technique(s).
- Student provides a generally correct description of how the results from the model might differ from the real life situation it models.

Level--Partially Correct (PC)
- Student articulates only some of the assumptions/simplifications made in developing a mathematical/statistical model or implementing method(s) or technique(s).
- Student indicates that the conclusions drawn from the model differ from real life but is unable to articulate the cause(s).

Level--Incorrect Solution (IC)
- Student does not articulate any assumptions/simplifications made in developing a mathematical/statistical model or implementing method(s) or technique(s).
- Student fails to realize that the results are not contextually appropriate.
- There is no response at all.

**GLOBAL / INFUSED LEARNING COMPETENCIES**

**Information Literacy & Management**

**Learning Goal:** Students will demonstrate competency in the methods of information literacy/management through their exposure to information resources and research techniques in applications relevant to the subject field.

**Measurable Learning Outcomes:** Students are able to

- Perform the basic operations of personal computer use, such as word processing, presentations, spreadsheets, email, the Internet, CD-ROMs, online databases, etc.
- Understand and use basic research techniques, including the ability to: identify a research topic or other information need, identify potential sources of information in a variety of formats, construct effective search strategies for the needed information (e.g., identifying key words, concepts, synonyms, related terms, etc.).
- Locate, evaluate and synthesize information from a variety of sources, including the ability to implement a search strategy from print and non-print sources; to interpret bibliographic citations; to determine the validity, reliability, authority, relevance and/or usefulness of gathered information; to create a product that demonstrates organization and integration of gathered information; to exercise discrimination in the ethical use of information and adhere to the standards of plagiarism.

**Critical Thinking**

**Learning Goal:** Students will develop critical thinking skills through their exposure to the methods of evidence and reasoning utilized to advance understanding in a subject field.

**Measurable Learning Outcomes:** Students are able to

- Identify, analyze and evaluate arguments as they occur in their own or other’s work, as demonstrated by their ability to decide whether the explicit or implicit premises of a (subject-specific) argument contain enough true, relevant information to justify acceptance of its conclusion; to explain why the premises do or do not support a conclusion; to understand the methods scientists use as a systematic application of critical thinking; to exercise other specified abilities with respect to the analysis of arguments important to the applications of the subject field.
- Develop well-reasoned arguments, as demonstrated by their ability to present a claim and support it with evidence; to anticipate and respond to criticisms and counter-arguments; to exercise other specified abilities with respect to the development of well-reasoned arguments important to the applications of the subject field.

**Basic Communication (Written)**

**Learning Goal:** Students will develop college level writing skills within the context of their coursework.
Measurable Learning Outcomes: *Students are able to demonstrate their ability to*

- Produce coherent texts within common college level forms.
- Revise and improve such texts.

**Basic Communication (Oral)**

**Learning Goal:** *Students will demonstrate an appropriate level of competence in oral discourse.*

**Measurable Learning Outcomes:** *Students are able to demonstrate their ability to*

- Communicate a clear thesis/purpose for speaking.
- Organize information in a logical pattern.
- Support ideas with credible evidence.
- Deliver articulate messages in a pleasing, energetic manner appropriate for the audience/occasion.
- Use appropriate language for the audience/occasion.

*Source: 2004 NCC-GEAR Report*