RESOLUTION-POLICY

X	Action Item
	For Information Only

From: Dr. William Freind, Rowan University Senate President

To: Dr. James Newell, Provost

Date: 5/14/14

RE: Senate Resolution ***140512-1***

Framework for a Revised General Education Program

Rationale for this Framework

After the Rowan Core proposal was voted down by the Senate in February, many senators suggested that because that model had many valuable ideas and insights, it could be revised in such a way that it could pass a subsequent vote with wide support. Because there was insufficient time left in the academic year to pass a revised model, an ad hoc committee was formed to present a series of guidelines and recommendations that would aid in the development of a full model in Fall 2014. The ad hoc Rowan Core committee to be formed in Fall 2014 is free to include, modify, or reject any or all of these guidelines and recommendations, as long as their model is assessable and compliant with the Lampitt Law.

Committee members Bill Carrigan, Karen Magee-Sauer, John Hasse and Bill Freind have developed the following framework, which is based on the immense efforts of the General Education Tactical Team and the Senate Ad Hoc Committee on the Rowan Core in researching, conceptualizing, and developing the Rowan Core model. The committee also acknowledges the active involvement of many in the Rowan community who participated in the Gen Ed reform process by attending meetings and providing substantial feedback.

Concerns with the Previous Rowan Core Model

The development of the new Rowan Core Literacies and their learning outcomes was a major accomplishment in the effort to create an integrated, progressive, and assessable Gen Ed system that addressed the recommendations of Middle States. The Rowan Core Literacies were ratified by the Senate in February, 2013.

While the Literacies were embraced in concept, the details of the proposed model for delivering the Literacies were more controversial. The proposed system entailed a fundamental change and left many with questions regarding the feasibility of

implementation. Questions were also raised about possible changing from the current model to the Rowan Core system without a mechanism for departments to receive data or feedback on unforeseen problems.

The Framework committee acknowledges the sincere and legitimate concerns that ultimately resulted in the negative senate vote. These included:

- Concerns that students might not understand the Rowan Core requirements given the **undue complexity** of the multi-literacy mandate for courses, and the resulting number of possible combinations.
- Concern that **BS majors** would require a substantially different model.
- Uncertainty of **how the literacies will translate** into existing departmental General Education courses.
- Concern that the **majority of General Education** courses at Rowan are **adjunct taught** and that some adjuncts may be unwilling or unable to teach multi-literacy courses.
- Concern regarding the **placement of transfer courses** into appropriate literacies.
- Concern about the development of a **completely separate Rowan Core curriculum process** from the regular curriculum process.
- Concern that some **vital Gen Ed components would be lost**, such as the requirement of Social/Behavioral Science or for a foreign language.

Although these and other concerns ultimately resulted in a negative senate vote, we believe that the vast majority of the work that was accomplished in reinventing Rowan's General Education model can provide the foundation for a revised model that can accomplish the objectives of the reform and also be widely embraced by the university community.

We believe that General Education at Rowan University will turn from a menu-driven, distribution model to one based on the attainment of six literacies (Artistic, Communicative, Global, Humanistic, Quantitative and Scientific) that are aligned with learning goals and outcomes. (See Appendix A for the literacies and their goals and outcomes.)

Recommendations

We recommend that the Rowan Core will offer different programs for students in BA and BS degree programs.

1. Students working toward a BS would need at least 30 credits in the Rowan Core, with at least one course in each literacy:

    - Artistic Literacy
    - Communicative Literacy. Comp I (COMP 01111) and Comp II (COMP 01112) are required.
    - Global Literacy
    - Humanistic Literacy
    - Quantitative Literacy
    - Scientific Literacy

BS students would also need three additional courses as part of their 30 credits:

a. Either Humanistic or Global
b. Either Scientific or Quantitative
c. Public Speaking (This requirement will expire after Spring 2018, and departments will be urged to include some form of Public Speaking as a program requirement.)

BS students will also need to complete a Writing Intensive course.

2. Students working toward a BA would need at least 36 credits in the Rowan Core, with at least one course in each literacy:

- Artistic Literacy
- Communicative Literacy. Comp I (COMP 01111) and Comp II (COMP 01112) are required.
- Global Literacy
- Humanistic Literacy
- Quantitative Literacy (Math requirement)[1]
- Scientific Literacy

While we feel that lab sciences courses can be an important part of the education of BA students, we are reluctant to require those courses. Instead, we suggest that BA students be offered an incentive to enroll in lab science courses. We propose that the Quantitative and Scientific Literacy courses must total at least seven credits. Students can choose from the following options:

a. A four credit lab science course and a three or four credit math course.
b. A three credit scientific literacy course and a three or four credit math course, along with an additional three credit course that satisfies the quantitative and/or scientific literacies.

Additionally, we propose that BA students (like BS students) would be required to take Public Speaking through Spring 2018. After that date, departments will be urged to include some form of Public Speaking as a program requirement.

BA students will also need to complete a Writing Intensive course.

Native students pursuing either a BA or a BS would be required to take both a Rowan Seminar in their first semester and an as yet unnamed course in their second or third semester. We suggest that, if possible, Rowan Seminars present at least two literacies. These courses are more fully explained on page 7 of this document.

[1] . BA students will need to take a Math course that corresponds to the existing requirement: Contemporary Mathematics (MATH01.115); Pre-calculus Mathematics (MATH01.122); College Algebra (MATH01.123); Calculus I (MATH01.130); Calculus II (MATH01.131); Structures of Mathematics (MATH01.201); Introduction to Geometry (MATH01.202); Calculus: Techniques & Applications (MATH03.125); Discrete Mathematics (MATH03.150); Discrete Structures (MATH03.160); Elementary Statistics (STAT02.100); Statistics I (STAT02.260); Honors Mathematics (H) (HONR05.180).

Requirements for Students in Accredited Programs

The curriculum for students in some programs is highly specified due accreditation requirements (such as NCATE and ABET). Therefore, the Rowan Core will be modified for students in these majors. It is anticipated that much of the Rowan Core model can be satisfied with careful assessment of existing coursework (possibly with some modifications) as well as utilization of credits currently dedicated to the existing general education model."

Transfer Students

According to the Lampitt Law, students who transfer to Rowan University with an Associate's Degree from a New Jersey county college have automatically fulfilled the lower level general education requirements.

The following diagram indicates how New Jersey community college general education courses map to the literacies in the Rowan Core framework.

Rowan Core Literacies	New Jersey Community College Goal Categories
Artistic Literacy	Humanistic Perspective
Communicative Literacy	Written and Oral Communication
Global Literacy	Global and Cultural Awareness Social and Human Behavior
Humanistic Literacy	Humanistic Perspective Historical Perspective
Quantitative Literacy	Quantitative Knowledge and Skills
Scientific Literacy	Scientific Knowledge and Reasoning

Transfer students will be required to complete a Writing Intensive course.

Implementation and Time Frame

This program will be implemented gradually to ensure proper planning, development and execution. This transition will occur over the course of four years. (See timeline below).

We propose the formation of two committees:

In Fall 2014, a Senate ad hoc committee will be formed to develop a Rowan Core model that will pass the Senate. Additionally, we recommend the formation in Fall 2015 of a permanent Senate committee called the Senate Rowan Core Committee to oversee and ensure the quality of the program.

We also recommend the creation of an independent administrative unit called the Rowan Core Program, to be headed by the Rowan Core Director, a faculty position with administrative release time. The Director's responsibilities will include scheduling and

assessing courses, recruiting staff to teach courses, organizing and coordinating the faculty training workshop, among other duties. Support staff of one secretary will be required to assist the director. Space will also be required to house the program and provide the director an office.

Timeline

In an effort to retain as much of the spirit and intent of the Rowan Core process to date while addressing the significant concerns that led to the negative senate vote, the committee proposes a pathway forward. We suggest a phased implementation of a reworked Rowan Core model that allows a stepped process of development, testing, evaluation and adjustment before a final model becomes officially implemented as Rowan's new system of General Education.

We propose the following implementation:

Phase I - Preliminary Rowan Core and Literacies Groundwork
Phase II - Trial Implementation of Rowan Core
Phase III - Assessment and Adjustment of the Rowan Core Model
Phase IV - Rowan Core Becomes Official

Phase I - Preliminary Rowan Core and Literacies Groundwork

(Fall 2014 through Spring 2015)

- **Current Gen Ed Model Remains in Place**
    - The current Gen Ed model will be maintained during Phases I, II and III.
    - We recommend the formation of a Senate ad-hoc committee to act on (and, if necessary, revise) the recommendations in this framework, and to develop a revised Rowan Core that will be passed by the Senate no later than December, 2014. This committee will have one representative from the College of Business; two representatives from the College of Communication and Creative Arts; one representative from the College of Education; one representative from Engineering; two representative from Humanities and Social Sciences; one representative from Performing Arts; and two representative Science and Mathematics.
    - A Rowan Core curriculum process will be established.

- **Recommended guidelines for departments who wish to offer courses in the Rowan Core**

- Departments will establish a primary literacy in which those courses will be designated.
- Departments will establish at least four learning objectives/outcomes for the literacy the course will develop.
- Departments will establish a plan for how the selected learning objectives/outcomes will be assessed within the given course.
- Departments that wish to offer courses that provide more than one literacy designation will submit a proposal for demonstrating the multi-literacy learning objectives and plan for assessment. At least four learning objectives must be address for each literacy.
- All courses will be reviewed by the Rowan Core committee for designation of the literacy(ies) and evaluation plan.
- Departments may also propose new multi-literacy courses that are either within their own department or with interdisciplinary collaboration.

- **Current Rowan Seminars should present at least two literacies, and should present an overview of the Rowan Core**.

- **Programs should develop a Senior Capstone model. The capstone course will cover at least two literacies and should be Writing Intensive. Departments can use their own capstone course to fulfill this requirement if it meets specific requirements.**

- **Departments and programs will develop models to assess their own courses.**

Phase II - Trial Implementation of Rowan Core Model

(Fall 2015 through Fall 2016)

The current Rowan Gen Ed model will remain in place, but courses in the Rowan Core Model will be run to evaluate their workability and provide data for adjustments.

First Year Experience

- Current Rowan Seminar courses will remain but will be enhanced to play more of the role envisioned by the Cornerstone concept in the previous Rowan Core proposal.
- Rowan Seminars should provide an introduction and overview to the Rowan Core model to give students context for the purpose of general education, what the Rowan Core is intended to do, and how students can get the most out of it.
- One or two semesters after completing Rowan Seminar, students will take an additional 100 level course that also introduces at least two literacies. Departments can begin to establish these 100-level courses during Phase I.
- When a sufficient number of these courses are available, Freshmen or first semester Sophomores will be required to take a multi-literacy course with at least two or more literacies different from the Rowan Seminar literacies so that they are introduced to at least four literacies by the middle of their second year.

Mid-level Courses

- Students will be required to take courses that fulfill at least one of each of the literacies so that each student has had each literacy at least once.
- Departments are urged to create mid-career courses that integrate two or more literacies, since those will be more attractive to students.

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Capstone Course

- Senior Capstone courses may be offered within the major and should address at least two literacies. The faculty member teaching the Capstone course should ensure that students have properly compiled their Rowan Core portfolios.

Departments and Programs will develop methods to assess these courses.

Phase III - Evaluation and Adjustment of Rowan Core Model

(Spring 2017 through Spring 2018)

- The Rowan Core model in Phase II will be monitored and evaluated, and adjustments will be made accordingly.
- A final draft of the new revised Rowan Core system will be presented to the Senate for Approval to officially replace the old Rowan Gen Ed System.

Phase IV - Rowan Core Becomes Official Rowan Model of General Education

(Fall 2018)

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APPENDIX A

The Rowan Core Literacies
Definitions, Learning Goals and Learning Outcomes

Artistic Literacy

Artistic literacy is the knowledge and understanding of the centrality of the arts and aesthetics to human existence. Art reflects, and artists respond to and interact with, their communities. Artistic literacy requires learning about and engaging in the creative and performing arts. Visual, verbal, physical and auditory expression will be informed by a study of historical and cultural contexts. Active experimental engagement, including critical

analysis and evaluation, will foster an aesthetic sensibility, which includes cognitive and emotional responses.

Learning Goals

Students will know:

- Vocabulary, practitioners, and various styles, genres, and traditions
- Historical foundations, ideological dimensions and cultural practices
- Practical techniques of expression and the creative process
- Professional and academic standards in the arts

Students will understand:

- The relationship of the arts to self and society
- The interdependent relationship of artists and audiences
- The innovative nature of the creative process
- How the body, voice, and mind can be used to express ideas
- The role of critical theory in the arts
- How art is a driver and product of culture
- The range of artistic contributions, such as "popular" or "high" art

Students will appreciate:

- The value of an aesthetic sensibility
- The role of the arts in society
- The ideological potential of art, e.g., as a means of social protest or political oppression

Students will engage their learning by:

- identifying and describing various forms of artistic expression
- Making and justifying aesthetic judgments
- Critiquing various forms of expression that are rooted in diverse cultures, value systems, or historical contexts
- Applying and practicing foundational creative techniques, such as visual, verbal, physical and auditory expression

Learning Outcomes

1. Students can use vocabulary related to and names of practitioners of various styles, genres, and traditions.
2. Students can describe historical foundations, ideological dimensions and cultural practices.
3. Students can discuss professional and academic standards in the arts.
4. Students can explain the relationship of the arts to self and society (e.g., the interdependent relationship of artists and audiences; how art, ranging from popular to high art, is both a driver and product of culture).
5. Students can demonstrate how the body, voice and mind can be used to express the creative process.
6. Students can describe the role of critical theory in the arts.
7. Students will experience firsthand and reflect on works of art and artistic performances in several different genres.
8. Students will critique (i.e., describe, analyze, interpret, judge) various forms of expression that are rooted in diverse cultures, values systems, or historical contexts.
9. Students will apply and practice foundation creative techniques, such as visual, verbal,

physical and auditory expression, through the creation of an original product or performance.

Communicative Literacy

Communicative literacy is the capacity to analyze, reflect on, and respond to diverse communication situations. This includes understanding the ways in which audience, context, and purpose shape acts of communication. Communicative literacy is demonstrated through fluency in various modes of communication and effective adaptation, invention, and choice of strategies for communication. Engagement in a range of communicative acts and experiences will cultivate critical awareness and ethical responsibility.

Learning Goals

Students will know:

- Critical reading and listening skills
- Standards and conventions of written and spoken discourse
- Research and citation skills within academic and nonacademic forums
- Information and communication technologies
- Diverse genres, styles, and strategies

Students will understand:

- How to be receptive as a reader and listener to new information and knowledge
- How individual perspectives affect the reception, interpretation and performance of communicative acts
- How self and community are situated within various communicative contexts, such as the social, the political, the personal, and the civic
- How purpose, audience, and context shape communication
- How language and cultural perceptions shape, construct, and negotiate reality
- How appropriate communication is defined by social groups or contexts through the use of genres, practices, and conventions
- How new media are revolutionizing communication

Students will appreciate:

- The creative power of language to shape reality (attitudes, actions, knowledge) in multiple forms
- The agility and knowledge required to respond to diverse communication situations
- The limits and possibilities of language use within particular social and material contexts
- The challenges of translation and comprehension
- The importance of intelligibility, purpose, and fluency in all communication forms

Students will appreciate:

- The creative power of language to shape reality (attitudes, actions, knowledge) in multiple forms
- The agility and knowledge required to respond to diverse communication situations
- The limits and possibilities of language use within particular social and material contexts

- The challenges of translation and comprehension
- The importance of intelligibility, purpose, and fluency in all communication forms

Students will engage their learning by:

- Transferring their understanding of effective written, oral, and nonverbal communication to all of their courses
- Practicing their communicative literacy skills in both academic and non-academic settings
- Taking responsibility for using language ethically, understanding that language is a powerful tool with social and material dimensions, functions, and consequences
- Critically analyzing how different modes of communication are constructed, meditated and moderated

Learning Outcomes

1. Students can compose texts that successfully respond to a variety of rhetorical situations and needs.
2. Students can investigate, discover, evaluate and incorporate information and ideas to create rhetorically adept messages
3. Students can create messages in a variety of formats, modes, and genres, including visual and digital modes.
4. Students can articulate their rhetorical choices/strategies in response to the needs and expectations of audience, context, and purpose.
5. Students can identify and evaluate various format, modes, and genres of communication within their social context.
6. Students can identify, analyze, and evaluate the rhetorical strategies of complex texts.
7. Students will produce and analyze complex texts (written, oral and nonverbal) for a variety of purposes and demonstrate their understanding of rhetorical strategies, genres, and discourse community expectations, and well as the effect of evolving digital technologies on communication.
8. Students will investigate, discover, evaluate and incorporate information and ideas to create authentic messages.
9. Students will explain how different forms of communication are culturally constructed, meditated, and moderated and how their value and effects are situate din the global, the political, the social, the civic, and the personal.

Global Literacy

Global literacy is the ability to understand the complexities of one's own society as well as the global community. This requires knowledge of the diversity of world cultures and recognition of the interdependence of the contemporary world. The extensive globalization of the world's economies and societies reveals the limits of human and natural resources in a global context. Knowledge of the reciprocal nature of local and global conditions will produce an international perspective. Engagement will occur through the traditional curriculum as well as high impact, experiential learning, such as Study Abroad, internships, service, and other methods of active community engagement.

Learning Goals

Students will know:

- The interconnectedness and interdependencies of the global community
- The issues regarding environmental, social and economic sustainability

- The social and cultural differences that influence individuals' lived experiences as members of communities
- The multiple avenues for civic engagement

Students will understand:

- Their perspective, rights and obligations as members of multiple communities
- The connections among the self, the local community and the global community
- How sustainability issues are embedded in disparate social, cultural, ecological, and economic milieus
- The costs and benefits of globalization
- Why solutions to many of today's problems are often borderless
- How culture shapes one's world view

Students will appreciate:

- How diversity in gender, race/ethnicity, ability, status, sexual orientation, national origin, etc. impacts individuals' differing lived experiences
- The value of civic engagement for the individual and for the community
- The growing internationalization of human experience
- The complex interdependencies of world economies and societies
- The interplay between cultural traditions and the increasing standardization of the global community
- The pervasiveness and importance of technology and its impact on global communities
- The history, literature, language, arts and cultures of other societies

Students will engage their learning by:

- Participating as builders and active members of multiple communities
- Engaging in international experiences (such as Study Abroad, study of foreign languages and cultures, service learning in an immigrant community, internationally focused co-curricular activities, etc.)
- Analyzing and reflecting upon social justice, multiculturalism, sustainability, and diversity in both local and international contexts

Learning Outcomes

1. Students can demonstrate civic engagement by active participation and reflection.
2. Students can express their knowledge and understanding of another culture.
3. Students can describe connections between local and global communities.
4. Students can communicate their understanding of sustainability in social, cultural, ecological and/or economic milieus, both locally and globally.
5. Students can express connections between the self and community.
6. Students can explain the costs and benefits of globalization.
7. Students will reflect critically on their own cultural experiences, cross-cultural interactions, and the diverse cultural experiences of others.
8. Students will use comparative thinking to understand local/global connections in contemporary society on arrange of cultural, political, economic and environmental issues.
9. Students will describe and appraise their civic engagement as active members and builders of multiple communities.

Humanistic Literacy

Humanistic literacy is the ability to understand how human experience is shaped by economic, political, literacy, socio-cultural, historical and other contexts. Humanistic literacy includes critical awareness of how dominant paradigms are created and shape human thinking and feeling. It also encompasses the ability to empathize with other times, places, cultures, and mindsets and to grasp the complexity of change and perspective. Active engagement involves the study ad interpretation of significant texts and artifacts to develop awareness and to use this awareness to make decisions and to initiate and react to change.

Learning Goals

Students will know:

- Human commonalties and differences as represented by histories, literary traditions, philosophical and religious viewpoints, and political and economic systems around the globe and throughout human history
- The major developments in human history and thought that led to the complex modern world

Students will understand:

- How the basic concepts/paradigms of major disciplines provide context for diverse interpretations of the present and past
- Intellectual and social dimensions of human experience in local and global contexts
- The impact of geographic, ecological, political, economic, and socio-cultural contexts on human experience and activity

Students will appreciate:

- The complexity of any historical moment, including the present, is a product of multiple, interacting forces within economic, political, geographic, socio-cultural, and other contexts
- That continuity and change as inherent to human experience
- That understanding the past takes into account knowing the values and culture of a particular time and place
- That intellectual inquiry generates debate and controversy, often leading to new perspectives

Students will engage their learning by:

- Studying texts and artifacts that reflect the concerns and experiences of the intellectual moment in which they were created
- Interpreting these texts and artifacts in light of a variety of theoretical and critical perspectives while demonstrating an understanding that no absolute “truth” exists in such interpretive efforts
- Using sound reason to evaluate claims, assess evidence, and guide decision making.

Learning Outcomes

1. Students can identify and describe major developments in human history and thought.
2. Students can identify major commonalities and differences in human societies.
3. Students can analyze and explain the factors, events, and developments that led to the contemporary world.

4. Students can locate and explain how basic concepts and/or paradigms of different disciplines can provide context for diverse interpretations of a present or past event.
5. Students can incorporate intellectual and social dimensions of human experience into an analysis of local and global contexts.
6. Students can explain the impact of geographic, ecological, political, economic, and socio-cultural contexts on human experience and activity.
7. Students will analyze the context and significance of a particular intellectual moment (e.g., prepares a debate or position paper).
8. Students will interpret texts and/or artifacts through multiple perspectives.
9. Students will evaluate claims, assess evidence, and exercise ethical standards to build a coherent argument on an event or topic.

Quantitative Literacy

Quantitative literacy is the ability to reason logically and to communicate mathematical ideas verbally, symbolically, and graphically. It means knowing fundamental concepts and techniques of mathematical principles and processes in order to see mathematical functions as quantitative relationships, to understand the concept of probability, and to estimate or approximate answers to questions. This knowledge provides a foundation for understanding how to construct logical arguments and how to make use of mathematical thinking. Quantitative literacy encourages appreciation of mathematics as a practical tool as well as a philosophical and humanistic endeavor which helps to understand the world. Engagement in quantitative literacy includes analysis of the use of mathematics and the application of mathematical thinking and modeling to real-world problems.

Learning Goals

Students will know:

- Fundamental functions and relational thinking
- Analytical thinking—how functions change as underlying parameters change
- Algorithmic thinking—being able to model a "real-world" problem as a "math-world" problem
- Computational thinking—how to solve complex problems through iterative processes
- Basic descriptive statistics (definitions, concepts)
- The distinction between continuous and discrete quantities (analog v. digital; real numbers v. natural numbers, measurable v. countable)

Students will understand:

- How to construct a complete, logical argument in quantitative terms
- Mathematical modeling as a representation of reality that can be evaluated based on its usefulness
- Applications and limitations of computational and statistical reasoning
- The difference between correlation and causality
- Quantitative and logical reasoning

Students will appreciate:

- Mathematics as a philosophical abstraction
- The contribution of quantitative reasoning to human innovation and progress

Students will engage their learning by:

- Communicating mathematical ideas in symbolic, graphic, oral and written forms

- Evaluating the appropriateness and limitations of quantitative models of real-world situations
- Applying algorithmic thinking to solve quantitative, real-world problems
- Assessing the claims of others and make informed decisions about issues related to probability

Learning Outcomes

1. Students can define basic statistical and regression vocabulary and also qualitatively describe the meanings relative to a set of given data (e.g. mean vs. median, what does the standard deviation represent; correlation coefficients, and model parameters/coefficients)
2. Students can outline a logical solution to complex real-world problems through simplification to a mathematical model.
3. Students can describe the differences between continuous (e.g. measureable) and discrete (e.g. countable) quantities and how this affects how they can be analyzed.
4. Students can perform basic statistical and regression analyses on data and also qualitatively describe the meaning of the results (e.g. how they change as new data are added, limits of regression models and how they can infer correlation and/or causality).
5. Students can solve complex real-world problems through simplification to a mathematical model and then discuss how that model is affected by adding back in ignored complexities.
6. Students can perform basic analyses on both discrete and continuous data.
7. Students will communicate mathematical ideas in symbolic, graphic, oral and written forms.
8. Students will evaluate the appropriateness and limitations of deterministic and probabilistic models to make informed decisions in real world situations.
9. Students will apply algorithmic thinking to solve quantitative, real world problems.

Scientific Literacy

Scientific literacy is the understanding that science is systematic, evidence-based process of observation, modeling, and testing, to formulate and refine theories which not only explain but predict. Scientific literacy encompasses an appreciation of the role of science in society, technology, engineering, and mathematics. It includes recognition of the scientific knowledge, skills and values that promote informed evaluation of the validity of claims and proposed solutions to current problems. Scientific literacy does not necessarily involve the production of new science but rather it enables one to informed decisions and cooperative engagement in the protection and improvement of the world through scientific processes.

Learning Goals

Students will know:

- Basic working definitions and vocabulary
- Universal unifying concepts in science
- Scientific skills including critical observation, objective analysis, measurement, estimation, and analyzing uncertainties (scientific error)

Students will understand:

- How science uses specific processes to yield accepted results
- How science uses models (simplifications) to represent the world and how these

models are evaluated as a function of their usefulness
- The difference among fact, hypothesis, and theory
- That the world is a collection of explainable phenomena and that it is possible to identify what is not yet known
- The importance of science in formulating public policy

Students will appreciate:
- The concept that learning science requires doing science
- Science is a human process, with a history and social context
- The value of science for understanding the natural world and improving the human condition
- That scientific conclusions must be informed by scientific evidence resulting from a systematic process of inquiry and reflective practice
- The value of a healthy, informed inquiry
- The accessibility of scientific knowledge and skills

Students will engage their learning by:
- Solving problems and making decisions in systematic ways by collecting and analyzing data to verify or falsify a hypothesis and by using evidence to distinguish between competing hypotheses
- Communicating scientific information effectively
- Being informed consumers of science

Learning Outcomes
1. Students can demonstrate the ability to conduct scientific measurement and to discuss its limitation due to scientific error/uncertainty.
2. Students can conduct directed experiments including set-up, data collection, data analysis, and interpret results to either "discover" or verify scientific theory.
3. Students can demonstrate knowledge of core ideas and vocabulary of science and the scientific method in written and/or oral work.
4. Students can describe how to design an experiment to test competing hypotheses by manipulating and controlling variables.
5. Students can identify and explain a modern example of public policy drawing on scientific evidence.
6. Students can discuss the utility and limitations of scientific models.
7. Students will conduct, critique and design scientific studies following the standard scientific method.
8. Students will compose and critique scientific arguments as presented in both popular media and scientific literature as well as compose their own.
9. Students will apply scientific data to solve a real-world problem.

Acceptance:
_____ I give my approval. I have forwarded this item to _____ for implementation.

_____ No approval is actually needed. I have forwarded this item to the following individual or office for informational purposes only:
_____

ADDITIONAL REVIEW NEEDED:
_____ I am willing to give approval if the following modification(s) are made:

_____ Before I can approve or reject this item, I need clarification on the following:

_____ I have forwarded this item to the following individual or office for further consideration and consultation.

Rejection:
_____ I decline acceptance of this item for the following reason:

*Please Return this Copy to the University Senate President ~ Retain a Copy for Your Record*s