Program SLOs
Biology

A.S. Degree – Biology, Biological Sciences, with options in: Biology; Health Science/Pre-Professional; Pre-Nursing
A.S.-T Degree – Biology (A.S. for Transfer)
A.S. Degree – General Science

Biology Program Student Learning Outcomes from the 2015 PrOF (Program Review) Update			
1	Program Student Learning Outcome (P-SLO)	**Successfully complete biology courses required to fulfill the goals of students.**	• Successfully complete biology courses required for completion of AA and AS degrees, transfer, acceptance to professional programs, or life-long learning. Students will have the skills and knowledge to successfully complete future courses for which CRC biology courses are prerequisites.
2	Program Student Learning Outcome (P-SLO)	**Demonstrate ability to acquire, synthesize, and evaluate information in biology.**	• Demonstrate understanding of the scientific method by designing experiments to test scientific hypotheses, including use of proper controls and appropriate choice of data to collect in order to address a specific hypothesis. • Use appropriate laboratory and/or field methods to make observations and acquire data. Examples of methods are measurement, microscopy, biotechnology, field sampling, and identification. • Collect, organize, and apply basic statistical analysis to data. • Acquire, evaluate, and synthesize information from print and electronic sources. • Evaluate information and data for quality, scientific validity, relevance, and bias. • Reach and clearly express logical conclusions that are supported by data.
3	Program Student Learning Outcome (P-SLO)	**Demonstrate ability to responsibly apply biological knowledge to individual, community, and global problems.**	• Identify the ethical implications of biological research, recognize the importance of the wise use of biological knowledge, and work

Biology Program Student Learning Outcomes from the 2015 PrOF (Program Review) Update			
			toward a personal resolution of ethical issues.
4	Program Student Learning Outcome (P-SLO)	**Demonstrate knowledge of and ability to think critically about biology.**	• Accurately apply appropriate vocabulary and concepts to describe and explain biological structures and processes. • Solve problems of a conceptual and/or numerical nature in biology, such as determining inheritance patterns, evaluating effects of perturbations to biological systems, and applying course knowledge to understanding of diseases, social issues, and ecological problems. • Present written and/or oral reports which address background information, procedures, results, and interpretation of data acquired during a laboratory or field activity. • Analyze multiple-choice questions, essay prompts and other types of test questions, and demonstrate the ability to respond with accurate, complete, and relevant information. • Apply the perspective of the scientific method to gathering and evaluating biological information. • Recognize the use and misuse of scientific concepts in society, including politics and the media.

A.S. – Biology, Biological Sciences with options in: Biology; Health Science/Pre-Professional Student Learning Outcomes**
SLO-1 DEMONSTRATE UNDERSTANDING OF THE PROCESSES OF SCIENCE, THE SCIENTIFIC METHOD, AND THE RELATIONSHIP BETWEEN SCIENTIFIC RESEARCH AND ESTABLISHED KNOWLEDGE. This includes the ability to: *Elucidate the way in which research leads to generally accepted conclusions and the integration of new research data with the building of a body of scientific knowledge. * Recognize that the information presented in science textbooks and other established “authorities” is the result of research conducted in the field or the lab and is based on an accumulation of data. *Design a scientific inquiry, including use of proper controls and analyses. *Demonstrate critical thinking skills by the analysis of data sets, recognition of the implications of perturbations to biological systems, and synthesis of information to draw conclusions.
SLO-2 EXPRESS ONE'S SELF [THEMSELVES] CLEARLY WHEN WRITING OR SPEAKING ABOUT BIOLOGY, DEMONSTRATING KNOWLEDGE OF BASIC BIOLOGICAL TERMINOLOGY AND UNDERSTANDING OF MAJOR BIOLOGICAL CONCEPTS. This

includes the ability to produce: *Laboratory reports which address background information, procedures, results, and analysis of data developed during a laboratory exercise or inquiry project. *Essays explaining biological processes in clear and concise terms. *Reports and term papers which clearly explain biological processes and elucidate current theories explaining biological phenomena.
SLO-3 DEMONSTRATE BOTH CONTENT KNOWLEDGE AND TEST TAKING SKILLS WHEN COMPLETING ESSAY, OBJECTIVE, AND MULTIPLE CHOICE EXAMS. This includes the ability to: *Demonstrate problem-solving abilities in the major content areas of biology including cell biology, anatomy, physiology, genetics, ecology, and evolution. *Analyze the logic of a multiple-choice question about biology and select the correct response from among related items. *Write clear responses to essay question prompts without including extraneous information or omitting information necessary to provide a clear answer. *Utilize test-taking skills such as critical analysis of information, test-time management and focused writing. *Demonstrate content knowledge in the broad areas of biology including cell biology, anatomy, physiology, genetics, ecology, and evolution.
SLO-4 CHOOSE AND UTILIZE APPROPRIATE LABORATORY TECHNIQUES PROFICIENTLY. Laboratory techniques for the Biology Health Sciences Pre-Professional Program include: *Measurement (use of metric measures) *Microscopy *Pipetting *Gel electrophoresis *Dissection *Basic biochemical techniques such as pH testing, Biuret test, Benedict's test, etc. *Ability to design a laboratory experiment, including the use of adequate controls and choice of analyses used to examine data, etc. Additional laboratory techniques relevant to the Biology Health Science Pre-Professional Program can be found in the SLOs for the chemistry and physics courses required for this major.
SLO-5 EVALUATE BIOLOGICAL DATA, DRAW REASONABLE CONCLUSIONS, RECOGNIZE THE ETHICAL IMPLICATIONS OF THESE CONCLUSIONS, AND APPLY THESE CONCLUSIONS TO PERSONAL, COMMUNITY, AND SCIENTIFIC PROBLEMS. This includes the ability to: *Choose what data to collect in order to address a specific hypothesis. *Collect data and keep organized records. *Conduct basic graphical and statistical analysis of data. *Reach and clearly express logical conclusions based on biological data. *Relate, in presentations and/or in written reports, how biological information is relevant to personal and community issues. *Recognize the ethical implications of biological research and the responsibility to use knowledge wisely.
SLO-6 EMPLOY INFORMATION-GATHERING TOOLS TO INVESTIGATE BIOLOGICAL IDEAS. This includes the ability to: *Use the Internet in order to gather scientific information, including the ability to recognize the relevance and scientific validity (or lack thereof) of information when found. *Use the library in order to gather scientific information, including the ability to recognize the relevance and scientific validity (or lack thereof) of information when found.

A.S. – Biology: Pre-Nursing **Student Learning Outcomes****
SLO-1 Demonstrate understanding of the processes of science, the scientific method, and the relationship between scientific research and established knowledge. This includes the ability to… •Elucidate the way in which research leads to generally accepted conclusions and the integration of new research data with the building of a body of scientific knowledge. •Recognize that the information presented in science textbooks and other established "authorities" is the result of research conducted in the field or the lab and is based on an accumulation of data. •Design a scientific inquiry, including use of proper controls and analyses •Demonstrate critical thinking skills by the analysis of data sets, recognition of the implications of perturbations to biological systems, and synthesis of information to draw conclusions.
SLO-2 Express themselves clearly when writing or speaking about biology, demonstrating knowledge of basic biological terminology and understanding of major biological concepts. This includes the ability to produce: •Laboratory reports which address background information, procedures, results, and analysis of data developed during a laboratory exercise or inquiry project •Essays explaining biological processes in clear and concise terms •Reports and term papers which clearly explain biological processes and elucidate current theories explaining biological phenomena

SLO-3 Demonstrate both content knowledge and test taking skills when completing essay, objective, and multiple choice exams. This includes the ability to: •Demonstrate problem-solving abilities in the major content areas of biology including cell biology, anatomy, physiology, genetics, ecology, and evolution. •Analyze the logic of a multiple-choice question about biology and select the correct response from among related items. •Write clear responses to essay question prompts without including extraneous information or omitting information necessary to provide a clear answer •Utilize test-taking skills such as critical analysis of information, test-time management and focused writing •Demonstrate content knowledge in the broad areas of biology including cell biology, anatomy, physiology, genetics, ecology, and evolution.

SLO-4 Use appropriate laboratory techniques proficiently. Pre-nursing majors lab techniques include: •Measurement (use of metric measures) •Microscopy (including histology) •Identification of unknown microorganisms •Staining of bacteria •Use of equipment used to gather physiological data on humans •Additional laboratory techniques relevant to pre-nursing majors can be found in the SLOs for the chemistry courses required for this career option.

SLO-5 Evaluate biological data, draw reasonable conclusions, recognize the ethical implications of these conclusions, and apply these conclusions to personal, community, and scientific problems. This includes the ability to: •Choose what data to collect in order to address a specific hypothesis •Collect data and keep organized records •Conduct basic graphical and statistical analysis of data •Reach and clearly express logical conclusions based on biological data •Relate, in presentations and/or in written reports, how biological information is relevant to personal and community issues • Recognize the ethical implications of biological research and the responsibility to use knowledge wisely

SLO-6 Employ information-gathering tools investigate biological ideas. This includes the ability to… •Use the Internet in order to gather scientific information, including the ability to recognize the relevance and scientific validity (or lack thereof) of information when found. •Use the library in order to gather scientific information, including the ability to recognize the relevance and scientific validity (or lack thereof) of information when found.

A.S. -T – Biology for Transfer
Student Learning Outcomes**

SLO-1 DEMONSTRATE UNDERSTANDING OF THE PROCESSES OF SCIENCE, THE SCIENTIFIC METHOD, AND THE RELATIONSHIP BETWEEN SCIENTIFIC RESEARCH AND ESTABLISHED KNOWLEDGE. This includes the ability to… • Elucidate the way in which research leads to generally accepted conclusions and the integration of new research data with the building of a body of scientific knowledge. • Recognize that the information presented in science textbooks and other established “authorities” is the result of research conducted in the field or the lab and is based on an accumulation of data. • Design a scientific inquiry, including use of proper controls and analyses • Demonstrate critical thinking skills by the analysis of data sets, recognition of the implications of perturbations to biological systems, and synthesis of information to draw conclusions.

SLO-2 EXPRESS ONE'S SELF CLEARLY WHEN WRITING OR SPEAKING ABOUT BIOLOGY, DEMONSTRATING KNOWLEDGE OF BASIC BIOLOGICAL TERMINOLOGY AND UNDERSTANDING OF MAJOR BIOLOGICAL CONCEPTS. This includes the ability to produce: • Laboratory reports which address background information, procedures, results, and analysis of data developed during a laboratory exercise or inquiry project. • Essays explaining biological processes in clear and concise terms. • Reports and term papers which clearly explain biological processes and elucidate current theories explaining biological phenomena.

SLO-3 DEMONSTRATE BOTH CONTENT KNOWLEDGE AND TEST TAKING SKILLS WHEN COMPLETING ESSAY, OBJECTIVE, AND MULTIPLE CHOICE EXAMS. This includes the ability to: • Demonstrate problem-solving abilities in the major content areas of biology including cell biology, anatomy, physiology, genetics, ecology, and evolution. • Analyze the logic of a multiple-choice question about biology and select the correct response from among related items. • Write clear responses to essay question prompts without including extraneous information or omitting information necessary to provide a clear answer. • Utilize test-taking skills such as critical analysis of information, test-time management and focused writing. • Demonstrate content knowledge in the broad areas of biology including cell biology, anatomy, physiology, genetics, ecology, and evolution.

SLO-4 CHOOSE AND UTILIZE APPROPRIATE LABORATORY TECHNIQUES PROFICIENTLY. Biology majors' lab techniques include: • Measurement (use of metric measures) • Microscopy • Pipetting • Gel electrophoresis • Dissection • Basic biochemical techniques such as pH testing, Biuret test, Benedict's test, etc. • Ability to design a laboratory experiment, including the use of adequate controls and choice of analyses used to examine data, etc. Additional laboratory techniques relevant to biology majors can be found in the SLOs for the chemistry and physics courses required for this major.
SLO-5 EVALUATE BIOLOGICAL DATA, DRAW REASONABLE CONCLUSIONS, RECOGNIZE THE ETHICAL IMPLICATIONS OF THESE CONCLUSIONS, AND APPLY THESE CONCLUSIONS TO PERSONAL, COMMUNITY, AND SCIENTIFIC PROBLEMS. This includes the ability to: • Choose what data to collect in order to address a specific hypothesis. • Collect data and keep organized records. • Conduct basic graphical and statistical analysis of data. • Reach and clearly express logical conclusions based on biological data. • Relate, in presentations and/or in written reports, how biological information is relevant to personal and community issues. • Recognize the ethical implications of biological research and the responsibility to use knowledge wisely.
SLO-6 EMPLOY INFORMATION-GATHERING TOOLS TO INVESTIGATE BIOLOGICAL IDEAS. This includes the ability to… • Use the Internet in order to gather scientific information, including the ability to recognize the relevance and scientific validity (or lack thereof) of information when found. • Use the library in order to gather scientific information, including the ability to recognize the relevance and scientific validity (or lack thereof) of information when found.

**Developed through the Curriculum Committee approval process.