BIOLOGY

Honours Major

Upon successful completion of the requirements for a BSc in the Biology 16 Course Honours Major, a student should know, and be able to do the following:

I. Depth and Breadth of Knowledge
- A. describe in detail the development of biological thought from the early concept of a vital force to the physical, chemical and molecular processes needed to sustain life.
- B. recall clearly the paradigm shift in the 19th Century that transferred the authoritative voice in matters of biology from the clergy-scientist to the public-scientist.
- C. clearly describe how biology is built upon the foundations of other academic disciplines, and explain in detail how the knowledge of other sciences (e.g., physics, chemistry, mathematics),or the humanities (e.g., philosophy, history), has facilitated our understanding of biology.
- D. give numerous examples of the contributions made by biologists through the centuries knowing that biologists have been awed by the intricate designs that many have attributed to the actions of an intelligent designer.
- E. review in detail the recent advances in biotechnology as they apply to an understanding of how biological processes and systems function, ranging from the molecular and cellular level to the environment and the biosphere.
- F. summarize the technologies and the knowledge they generated in the major fields of biology, such as genetics, molecular biology, cell biology, evolutionary biology, ecology, botany and zoology.
- G. summarize the process leading to the development of a testable biological hypothesis and articulate this information in the form of a research proposal.

II. Knowledge of Methodologies
- A. clearly differentiate between a fact of biology and a theory of biology, and give examples of discerning what facts support or refute which theories.
- B. distinguish between a scientific debate and a theological debate pointing out examples in which differences of opinion cannot be settled by the presentation of more biological or theological facts.
- C. relate biological theories to both the naturalistic view of life, in which God used evolution to create, and to a biblically literal view of life, in which Adam and Eve, created as modern people, set the stage for redemption through the second Adam, Jesus Christ.
- D. describe how biologists conduct research to explore both the micro- and macro-biological systems.
- E. identify the appropriate tools and methods associated with sub-disciplines in biology ranging from microbiology to the study of the biosphere.
- F. be knowledgeable and have experience in handling laboratory equipment and biological materials.
- G. differentiate between good and bad animal practise when devising biological experiments and judge which procedures are ethically appropriate according to government protocols.

III. Application of knowledge
- A. the ability to review and interpret biological information using the appropriate graphs, figures, diagrams or statistics in order to construct a solution to a biological question.
- B. discern the difference between objective and subjective evidence when developing arguments and making sound judgments.

C. critically appraise literature in biological research and develop questions and design experiment that will lead to the discovery of new information.
D. can access biological information in journals and news articles and summarize the pertinent information into intellectually digestible portions.
E. can articulate an informed opinion on politically-charged biological issues, such as intelligent design, climate change, stem-cell research, genetically modified foods, gene therapy and bioethics.

IV. Communication Skills
A. construct presentations, both written and oral, to review a topic in biology or to present new information.
B. summarize an aspect of biology and be able to present it at a level appropriate for the audience.
C. display a comfortable level of confidence during an oral presentation which takes into account the appropriate pace, and volume and inflection of voice.

V. Awareness of Limits of Knowledge
A. recognize that technology limits our ability to explore all of reality, and that biological theories can change or be modified as new information becomes available.
B. clearly recognize and justify when the scientific method is used to rule out certain hypotheses.
C. explain with examples how a biological theory may be well accepted, but its acceptance does not establish it as a biological fact.
D. full explain with biological and biblical examplesthat biology is the study of life as viewed from a naturalistic perspective, but this approach does not rule out the possibility that life may be more that the physical and chemical makeup of living things.

VI. Maturity and Professional Capacity
A. can fully describe many complex biological systems which sustain life.
B. are successful in taking part in open dialogues with people of opposing views to elucidate and clarify the complexity in biology.
C. have identified an area of biology which is of interest to them, and have a development plan to seek a career in such an area.
D. have the ability to share their knowledge, and to collaborate with other biologists in a professional and Christianly manner whether this collaboration occurs in the laboratory, field or classroom.
E. are able to relate their biological knowledge, based on naturalistic explanations, to their personal faith in Christ, and can express both their confidence and uncertainty in their search towards a common truth that encompasses all of reality.

Four-Year Major

Upon successful completion of the requirements for a BSc in the Biology 14 Course Major, a student should know, and be able to do the following:

I. Depth and Breadth of Knowledge
A. describe the development of biological thought from the early concept of a vital force to the physical, chemical and molecular processes needed to sustain life.
B. recall the paradigm shift in the 19th Century that transferred the authoritative voice in matters of biology from the clergy-scientist to the public-scientist.
C. recognize that biology is built upon the foundations of many academic disciplines, and that knowledge of other sciences (e.g., physics, chemistry, mathematics), or the humanities (e.g., philosophy, history, theology), has facilitated our understanding of biology. outline the

contributions made by biologists through the centuries knowing that biologists have been awed by the intricate designs that many have attributed to the actions of an intelligent designer.

D. recall recent advances in biotechnology as they apply to an understanding of how biological processes and systems function, ranging from the molecular and cell level to the biosphere.
E. describe the various technologies and the knowledge they have generated in the major fields of biology, such as genetics, molecular biology, cell biology, evolutionary biology, ecology, botany and zoology.

II. Knowledge of Methodologies
A. differentiate between a fact of biology and a theory of biology, and discern what facts support or refute which theories.
B. distinguish between scientific and theological arguments and realize that differences of opinion are seldom settled by the presentation of more biological or theological facts.
C. relate biological theories to both the naturalistic view of life, in which God used evolution to create, and to a biblically literal view of life, in which Adam and Eve, created as modern people,set the stage for redemption through the second Adam, Jesus Christ.
D. describe how biologists conduct research to explore both the micro- and macro-biological systems.
E. identify the appropriate tools and methods associated with sub-disciplines in biology ranging from microbiology to the study of the biosphere.
F. be knowledgeable in handling laboratory equipment and biological materials.
G. differentiate between good and bad animal practise when devising biological experiments and judge which procedures are ethically appropriate according to government protocols.

III. Application of knowledge
A. the ability to review and interpret biological information using the appropriate graphs, figures, diagrams or statistics in order to construct a solution to a biological question.
B. discern the difference between objective and subjective evidence when developing arguments and making sound judgments.
C. have the ability to critically appraise literature in biological research and to develop questions and design experiments that will lead to the discovery of new information.
D. can access biological information in journals and news articles and summarize the pertinent information into intellectually digestible portions.
E. can provide an informed opinion on politically-charged biological issues, such as intelligent design, climate change, stem-cell research, genetically modified foods, gene therapy and bioethics.

IV. Communication Skills
A. construct presentations, both written and oral, to review a topic in biology or to present new information.
B. summarize a particular aspect of biology and be able to present it at a level appropriate for the audience.
C. display a comfortable level of confidence during an oral presentation which takes into account the appropriate pace, and volume and inflection of voice.

V. Awareness of Limits of Knowledge
A. recognize that technology limits our ability to explore all of reality, and that biological theories can change or be modified as new information becomes available.

B. appreciate that the scientific method can be used to rule out certain hypotheses, but if a biological theory becomes well accepted, its acceptance does not establish it as a biological fact.
C. appreciate that biology is the study of life as viewed from a naturalistic perspective, but this approach does not rule out the possibility that life may be more that the physical and chemical makeup of living things.

VI. Maturity and Professional Capacity
A. can appreciate that biological systems which sustain life are extremely complex.
B. are successful in taking part in open dialogues with people of opposing views to elucidate and clarify the complexity in biology.
C. have identified an area of biology which is of interest to them, and have a development plan to seek a career in such an area.
D. have the ability to share their knowledge, and to collaborate with other biologists in a
E. professional and Christianly manner whether this collaboration occurs in the laboratory, field or classroom.
F. are able to relate their biological knowledge, based on naturalistic explanations, to their personal faith in Christ, and can express both their confidence and uncertainty in their search towards a common truth that encompasses all of reality.

General Major

Upon successful completion of the requirements for a BSc in the Biology General Major, a student should know, and be able to do the following:

I. Depth and Breadth of Knowledge
A. describe the development of biological thought from the early concept of a vital force to the physical, chemical and molecular processes needed to sustain life.
B. recognize that biology is built upon the foundations of many academic disciplines, and that knowledge of other sciences (e.g., physics, chemistry, mathematics), or the humanities (e.g., philosophy, history, theology), has facilitated our understanding of biology.
C. recognize that contributions made by biologists through the centuries knowing that biologists have been awed by the intricate designs that many have attributed to the actions of an intelligent designer.
D. describe some of the technologies and the knowledge they have generated in the major fields of biology, such as genetics, molecular biology, cell biology, evolutionary biology, ecology, botany and zoology.

II. Knowledge of Methodologies
A. differentiate between a fact of biology and a theory of biology, and discern what facts support or refute which theories.
B. distinguish between scientific and theological arguments and realize that differences of opinion are seldom settled by the presentation of more biological or theological facts.
C. relate biological theories to both the naturalistic view of life, in which God used evolution to create, and to a biblically literal view of life, in which Adam and Eve, created as modern people, set the stage for redemption through the second Adam, Jesus Christ.
D. recall the appropriate tools and methods associated with several of the sub-disciplines in biology.

III. Application of Knowledge
- A. the ability to interpret biological information using the appropriate graphs, figures, diagrams or statistics in order to construct a solution to a biological question.
- B. discern the difference between objective and subjective evidence when developing arguments and making sound judgments.
- C. can access biological information in journals and news articles and summarize the pertinent information into intellectually digestible portions.
- D. can provide a rational opinion on politically-charged biological issues, such as intelligent design, climate change, stem-cell research, genetically modified foods, gene therapy and bioethics.

IV. Communication Skills
- A. construct presentations, both written and oral, to review a topic in biology.
- B. summarize a particular aspect of biology.
- C. can provide an oral presentation which takes into account the appropriate pace, and volume and inflection of voice.

V. Awareness of Limits of Knowledge
- A. appreciate that technology limits our ability to explore all of reality, and that biological theories can change or be modified as new information becomes available.
- B. recall that the scientific method can be used to rule out certain hypotheses, but if a biological theory becomes well accepted, its acceptance does not establish it as a biological fact.
- C. recognize that biology is the study of life as viewed from a naturalistic perspective, but this approach does not rule out the possibility that life may be more that the physical and chemical makeup of living things.

VI. Maturity and Professional Capacity
- A. can appreciate that biological systems which sustain life are extremely complex.
- B. are successful in taking part in open dialogues with people of opposing views to elucidate and clarify the complexity in biology.
- C. are able to relate to some extent their biological knowledge, based on naturalistic explanations, to their personal faith in Christ.

Minor

Upon successful completion of the requirements for a BSc in the Biology 6 Course Minor, a student should know, and be able to do the following:

I. Depth and Breadth of Knowledge
- A. recognize that biology is built upon the foundations of many academic disciplines, and that knowledge of other sciences (e.g., physics, chemistry, mathematics), or the humanities (e.g., philosophy, history), has facilitated our understanding of biology.
- B. outline the contributions made by some biologists through the centuries knowing that biologists have been awed by the intricate designs that many have attributed to the actions of an intelligent designer.
- C. identify recent advances in biotechnology as they apply to an understanding of biology.
- D. describe some of the technologies and some of the knowledge of biology they have generated.

II. Knowledge of Methodologies
- A. differentiate between a fact of biology and a theory of biology, and discern what facts support or refute which theories.
- B. describe how biologists conduct research to explore both the micro- and macro-biological systems.
- C. identify the appropriate tools and methods associated with a few of the sub-disciplines in biology.
- D. be knowledgeable in handling laboratory equipment and biological materials.

III. Application of knowledge
- A. the ability to recognize how biological information is expressed using the appropriate graphs, figures, diagrams or statistics.
- B. discern the difference between objective and subjective evidence when developing arguments and making sound judgments.
- C. access biological information in journals and news articles.
- D. provide an informed opinion on some politically-charged biological issues.

IV. Communication Skills
- A. construct presentations to review a topic in biology or to present new information.
- B. display a comfortable level of confidence during an oral presentations which takes into account the appropriate pace, and volume and inflection of voice.

V. Awareness of Limits of Knowledge
- A. recognize that technology limits our ability to explore all of reality, and that biological theories can change or be modified as new information becomes available.
- B. appreciate that the scientific method can be used to rule out certain hypotheses, but if a biological theory becomes well accepted, its acceptance does not establish it as a biological fact.

VI. Maturity and Professional Capacity
- A. can appreciate that biological systems which sustain life are extremely complex.
- B. are successful in taking part in open dialogues with people of opposing views to elucidate and clarify the complexity in biology.
- C. have identified an area of biology which is of interest to them, and can be applied to their major area of study.
- D. are able to relate in some degree their biological knowledge, based on naturalistic explanations, to their personal faith in Christ.