

SCIENTIFIC ISSUES AND PERSPECTIVES (SIP)

September 1, 2015

I. Short Description

In Scientific Issues and Perspectives (SIP) courses, students will explore scientific investigations of contemporary or historical significance so that they may learn to use and critique scientific information responsibly. Through engagement with primary and secondary sources about the study of the natural world, students will reflect on the nature and scope of scientific knowledge—both its power and its limits—and evaluate the ways that scientific information informs personal and social decision-making. Courses may focus on contemporary issues that span disciplinary boundaries or on the historical, philosophical, theological, or sociological foundations of the modern scientific enterprise.

II. Thematic Core Learning Outcomes and Interpretation

A. Students will be able to....

1. articulate the historical and social contexts of scientific investigation
2. demonstrate responsible stewardship of scientific knowledge regarding the natural world in personal and/or social decision-making
3. discuss connections between science and Christian thought in a humble, constructive, and informed manner

B. Expansion and Interpretation of the Outcome Statements

1. Subject matter and content coverage in Scientific Issues and Perspectives courses

Courses in this theme will introduce students to the application of science to particular issues, projects or problems of contemporary or historical significance. Understanding how science is applied in these contexts acknowledges that science is a human activity that calls for an understanding of the historical and social background of any given scientific investigation. Courses will also draw out the connections to other perspectives, such as biblical, theological, philosophical, sociological, or ethnical perspectives. Subject matter may be drawn from a topic related to the natural world or from the contributions and perspectives of one or more scientific disciplines. For example, a course could follow the historical development and science of the human genome project and reflect upon social and ethical implications. Other topics could include global climate change, neuroscience, energy or other natural resources, public health, sustainable development, exploring the universe, humanitarian disasters and recovery, etc.

Students will achieve the outcomes of the Scientific Issues and Perspectives courses by engaging the primary and secondary scientific literature pertaining to the course topic. Often, they will need background information on the particular methods of investigation used, and issues related to the analysis and interpretation of data. Thus, some class sessions should be devoted to explaining the science, discussion of how the data is interpreted and applied, or student teamwork designed to investigate subtopics.

Some Scientific Issues and Perspectives courses require foundational scientific practice, including lab and field work, in order to promote developmental understanding of the processes of scientific investigation. For this reason, departments may require Scientific

Practice or a specific laboratory course as a pre-requisite for their Scientific Issues and Perspectives course(s).

2. Definitions and explanations of disciplinary terms

“Historical and social contexts”: Science is a human activity and thus a cultural activity. Understanding how science is used and ought to be used requires some appreciation of the cultural embeddedness of the modern scientific enterprise. The term “historical and social contexts” is used to capture as many dimensions of this embeddedness as possible – historical, philosophical, theological, ethical, political, religious, social, cultural, artistic, literary, etc. – without implying a particular social science approach or methodology.

“Scientific investigation”: This term is used to reflect the systemic yet creative practices scientists use to produce data that serves as evidence in support of an answer to a question, solution to a problem, or explanation of a phenomenon.

“Scientific knowledge”: The process of scientific investigation culminates in the formulation of evidence-based conclusions that seek to be the best explanations of phenomena or the best answers to questions that can be supported by the data. Scientific knowledge consists of these conclusions and best explanations as articulated by scientists. It includes both the well-established conclusions/explanations that appear in textbooks as well as the more recent experimental or theoretical discoveries, some of which may still be the subject of appropriate professional debate. As students seek to become responsible users of scientific information, they need to understand the nature of these claims and how to apply them. Using the lens of a particular issue, project, or problem, courses in Scientific Issues and Perspectives will analyze the explanations and answers offered by scientists in order to learn when and how scientific information applies to personal or social issues, how scientific claims differ from other types of knowledge claims, or how particular scientific explanations are used or misused in public discourse.

“Natural world”: Although there is not always a clear line between what is “natural” and what is created by human beings, this phrase is meant to focus these courses towards studies of the physical realm and created order. This is meant to include some forms of human behavior closely related to human anatomy and physiology, most forms of behavior in other animals, and the physical properties of humanly-created substances that can be investigated through the scientific methods commonly used in the disciplines of the natural sciences.

“Christian thought”: This term encompasses both intellectual understanding and practical application, both personal and social. It is meant to speak to all dimensions of Christian faith and practice that may have bearing on the interpretation and use of scientific information.

III. Guidelines

A. Expanded Description

Our understanding of the natural world and our use of applied technologies have greatly expanded in recent human history. In order to engage and understand these advances, all members of society need to be scientifically literate, which includes the ability to explore and evaluate particular scientific issues and perspectives. Many of these issues and perspectives are related to Christian faith. For example, some scientists contend that science has replaced the need for religion, while others are applying technologies that have questionable moral outcomes. For

all of humanity, science and technology have brought great benefits and power, as well as potential for misuse that betrays God and others. Scientific Issues and Perspectives courses invite students to reflect on the modern scientific enterprise and to engage critically with scientific information and make wise decisions regarding the use of science and technology, both personally and socially. They will gain an understanding of science that will increase their faith in Christ as creator, sustainer and redeemer, will enliven their witness as they demonstrate that Christians can and do embrace the natural sciences, and will be salt and light as they bring this understanding to areas where humans have responsibility for all of creation.

B. Connection between area outcomes (Part II above) and the 12 overall program goals of Christ at the Core (see p. 8-9 of the Proposal).

Scientific Issues and Perspectives courses will engage students in considering scientific issues, many of which are of contemporary relevance. As students learn to relate scientific understanding with philosophical and theological perspectives, they will gain a better understanding of all of God's revelation. In addition, they will be better equipped as they encounter issues involving topics such as origins and ethics, and will be able to respond in ways that reflect all of God's revelation. Such learning will contribute to many of the learning goals of the Christ at the Core program, especially Holistic Learning Goals 1, 2 and 3 and Growth in Wisdom Learning Goals 2 and 3.

1. Scientific Issues and Perspectives courses will engage students to understand and evaluate the scientific aspects of modern scientific issues. Often, that will require evaluating alternative hypotheses or explanations, and having basic knowledge in order to gain some understanding of such alternatives as well as ability to discern the most helpful explanations. This relates to "Christ at the Core" Holistic Learning Goal #1: "developing strong abilities to discover and evaluate information they need to draw conclusions, practicing analytical and scientific reasoning, presenting their thoughts clearly in oral and written forms, and developing skills in aesthetic engagement."

2. Many scientific issues and perspectives involve complex scientific topics, many of which are carried out in an even more complex social context. As students explore science in this way, they will need to develop good discernment as well as humility to know that further information may be needed to better understand such complex topics, with a realization that no one will understand all of the complexities. This connects to "Christ at the Core" Holistic Learning Goal #2: "by pursuing varied approaches to knowledge with discernment and humility as they map both the rich connections and the conflicts among the disciplines."

3. Many scientific issues and perspectives are better understood by better understanding the historical and social contexts in which they developed. Likewise, theological perspectives regarding topics such as creation, soteriology, eschatology, and human dignity are helpful when understanding a richer context within which scientific issues and perspectives are encountered. This promotes "Christ at the Core" Holistic Learning Goal #3: "understanding the contours of theological, cultural, and intellectual traditions."

4. Studying scientific issues and perspectives also calls for the task of integration of faith and science. Scientific issues and perspectives considered in these courses require understanding, as well as a variety of virtues such as wisdom, restraint, humility and hope, to live in accordance with the acquired understanding of such issues. This relates to "Christ at the Core" Wisdom Learning Goal #2: "applying biblical principles and theological perspectives and developing the

virtues required to meet the myriad challenges of their lives.”

5. Most scientific issues and perspectives are complex, but many can be engaged by the non-scientist in adequate detail to engage these issues intelligently and wisely. This connects with “Christ at the Core” Wisdom Learning Goal #3: “grow in wisdom by growing in intellectual virtue and critical self-awareness through engagement with the complex questions of history, human values, and contemporary life.”

C. Examples of Assessment

A range of rigorous assignments could provide evidence that students have successfully achieved the three Student Outcomes given in section II.A. Depending on the structure of the course, one significant assignment might be relevant for assessing more than one outcome; in other cases a series of assignments will be more appropriate. A few examples and suggested approaches are offered here as *possible inspiration* of disciplinary appropriate and rigorous options, but **use of these exact assignments is not required**. Faculty are encouraged to go beyond these or substitute other creative assignments as they develop individual courses.

1. Assessment of Outcome #1: Students should demonstrate their comprehension of how science is culturally embedded and their understanding of science as a human activity. This could be measured by essay exam questions, a paper, or a presentation, containing appropriate summaries and illustrations.

2. Assessment of Outcome #2: Students should demonstrate their ability to critique the usefulness of scientific information in a particular personal or social context. The focus of this outcome is on understanding the nature of scientific knowledge, its limits and reliability. It could be demonstrated through homework assignments or exam questions that require the ability to discern between appropriately applied and misapplied scientific knowledge, or through a practical project.

3. Assessment of Outcome #3: Students write a paper exploring a particular topic and developing an argument about the relation of science and faith in the context of the topic; example topics for this paper include how both faith and science contribute to a robust doctrine of creation, play a role in environmental stewardship, and speak to the sanctity of human life.

D. General Advice

None given.