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Text from PowerPoint Slide Presentation

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Lilly Fellows Network
Exchange Program
Sacred Heart University
Monday, April 16, 2012

Introducing Astrophysics and Cosmology as Part of Multi-Disciplinary Approaches to Liberal Arts Courses Addressing “The Big Questions” of Human Experience

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The Development of the Sacred Heart University Common Core Physics Course

PYCC 103: The Journey in the Physical Universe

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**Sacred Heart University’s
Common Core Curriculum**

**The Human Journey:
“The Human Community &
Scientific Discovery”**

**The Catholic Intellectual Tradition
Excerpt from the SHU Common Core Document**

From: THE HUMAN JOURNEY: Describing the Catholic Intellectual Tradition*
By: Brian Stiltner, Associate Professor of Religious Studies, SHU

The Catholic intellectual tradition is a collection of characteristically Catholic concepts, habits, and values that have been developed in a variety of disciplines and through an intercultural conversation lasting over 2000 years. Among the Catholic intellectual tradition's central claims are that

- (1) humans exist in relation to a Triune God;**
- (2) God's presence is mediated through the particular;**
- (3) morality is objective and knowable;**
- (4) human knowledge can be connected into a coherent whole;**
- (5) faith and reason work together to provide understanding of the world; and**
- (6) humans have inviolable dignity and are responsible toward the common good.**

[***Bold emphasis was added, and some minor format changes were made to the original for this presentation.**]

**Course Goals Related to the CIT &
the 4 Fundamental Core Questions**

Through this course students will be able to demonstrate the use of aspects of the Catholic Intellectual Tradition (CIT) to gain:

1. an understanding of the ways in which we have historically altered our view of the physical universe through the applications of the methods of scientific reasoning, and the ways that these views have informed our understanding of God and His Creation.

2. the ability to examine how the ways in which our understanding of the interaction of physics and faith provide us with the keys to help us realize what it means to be human.

3. insight into the way in which an understanding of the physical universe, in the context of faith, can help people enhance their ability to live deeper lives of meaning and purpose.

4. an increased appreciation and understanding of the natural world as seen from the frame of reference of the sciences, particularly as seen in the context of physics and astronomy.

5. a realization that the ways in which we choose to utilize our knowledge of the physical universe, and to apply the technology derived from that knowledge to meeting human needs, is a reflection of wise stewardship involving the interaction of faith, knowledge and reason to serve the common good.

**Required Texts and
Resource Readings**

**Francis S. Collins, The Language of God: A Scientist Presents Evidence for Belief,
New York: Free Press, 2006.**

**John Polkinghorne, Quantum Physics and Theology:
An Unexpected Kinship,
New Haven: Yale University Press, 2007.**

**Ian G. Barbour, When Science Meets Religion,
New York: HarperCollins Publishers, Inc., 2000.**

**Hugh Ross, Why the Universe is the Way It Is,
Grand Rapids, MI: Baker Books, 2008.**

**Krista Tippitt, Einstein's God: Conversations About Science and the Human Spirit, The
Penguin Group, 2010.**

I. What are the dimension of physics and the dimension of faith, and how do they relate to our knowledge of the universe? (Jan 19, 24, 26, 31)

A. Wednesday, January 19: Epistemology - How do we know what we know? What is faith, and what is science?

**B. Monday, January 24: Where are you (u)?
What is the large-scale size and structure of the universe (U)?
What does the size and scale of the U have to do with our sense of human significance?
What does the size and scale of the U have to do with our characterization of God?**

**C. Wednesday, January 26: How has our understanding of size and scale in the universe changed over time?
Modeling the Earth, Modeling the Earth-Moon System, and Modeling the Solar System.**

**D. Monday, January 31: What is the scale of the universe in time?
How has our view of this time-scale changed over time?
What is the universe like on the small scales of space and time?**

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II. How does our knowledge of the physical universe, in the context of our faith, relate to our humanity? (February 02, 07, 09, 14)

E. Wednesday, February 02: What does it mean to be “human”?

F. Monday, February 07: How do we, on the human-scale, fit into the universe of space and time?

G. Wednesday, February 09: How does faith inform our understanding of our humanity and our place in the U?

**H. Monday, February 14: Where does the human journey begin on the:
space dimension?
temporal dimension?
spiritual dimension?**

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III. How does our awareness of and knowledge of the physical and the spiritual universe enable the realization of meaning and purpose in our lives? (February 16, 21, 23, 28)

I. Wednesday, February 16: What is reality?

J. Monday, February 21: Why are we here?

K. Wednesday, February 23: What is truth? (VERITAS?)

**L. Monday, February 28: How does the human “desire to know” relate to:
our search for knowledge,
our spiritual quest, and
our understanding of the universe?**

MX. THE MID-TERM EXAM → Wednesday, March 2nd, 2011

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IV. How does our knowledge of the principles of physics enable us to appreciate the natural world? Part 1: (Mar 14, 16, 21, 23, 28)

- N. Monday, March 14: Scientific models and reality. Early conceptions of motions of objects on Earth, motions of the Earth itself, and of motions of objects in the heavens.**
- O. Wednesday, March 16: The “mechanical universe” of physics: Copernican, Galilean, and Newtonian Models.**
- P. Monday, March 21: Fundamental forces (“interactions”) in the universe, and the nature of matter/energy.**
- Q. Wednesday, March 23: The behavior of particles and the behavior of waves – sound, Earthquakes, light?.**
- R. Monday, March 28: The nature of light – wave/particle duality, and the “misbehavior” of particles – quantum mechanics.**

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IV. How does our knowledge of the principles of physics enable us to appreciate the natural world? Part 2: (Mar 30, Apr 04, 06, 11)

- S. Wednesday, March 30: Atomic and nuclear physics, quantum mechanics and theology.**
- T. Monday, April 04: The origin and nature of the universe. The origin of the Solar System.**
- U. Wednesday, April 06: Why does the universe function on the basis of fundamental mathematical laws?**
- V. Monday, April 11: Is the universe a product of chance or a matter of purpose? Can we know?**

V. How does our knowledge of and application of the principles of physics in the context of our faith, enable us to improve our society for the common good? (April 13, 18, 27, May 02)

**W. Wednesday, April 13: How do science, faith and our place in the world relate?
What about the case of Galileo?**

**X. Monday, April 18: How can we use scientific knowledge and
technology for the “improvement” of society?
What about the case of nuclear energy? ... nuclear weapons?
What guides our decision making?**

**Y. Wednesday, April 27: What role does faith have in dealing with our
personal future & the future of society?
The cases of natural and man-made disasters:
How are we best able to cope with reality?
(H. G. Well’s story “The Star”)**

**Z. Monday, May 02: What is our source of hope?
Will science and technology save us from disaster?
How should we define wise stewardship?
Are you simply a product of blind chance or a person of purpose?**

FX ← FINAL EXAM → Wednesday, May 4th, 2011

Active Engagement Using Models

These “models” are for the purpose of enabling students to examine of large-scale and small-scale aspects of the universe, and in order to actively engage students in thinking about where they are in space and time.

Models currently in use →

**SPACE: “A Fieldtrip Through the Universe”
The Outward Journey to 1026 m.
The Inward Journey to 10-16 m.**

**“The Local Universe” – Modeling the Earth,
Modeling the Earth-Moon System,
Modeling the Solar System.**

TIME: “The Universe in Time”