HONORS 2030 - PHYSICS IN THE PLAYS OF TOM STOPPARD

Course Outline - Spring Semester 2018

INSTRUCTOR: Dr. Bradley W. Carroll
OFFICE: TY 213
TELEPHONE: 626-7921
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TEXTS:  
Hamlet, William Shakespeare;  
Rosencrantz & Guildenstern are Dead, Tom Stoppard;  
Arcadia, Tom Stoppard;  
Seven Ideas that Shook the Universe, Nathan Spielberg and Bryon D. Anderson
(ISBN: 0471848166)

Science and math background assumed: none!

OUTLINE

In several of his plays, Tom Stoppard examines the paradox of free will in a deterministic Newtonian world. To what extent can individuals control their lives in a clockwork universe? We will examine the rise and fall of the Newtonian worldview in this course, and see how this provides the philosophical themes of three of Tom Stoppard's plays, Rosencrantz & Guildenstern are Dead, Arcadia, and Hapgood. Classroom activities will include

- discussions of the ideas of the plays
- performing selected readings from the plays
- investigations that explore the physics content of the plays

There will be a two-part midterm for each of Stoppard’s plays (covering the storyline of each play and the physics in it), and an optional course project of your choice (with the instructor’s approval).

OFFICE HOURS

12:00 - 1:00 TTh  
and  
any other time I am in my office
Topics for discussion will be distributed for each day the plays are discussed. Be prepared to discuss these topics in class. A Quick Quiz will be given each day the plays are discussed. Each Quick Quiz can add 1 point to your physics exam scores. The midterms on the physics content of the plays will consist of multiple-choice questions, and will be given on ChiTester over a three-day period. The other will be a short essay paper (3 - 5 pages) on an assigned topic from the plays. Each person is responsible for his or her own work. Academic dishonesty on any exam will result in a grade of zero being given for that examination. A second violation will constitute failure of the course.

Physics provides the fundamental description of physical reality, an exciting and sometimes startling view of the world that most people never get to see. Above all, Ask Questions at Any Time! If you have questions that can't be cleared up in class, drop by my office to discuss the meaning and implications of the material. Relax and enjoy this exploration of how nature really works, and remember the words of British scientist J. B. S. Haldane: “Not only is the universe stranger than we imagine, it is stranger than we can imagine!”

**GRADING**

“A”: An overall quiz and midterm average of at least 80% and an acceptable approved project for a total of at least 90% (midterms + project) and a satisfactory effort in group discussion

“B”: An overall quiz and midterm average of at least 80% and a satisfactory effort in group discussion

“C”: An overall quiz and midterm average of at least 70% and a satisfactory effort in group discussion

“D”: An overall quiz and midterm average below 70% or an unsatisfactory effort in group discussion

“E”: An overall quiz and midterm average below 70% and an unsatisfactory effort in group discussion

The course project is worth up to 10%. It should be something original and creative, and must be at least peripherally related to the subject matter of the course. With your project you must hand in a short written paper that describes what you did and how it is connected to the course. No last-minute projects will be approved. Your project should be something we can both be proud to share with the rest of the class!
SCHEDULE AND READING ASSIGNMENTS

Week 1
Jan 9  Introduction
Seven Ideas, p. 1 - 13
11 Seven Ideas, p. 14 - 35

Week 2
Jan 16 Seven Ideas, p. 35 - 49
18 Hamlet, Act 1, Scene 1 through Act 2, Scene 1

Week 3
Jan 23 Hamlet, Act 2, Scene 2 through Act 3, Scene 4
24 Hamlet, Acts 4 and 5

Week 4
Jan 30 Seven Ideas, p. 50 - 65
Feb 1 Seven Ideas, p. 65 - 73

Week 5
Feb 6 Seven Ideas, p. 73 - 83
8 Rosencrantz & Guildenstern, Act 1
*** Exam #1 (Physics) - ChiTester (Feb 8 - 10)

Week 6
Feb 13 Rosencrantz & Guildenstern, Act 2
15 Rosencrantz & Guildenstern, Act 3
16 Movie night: Rosencrantz & Guildenstern are Dead

Week 7
Feb 20 Seven Ideas, p. 84 - 105
22 Seven Ideas, p. 106 - 124

Week 8
Feb 27 Seven Ideas, p. 125 - 138
*** Exam #2 essay paper due at beginning of class
March 1 Exploring Chaos (readings to be handed out in class)

Week 9
March 6 Spring
8 Break

Week 10
March 13 Arcadia, Act 1, Scenes 1 and 2
15 Arcadia, Act 1, Scenes 3 and 4
*** Exam #3 (Physics) - ChiTester (March 15 - 17)
Week 11
March 20  Arcadia, Act 2, Scenes 5 and 6
       22  Arcadia, Act 2, Scene 7

Week 12
March 27  Seven Ideas, p. 139 - 183
       29  Seven Ideas, p. 184 - 198

Week 13
April 3  Seven Ideas, p. 199 - 220
       5  Seven Ideas, p. 220 - 224

*** Exam #4 essay paper due at beginning of class

Week 14
April 10  Hapgood, Act 1, Scenes 1 - 3
       12  Hapgood, Act 1, Scenes 4 and 5
*** Exam #5 (Physics) - ChiTester (April 12 - 14)

Week 15
April 17  Hapgood, Act 2, Scenes 1 - 3
       19  Hapgood, Act 2, Scenes 4 - 7

Exam #6 essay paper due Tuesday, April 24,
at the presentation of course projects

FINAL EXAM

Tuesday, April 24, 3:00 - 4:50 pm

Presentation of course projects

Any student requiring accommodations or services due to a
disability must contact Services for Students with Disabilities
(SSD) in room 181 of the Student Service Center. SSD can also
arrange to provide course materials (including this syllabus) in
alternative formats if necessary.

In the event of a campus emergency (e.g., weather,
utilities, etc.) that results in the interruption of this class,
please check the course homepage for details on how this course
will continue.
WSU Natural Sciences General Education Program

Mission Statement

The mission of the natural sciences general education program is to provide students with an understanding and appreciation of the natural world from a scientific perspective.

Science is a way of knowing. Its purpose is to describe and explain the natural world, to investigate the mechanisms that govern nature, and to identify ways in which all natural phenomena are interrelated. Science produces knowledge that is based on evidence and that knowledge is repeatedly tested against observations of nature. The strength of science is that ideas and explanations that are inconsistent with evidence are refined or discarded and replaced by those that are more consistent.

Science provides personal fulfillment that comes from understanding the natural world. In addition, experience with the process of science develops skills that are increasingly important in the modern world. These include creativity, critical thinking, problem solving, and communication of ideas. A person who is scientifically literate is able to evaluate and propose explanations appropriately. The scientifically literate individual can assess whether or not a claim is scientific, and distinguish scientific explanations from those that are not scientific.

Foundations of the Natural Sciences Learning Outcomes

After completing the natural sciences general education requirements, students will demonstrate their understanding of general principles of science:

1. Nature of science. Scientific knowledge is based on evidence that is repeatedly examined, and can change with new information. Scientific explanations differ fundamentally from those that are not scientific.
2. Integration of science. All natural phenomena are interrelated and share basic organizational principles. Scientific explanations obtained from different disciplines should be cohesive and integrated.
3. Science and society. The study of science provides explanations that have significant impact on society, including technological advancements, improvement of human life, and better understanding of human and other influences on the earth’s environment.
4. Problem solving and data analysis. Science relies on empirical data, and such data must be analyzed, interpreted, and generalized in a rigorous manner.

The Physical Sciences Learning Outcomes

Students will demonstrate their understanding of the following feature of the physical world:

1. Organization of systems: The universe is scientifically understandable in terms of interconnected systems. The systems evolve over time according to basic physical laws.
2. Matter: Matter comprises an important component of the universe, and has physical properties that can be described over a range of scales.
3. Energy: Interactions within the universe can be described in terms of energy exchange and conservation.
4. Forces: Equilibrium and change are determined by forces acting at all organizational levels.