

**TC 357 – Plan II Junior Seminar in Applied Science**  
**The Physics of National Security**

**General Information**

**Class Meetings:** Tues, Thur. at 11 AM – 12:30 PM in RLM 7.112

**Unique #: 43810**

**Purpose:** This seminar concentrates on the physical principles which underlie technical issues in national and global security. The course is aimed at students interested in security matters who have a background in quantitative methods. The relevant physical principles will be developed in class and reading, and applied to modern security problems involving such topics as nuclear weapons, space, surveillance, and communications. The purpose is to provide analytical tools and experience for students to understand and to be able to critically evaluate the technical facts that underlie important national policy issues.

**Instructor:** Professor Roy Schwitters  
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email: [schwitters@physics.utexas.edu](mailto:schwitters@physics.utexas.edu)  
Office hours: Tuesdays 9 - 10:30 AM, Wednesdays 10:30 AM - noon.

**Class web info.:** UT Blackboard

**Texts:** “Innumeracy” by John Allen Paulos, Hill and Wang, 2001.  
“An Introduction to Information Theory: Symbols, Signals and Noise”, Second Ed. by John R. Pierce, Dover Publications, 1980.  
“Physics for Future Presidents: the Science Behind the Headlines” by Richard A. Muller, W.W. Norton, 2008.  
“Principles of Data Analysis” by Prasenjit Saha, which is available for free on the web (<http://www.physik.uzh.ch/~psaha/pda/>) or can be purchased in book form as: ISBN 1902918118

**Web resource:** The Garwin Archive at the Federation of American Scientists:  
<http://www.fas.org/rlg/>

**Lectures and Discussions:** Each class period will typically be divided between lecture and discussion. The goals of the discussion period are to clarify lecture material, explore the relevance of lecture material to specific national security issues, and to develop ideas for the term paper and presentation.

**Term paper and presentation as alternative to final exam:** Each student will prepare a term paper on some technical subject related to national security and present the results of the paper to the class for discussion.

**Homework:** A total of seven homework assignments will be given during the term. Typically, homework problems will be given out at the Thursday lecture and they will be due the following Thursday at the beginning of class. Late homework will be accepted for one additional week. Late homework will receive a maximum of one-half credit; homework more than one week overdue will receive no credit.

**Exams:** Two quizzes will be given during class hours. No makeup tests will be given. The quizzes will be closed-book; a single 8 1/2" x 11" page of *your* notes and calculators may be used.

**Grading:** The final grade will be based on work performed during the semester according to the following weights:

Term paper and class presentation	50%
Two quizzes	25%
Homework assignments	15%
Class participation	10%

## TC 357 Class Schedule

Class		Date	Topic	Homework Assigned	Reading
1	Th	27-Aug	Introduction		
2	T	1-Sep	Quantifying the world		Paulos: "Innumeracy"
3	Th	3-Sep	Describing the world:	1	Einstein handout Pierce: "Info. Theory"
4	T	8-Sep	Space, time, and events		
5	Th	10-Sep	What is information?	2	
6	T	15-Sep	"		
7	Th	17-Sep	How we sense the world:	3	Handouts
8	T	22-Sep	Photons and more		
9	Th	24-Sep	<b>Quiz 1</b>		
10	T	29-Sep			
11	Th	1-Oct	Quantifying uncertainty ( <b>Term paper proposal due</b> )	4	Saha: Principles of Data Analysis Muller: "Physics for Future Presidents"
12	T	6-Oct	Energy		
13	Th	8-Oct	contd.	5	
14	T	13-Oct	Nukes		
15	Th	15-Oct	contd.	6	
16	T	20-Oct	Getting to space		
17	Th	22-Oct	"Navigating" when up there	7	
18	T	27-Oct	Review		
19	Th	29-Oct	<b>Quiz 2</b>		
20	T	3-Nov	Applications		
21	Th	5-Nov	More applications		
22	T	10-Nov	" ( <b>First draft of term paper due</b> )		
23	Th	12-Nov	"		
24	T	17-Nov	"		
25	Th	19-Nov	Student presentations		
26	T	24-Nov	"		
27	T	1-Dec	"		
28	Th	3-Dec	General discussion ( <b>Term paper due</b> )		