Physics 274: Weapons of Mass Destruction

Spring 2009

Instructor: Dr. J. R. Mureika
Office (hours): Seaver 102A (M 13:00-14:00; T 15:00-16:00; W 13:00-14:00; or by appointment)
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Texts and readings:

- *The α β γ's of Nuclear Weapons* [Downloadable on Web]

Outline/Schedule:
This course will discuss the underlying principles and effects of various weapons of mass destruction. The majority of the course will offer a comprehensive look at the only true weapons of *mass destruction*, nuclear and thermonuclear devices. Toward the end of the semester, we will also look at potential future WMD, as well as ways in which the entire planet could be destroyed -- through innocent scientific investigation!

The following is a rough list of topics which will be covered:

- Basic nuclear physics: structure of the atom, radioactivity, fission, fusion
- Scientific principles of nuclear weapons
- Effects of nuclear weapons: physical, biological, environmental
- Case studies: Hiroshima and Nagasaki; terrorism scenarios
- The nuclear geopolitical climate, ethics and morality
- The Cold War society and the nuclear subculture
- The future of particle physics and weaponry

Although there are no official science prerequisites for the course, I will assume that everyone has at least a general grasp of high school mathematics (pre-calculus algebra), and some basic physics and biology. Everything else you need to know you will pick up along the way. Most of the math in this course will be only slight more than you need to fill out your taxes!

If at any point you feel flustered or nervous about the work -- *ASK QUESTIONS!!* I am always happy to help you out and chat.

Grading Scheme:

Assignments	5 @ 6%	30%
In-class tests	2 @ 20%	40%
Term paper	1 @ 25%	25%
Participation	1 @ 5%	5%

Assignments: Five assignments will be given at regular intervals throughout the semester. Some will involve mathematical calculations, while others will be more conceptual assessments of situations and scenarios. They will generally be due two weeks from the day they are assigned. Although you must write up your own assignment, you are encouraged to work in groups.

In-Class Tests: There will be two in-class tests, scheduled for **mid-February** and **mid-March**.

Term paper: Although probably none of you are scientists, most likely WMD touch your field of expertise in some way or another, be it through history, government policy, or even movie-making! This is your chance to explore this connection to a personal interest of yours, and will be in lieu of a final exam. The paper should be no less than 2000 words in length, and must discuss some aspect of WMD of your choice. We won't be able to discuss *every* type of WMD in the course, so you are free to write on devices not covered in class. Alternatively, you can follow up on topics covered either in class or the labs. **All paper topics must be approved by me prior to proceeding**. The term paper is due in the last class, **THURSDAY APRIL 30th** Late papers will absolutely not be accepted.

Participation: This is the type of class where you should *want* to attend, ask questions, or visit your professor in his office to discuss things WMD (or physics, or math!). There will also be group activities, including discussion, debate, and problem solving sessions. Positive contributions to these will reflect in your participation grade. The more you participate, the higher your participation grade.

Attendance: Class attendance is essential for your understanding of the material and effective participation in discussions and activities. Absences are excused only for reasons of academic conflicts (e.g. field trips) or medical emergencies. These must be cleared with me ahead of time, and/or supported by official documentation afterward in the case of an unexpected situation (doctor's note for illness, *etc*…). *Three unexcused absences will result in a full letter grade reduction (A to B, B- to C-, etc…). Each additional unexcused absence will also result in a full letter-grade reduction. A maximum of six unexcused absences will result in failing grade.*

Grading Conversion

A	92-100%
A-	88-91%
B+	84-87%
B	80-83%
B-	76-79%
C+	72-75%
C	68-71%
C-	64-67%
D	60-63%
F	0-59%