

**Course Title:** “The Physics of Warfare”

**Credits:** Two credits, A/F

**Instructor:** Regents Professor Allen Goldman

**Office:** Room 226 PAN

**Phone:** (612) 624-6062

**Email:** goldman@umn.edu

**Place:** PAN 120

**Time:** 9:20 AM, Tuesdays

**Website:** Canvas and the Physics Website

https://www.physics.umn.edu/classes/phys/2019/spring/Phys%201907.001/class_list.html

You can navigate to the website by going to the Physics site (www.physics.umn.edu), clicking on classes on the left-hand column, and selecting Physics 1907.001. For full access to the materials you will need your university user name and password.

**Office Hours:** By appointment which can be arranged by email

**Approach:** Throughout history and even today, military leaders contemplating war, or involved in it, are always looking for some advantage over their enemies. Most have searched for a new type of wonder weapon, one that the enemy does not have. It is frequently physics that provides a path to this new weapon. Physics and science and technology in general have been of tremendous value to contemporary military leaders. They have given them an understanding of the electromagnetic spectrum so that radiation can be used in various military applications. They have also given them an understanding of rocketry and jet engines, and knowledge of the secrets of the atom so that it is possible to engineer weapons of mass destruction. This seminar will provide an overview of most branches of physics and in the process of doing so will show how physics has been used for military applications. It will to some extent provide a summary of the history of warfare from the first bows and arrows and chariots, through contemporary weapon systems. Students enrolled in this seminar will learn some physics, and hopefully they will take away enough understanding of contemporary military technology to be informed citizens on issues that command such a large fraction of the national budget.

**Work Required:** *There will be no examinations.* There will be assigned readings and discussions. The readings will be from the text, reserved books, duplicated materials, and web sites. Students will be required to make oral presentations during the semester. *This is not a writing intensive course.* Grades in the course will equally weight class participation, and the presentations. Students will read the text, which will be discussed in class and augmented by the instructor.

**Communication Mode:** Course materials will be posted on Canvas, and on the departmental website. Email will be used for notifications and other communications.
Required Text: The Physics of War, by Barry Parker
ISBN-10: 1616148039
Prometheous Books, Amherst, NY, 2014

Topics in the Text

Early Wars and the Beginning of Physics
Basic Physics of Early Weapons-Mostly Mechanics
The Roman Empire and Early English-French Wars
Gunpowder and Cannons
Men Ahead of their time: DaVinci, Tartaglia, Galileo
From Early Guns to Total Destruction and Discovery
The Industrial Revolution
Napoleon’s Weapons and Breakthroughs in Physics
The American Civil War
World War I: Machine Guns
Invisible Rays: Radio and Radar
Sonar and the Submarine
World War II
The Atomic Bomb
The Hydrogen Bomb, Jet Aircraft, Missiles, Satellites, Lasers, Computers, GPS, Drones, Artificial Intelligence, Robots, and the Future

University and CSE Policies

Student conduct code

Disability Services—If you have accommodations for this course, please provide staff in Tate 130 with a copy of your accommodation letter for the current semester. Exams will be arranged according to accommodations and sent to the testing center for administration.

Use of Personal Electronic Devices in the Classroom
http://www.policy.umn.edu/Policies/Education/Education/STUDENTRESP.html

CSE Calculator Policies

Appropriate Student Use of Class Notes and Course Materials
http://www.policy.umn.edu/Policies/Education/Education/STUDENTRESP.html

Makeup Work for Legitimate Absences
http://policy.umn.edu/Policies/Education/Education/MAKEUPWORK.html
ATHLETES must provide their official University of Minnesota athletic letter containing the approved competition schedule to their instructor and the staff in TATEH 130. Away exams will be arranged with the athletic adviser traveling with the team. Accommodations will be made for official university sports only (i.e. no accommodations will be made for intramurals, club sports, etc.)