

Syllabus for PHY492, Spring 2006

Lecturer: Prof. Carl Bromberg; E-mail: bromberg@pa.msu.edu; Office: Rm. 3225 BPS;
Phone: 5-9200 Ext. 2122; Office hrs: Mon. & Wed., 10:30-12:00, or by appointment.

TA: Weigang Gen; E-mail: weigang@pa.msu.edu; Phone: 59200, ext.2080.

See Weigang for grading issues. Disputes must be forwarded to me ONLY by Weigang.

Lectures:

- Mon. and Wed., 9:00 - 10:10 pm, in room 220 Chemistry (see Course Schedule).
- Optional Seminar: bi-weekly, based on 5 lectures in streaming video by L. Lyons.

Required Textbooks:

- 1) "Introduction to Nuclear and Particle Physics" (2nd Edition), A. Das and T. Ferbel, World Scientific Pub., 2003, ISBN 981-238-744-7 (pbk)
- 2) "Facts and Mysteries in Elementary Particle Physics", M. Veltman, World Scientific Pub., 2003, ISBN 981-238-149-X (pbk)

Optional Text:

- "Statistics for Nuclear and Particle Physicists", Louis Lyons, Cambridge University Press, 1989, ISBN 0 521 37934 2 (pbk)

Course Topics:

- Course covers the topics shown in the **Course Schedule** (on the next page).
- Lectures may not cover all topics presented in the **Reading Assignments**. All topics, in the assigned reading or presented in lecture may appear on an exam.
- Lectures on Mon. and Wed. will be posted on the Course Web site by Fri of that week.

Tier II Writing Assignment

- You are required to write an 8-10 page technical paper (referenced) on a subject to be determined. Suggestions: use Veltman's book as a starting point.
- A 1 page detailed outline or draft of this paper will be due on Wednesday, March 20. Deadline for submission is April 27, the last class. I will be out of the country after that date. Late submission will result in an Incomplete as your grade. No exceptions.

Homework (HW) and Exams:

- There will be 7 homework assignments with due dates as indicated in the **Course Schedule**. Homework handed in late will not be graded, but will be logged. All missing homework assignments must be submitted by the last class on April 27.
- Two, **60 minute exams** will be given in class on the dates indicated in the Course Schedule. There is a 2 hr final exam on May 3, 7:45 – 9:45 am in Chemistry 220.
- Documented medical (or other) excuses for **one** 60 minute exam will be considered on a case by case basis. Resolution may involve an oral exam.

Grades

- HW (2 points/problem. ~100 total points), 2 exams (75 points each), Tier II paper (50 points), Final Exam (200 points) Straight scale. >350 points will get a 4.0, and cuts are 30 points lower for each 0.5 in grade.
- Frequently check the **WEB** site, <http://www.pa.msu.edu/courses/PHY492>, for announcements, HW (hints, corrections) and exam solutions, scores and grades.

Miscellaneous

- No HEAD-phones, IPODs, CD-players, CELL-phones, or HATs in class.

PHY492 Schedule Spring 2006

| W | D | Date | L | Subjects | D&F | V | HW | HW Due |
|----|---|---------|----|--|------------------------------------|---------------------------------|---------------|-----------|
| 1 | M | Jan. 9 | 1 | Relativistic Kinematics, Forces | Apx-A | 1, 4 | | |
| | W | Jan. 11 | 2 | Rutherford Scattering | 1 | | | |
| 2 | M | Jan. 16 | | M. L. K. Day - no classes | | | | |
| | W | Jan. 18 | 3 | Properties of Nuclei | 2-3 | | odd #'d prob. | Ch. 1 |
| 3 | M | Jan. 23 | 4 | Nature of the Nuclear Force | | | | |
| | W | Jan. 25 | 5 | Liquid Drop Model | | | | |
| 4 | M | Jan. 30 | 6 | Shell Model | | | | |
| | W | Feb. 1 | 7 | Alpha Decay | 4-5 | | odd #'d prob. | Ch. 2-3 |
| 5 | M | Feb. 6 | 8 | Beta Decay | | | | |
| | W | Feb. 8 | 9 | Applications of Nuclear Physics | | | | |
| 6 | M | Feb. 13 | 10 | Energy Deposition in Media | 6-7 | | odd #'d prob. | Ch. 4-5 |
| | W | Feb. 15 | | 60-min. Exam (L1-9) | | | | |
| 7 | M | Feb. 20 | 11 | Introduction to Detectors and Accelerators | | 5-7 | | |
| | W | Feb. 22 | 12 | EM & Hadronic Particle Detection | | | | |
| 8 | M | Feb. 27 | 13 | Accelerators I | 8 | | | |
| | W | Mar. 1 | 14 | Accelerators II | | | odd #'d prob. | Ch 6-8 |
| | | | | Spring Break | | | | |
| 9 | M | Mar. 13 | 15 | Elementary Particles I | 9-10 | 8 | | |
| | W | Mar. 15 | 16 | Elementary Particles II | | | | |
| 10 | M | Mar. 20 | 17 | Symmetries I | (Tier-II Paper Outline Due) | | | |
| | W | Mar. 22 | 18 | Symmetries II | | | odd #'d prob. | Ch. 9-10 |
| 11 | M | Mar. 27 | 19 | 60-min. Exam (L11-18) | | | | |
| | W | Mar. 29 | 20 | Angular Momentum Coupling | 11-12 | 9-11 | | |
| 12 | M | Apr. 3 | 21 | Parity Conservation and Violation | | | | |
| | W | Apr. 5 | 22 | Time and Charge Symmetries | | | | |
| 13 | M | Apr. 10 | 23 | Neutral Kaons and Oscillations | | | odd #'d prob. | Ch. 11-12 |
| | W | Apr. 12 | 24 | CP Violation | 13-14 | | | |
| 14 | M | Apr. 17 | 24 | Standard Model, QCD | | 2-3 | | |
| | W | Apr. 19 | 25 | Gauge Bosons | | | | |
| 15 | M | Apr. 24 | 26 | Neutrino Oscillations | | | odd #'d prob. | Ch. 13-14 |
| | W | Apr. 26 | 27 | Testing the Standard Model | 15 | (Tier-II Paper Deadline) | | |
| | W | May | 3 | Final Exam (L1-27) | | | | |