

## PH 493 Section 001: Intro To Research

Spring 2012

1 Credit Hours

Primary Instructor: Dr. Andreas Piepke

Syllabus subject to change.

### Prerequisites

From the Student Records System

No prerequisites found.

### Course Description

This course will provide a self paced introduction to experimental neutrino physics. The emphasis is on the investigation of nuclear double beta decay. The course involves reading of papers and involvement in the ongoing EXO-200 double beta decay experiment. The latter will be through analysis of experiment data using our local, LINUX based, computing system. The primary task is add the muon veto detector system to the detector simulation code, based on GEANT4. The student will participate in the weekly Friday meetings of the neutrino physics research group and present results to this group by means of PowerPoint presentations. Achieving a passing grade will require an end of semester oral presentation to the group of at least 30 min length or writing of a semester paper in scientific format (at least 5 pages).

### Student Learning Outcomes

1. Become familiar with the experimental techniques involved in rare event searches.
2. Develop a working understanding of neutrino mass tests and double beta decay experiments.
3. Become familiar with the EXO-200 double beta decay experiment and its software tools.
4. Develop the ability to work on EXO-200 data analysis.

### Outline of Topics

1. Radioactive decay
2. Rare event searches, backgrounds
3. Double beta decay and its importance for neutrino physics
4. EXO-200 data analysis

### Exams and Assignments

Student performance will be assessed using the following:

1. Active participation in the meetings of the neutrino research group.
2. At least one 15 min PowerPoint presentation on double beta decay and the EXO-200 experiment by mid term.
3. A final 30 min presentation on EXO-200 research result or a 5 page paper on the same subject.

### Grading Policy

A passing grade requires regular participation in the neutrino physics group meetings. I will remove 2%-points for each unexcused absence from a group meeting. Students need to give a 15 min midterm PowerPoint presentation to the group, and a 30 min end of semester PowerPoint presentation. A 5 page end of term paper on EXO-200 research results (in scientific format) may be substituted for the final talk. This substitution needs to be approved by the instructor.

- Regular participation: 30%
- Mid term report: 20%
- Final report: 50%

## Policy on Missed Exams & Coursework

This class is self paced. The students are responsible for allocating sufficient study time to the subject. Absences from the weekly group meetings will be accepted if it is scheduled ahead of time. There will be no make up of missed meetings. However, the scheduling will be flexible to accomodate the student's learning pace and time constaints.

## Attendance Policy

Attendance of the weekly meetings of the neutrino physics research group is required. Absences can be excused for valid reasons and if prior arrangements are made with the instructor.

## Required Texts

UA Supply Store Textbook Information

- NONE / NO TEXT REQUIRED

## Other Course Materials

This class requires reading of scientific papers. A list of resources will be developped in collaboration with the instructor who will aid in identifying relevant papers.

## Extra Credit Opportunities

None

## Policy on Academic Misconduct

All students in attendance at the University of Alabama are expected to be honorable and to observe standards of conduct appropriate to a community of scholars. The University expects from its students a higher standard of conduct than the minimum required to avoid discipline. Academic misconduct includes all acts of dishonesty in any academically related matter and any knowing or intentional help or attempt to help, or conspiracy to help, another student.

[The Academic Misconduct Disciplinary Policy](#) will be followed in the event of academic misconduct.

## Disability Statement

If you are registered with the Office of Disability Services, please make an appointment with me as soon as possible to discuss any course accommodations that may be necessary. If you have a disability, but have not contacted the Office of Disability Services, please call 348-4285 or visit 133-B Martha Parham Hall East to register for services. Students who may need course adaptations because of a disability are welcome to make an appointment to see me during office hours. Students with disabilities must be registered with the Office of Disability Services, 133-B Martha Parham Hall East, before receiving academic adjustments.

## Severe Weather Protocol

In the case of a tornado warning (tornado has been sighted or detected by radar, sirens activated), all university activities are automatically suspended, including all classes and laboratories. If you are in a building, please move immediately to the lowest level and toward the center of the building away from windows (interior classrooms, offices, or corridors) and remain there until the tornado warning has expired. Classes in session when the tornado warning is issued can resume immediately after the warning has expired at the discretion of the instructor. Classes that have not yet begun will resume 30 minutes after the tornado warning has expired provided at least half of the class period remains.

UA is a residential campus with many students living on or near campus. In general classes will remain in session until the National Weather Service issues safety warnings for the city of Tuscaloosa. Clearly, some students and faculty commute from adjacent counties. These counties may experience weather related problems not encountered in Tuscaloosa. Individuals should follow the advice of the National Weather Service for that area taking the necessary precautions to ensure personal safety. Whenever the National Weather Service and the Emergency Management Agency issue a warning, people in the path of the storm (tornado or severe thunderstorm) should take immediate life saving actions.

**When West Alabama is under a severe weather advisory, conditions can change rapidly. It is imperative to get to where you can receive information from the [National Weather Service](#) and to follow the instructions provided. Personal safety should dictate the actions that faculty, staff and students take. The Office of Public Relations will disseminate the latest information regarding conditions on campus in the following ways:**

- Weather advisory posted on the UA homepage
- Weather advisory sent out through Connect-ED--faculty, staff and students ([sign up at myBama](#))
- Weather advisory broadcast over WVUA at 90.7 FM
- Weather advisory broadcast over Alabama Public Radio (WUAL) at 91.5 FM
- Weather advisories are broadcast via WUOA/WVUA-TV, which can be viewed across Central Alabama. Also, visit [wvuatv.com](http://wvuatv.com) for up-to-the-minute weather information. A mobile Web site is also available for your convenience.