

Spring 2008

Stony Brook University
Department of Physics & Astronomy
College of Arts and Sciences
PHY 315-E/ CEB 558 Hands-On Science with Cosmic Rays: Experimental Research for Non-Physics Majors
Course Instructor: Michael Marx
Section: 01
Office Hours: Tuesday and Thursday 11:00am -12:00 noon , Wednesday 3:00 – 4:00pm and by appointment
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COURSE DESCRIPTION:

Cosmic rays are a ubiquitous source of background radiation here on Earth, constantly replenishing short-lived radioactive materials (like Carbon 14) and perhaps providing the engine that has driven evolution over the ages. This seminar will provide an inquiry-based interactive opportunity to study the properties of cosmic rays using modern particle detectors and computers as an introduction to the scientific method, experimental techniques, and data analysis. Classes will integrate group discussions with hands-on investigation in small teams, and then joint brainstorming sessions to analyze and understand the data to suggest ways to improve the experimental measurements. Students will use computers to take and analyze data, to post their results, and to interact with each other and the course staff.

Intended for non-Physics majors, K-12 science and research teachers, and those interested in inquiry-based learning and the experimental method.

Course Pre/co-requisites DEC C (One course in Mathematical and Statistical Reasoning) , U2 standing or higher

COURSE OBJECTIVES:

Category E courses expand students' knowledge about objects and processes observable in nature, whether animate as in the biological sciences, or inanimate as in the physical sciences of chemistry or physics.

COURSE REQUIREMENTS:

Attendance and Make Up Policy

Attendance is one of the key requirements for this course. Unexcused absences cannot be made up and will detract from the final grade. Excused absences may be made up by pre-arrangement with the course staff on Tuesdays in April.

Description and schedule of Required Readings and/or Assignments.

All materials for this course can be found at the class wiki:

<http://www.mariachi.stonybrook.edu/wiki/index.php/PHY315-08>

GRADING:

Your grade will be a composite of

- Your class attendance and participation (25%)
- Your weekly additions to your wiki site (25%)
 - Note that assignments will be posted to the wiki site
- Three in class progress and final reports (25%)
 - **Dates March 4, April 8, and May 6**
- Your completed research projects with emphasis on your insights as to its scientific accuracy, how it could be improved, and suggestions for new directions of inquiry posted on your wiki page (25%)

MEETING SCHEDULE

Week 1 January 29	Introduction to Cosmic Rays Introduction to Detectors – (demonstrations) Noise, signals, coincidences, and accidentals
Week 2 February 5	Introduction to Mariachi and radar Electronic logic and data acquisition Hands-on measurement of detector efficiency and rates
Week 3 February 12	Statistical and Systematic errors Analysis of efficiency and statistical measurement variations Discussion of experiments and team formation
Week 4 February 19	Experiment 1 Discussion of progress
Week 5 February 26	Experiment 1 Data analysis (discussion of statistical errors, more measurement) Discussion of progress
Week 6 March 4	Presentation of Results Brainstorming/Critiques (x and y errors, refine measurements)
Week 7 March 11	Experiment 2 Data analysis (calibrations, comparison of measurement to “true” value”) Discussion of progress

NO CLASS ON MARCH 18 – SPRING RECESS

Week 8 March 25	Experiment 2 Data analysis (refine measurements) Discussion of progress
Week 9 April 1	Experiment 2 Data analysis Discussion of progress
Week 10 April 8	Presentation of Results Brainstorming/Critiques Accelerators and Tour of Van de Graaff
Week 11 April 15	Experiment 3 Data analysis Discussion of progress
Week 12 April 22	Experiment 3 Data analysis Discussion of progress
Week 13 April 29	Experiment 3 Data analysis Discussion of progress
Week 14 May 6	Presentation of Final Results Last Class

DISABILITY SUPPORT SERVICES (DSS) STATEMENT

If you have a physical, psychological, medical, or learning disability that may impact your course work, please contact Disability Support Services (631) 632-6748 or <http://studentaffairs.stonybrook.edu/dss/>. They will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential.

Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and Disability Support Services. For procedures and information go to the following website:

<http://www.stonybrook.edu/ehs/fire/disabilities/asp>.

ACADEMIC INTEGRITY STATEMENT:

Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty are required to report any suspected instance of academic dishonesty to the Academic Judiciary. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at <http://www.stonybrook.edu/uaa/academicjudiciary/>

CRITICAL INCIDENT MANAGEMENT :

Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Judicial Affairs any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, and/or inhibits students' ability to learn.