PHYS 111 Our Universe: Forensic Studies Lab

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Short Description of Scientific Perspective Course
The scientific method has resulted in historically unprecedented changes in our world. In this course you will learn how science proceeds, and practice the scientific method yourself in a weekly laboratory experience. You will learn the qualities of a good hypothesis or model, how to assess its validity, the significance of a scientific theory, and the elusiveness of “proof.” On completing the course, you will be better able to understand and evaluate scientific or pseudoscientific claims that have direct impacts on your personal and professional life.

This course is part of the Xavier Core Curriculum, which aims to develop people of learning and reflection, integrity and achievement, in solidarity for and with others. It addresses the following core learning objectives at the introductory level:

1a: Students recognize and cogently discuss significant questions in the humanities, arts, and the natural and social sciences.

2b. Students evaluate problems using quantitative methods and arguments

Specific Objectives for the Scientific Perspectives Course
1.1 Students utilize the scientific method, and differentiate between hypotheses/models, theories and laws.
1.2 Students articulate the nature of evidence, objectivity, data interpretation, the elusiveness of “proof”, and reproducibility/replicability
1.3 Students compare various types of research studies (e.g. observational, experimental, correlational, mechanistic).
2.1 Students utilize analytical and quantitative skills to design experiments, collect data, and make measurements.
2.2 Students construct and interpret graphs and tables, and to calculate and interpret appropriate statistics (e.g. mean, variability, correlation).
3.1 Students analyze and distinguish claims based on science from misinformation based on pseudoscience
3.2 Students analyze claims and information that they encounter regarding science in their everyday lives based on their transfer and utilization of knowledge about science.
Components:
You will perform 10 lab experiments which will be assessed through lab reports. The labs will sometimes cover material from the lecture. Some labs are independent from the lecture. Therefore you need to read the manual in advance for all labs.

1. Forensic photography
2. Face Bertillonage
3. Finger Prints
4. Voice Analysis
5. Hair Comparison
6. Fracture Patterns in glass
7. Blood Typing
8. Blood Spatter
9. Determination of the Time of Death
10. Fluorescent Scavenger Hunt
11. Cryptography

In addition there will be one lab exam. The date will be announced on CANVAS.

How to do the LAB EXPERIMENTS:

Lab Preparation: Read each lab handout prior to the lab period. Students who are unprepared for lab will have their grade lowered for that week.

Lab Work: Always work diligently. Diligence is the essence of forensic science and science in general. Document your work with a table of data, photographs, sketches whenever appropriate.

Lab Partners: You will work in pairs during the lab sessions. Both students in the pair are expected to participate fully. You must hand in your own individual lab report. Data will be identical for each partner, but the memos and reports must be written in your own words and must not be identical. Placing your name on another student’s lab report DOES NOT COUNT as handing in a lab.

Due Dates: All lab reports are due at the beginning of the next lab period, one week after the lab has been completed. Partial credit will be given to lab reports submitted one week late. Lab reports will not be accepted if they are more than one week late. Attendance is mandatory at all lab sessions.

Lab reports: Once the experiment has been completed, you will prepare a report summarizing the data, analysis and conclusion. Report like a professional:

   Explain the issue: clearly describe the issue/problem and deliver all relevant information necessary for full understanding.
Document, document, document for use in a trial later on! Use appropriate methods to document your findings and supply these documents with your report.

Evidence: Provide or select and use data/measurements/documentation to support your conclusion based on the evidence you found. Your conclusion has to be logical. Comment on any limiting factors that could present an error in your conclusion.

Photo Project: You will be staging your own murder scene, complete with pieces of physical evidence. You will then “investigate” your own scene, making sketches, taking notes, and preparing detailed photographs. A full report must accompany this project. More details and materials will be given to you in lab.

Crime Scene: You will be faced with a crime scene. As a group, you must discover, document, preserve, and analyze evidence. You must question witnesses, identify suspects, and create a theory of the crime. You will be graded on your successful solution of the crime, as well as on the role you play individually. At the end of the exercise, you will write a memo to me, outlining the approach the team took, and parts in which you were directly involved. This is designed to be both fun and challenging, and to act as a capstone to this course.

Lab Final Exam: You are expected to understand the concepts behind each lab, as well as the procedure followed. The test will be a combination of multiple choice questions, short answer questions, and some practical activities. You should be able to perform the techniques used in the lab. The lab handouts will provide a good study guide. This exam is closed notes.
Attendance:

Attendance is mandatory, and no make-up labs will be allowed. Absences due to family or medical emergencies will be considered on a case by case basis.

Grading:

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