Course Profile - Department of Physics

Course Number : PHYS 475	**Course Title :** Methods in Experımental Physics
Required / Elective : elective	**Pre / Co-requisites :**
Catalog Description: Principles of experimentation; error analysis; uncertainty and precision in measurements; data collection and statistical analysis; Binomial, Poisson and Gauss distributions; expected values; variance; chi-square test; least square fitting; experimental design and methods..	**Textbook / Required Material :** *Experimental Methods, L. Kirkop, John Willey&Sons, 1994.*
Course Structure / Schedule : (3+0+0) 3 / 6 ECTS	
Extended Description : Classical probability; counting; conditional probability; dependent and independent events; leaf and stem diagram; tree diagram; Baye's Theorem. Discrete random variables; expected value of a discrete probability distribution; variance; hypergeometric probability distribution; Binomial probability distribution; Poisson probability distribution; mathematical properties of the discrete distributions.Continuous random variables; expected value of a continuous probability distribution; variance; Gauss probability distribution; normal distribution; Mathematical properties of the Gaussian or normal distribution; the equation of the Gaussian distribution curve; standard deviation of the Gaussian distribution; areas under the Gaussian distribution curve; exponential probability distribution; Weibull probability distribution;Gaussian distributions and sampling; central values of distribution; sample means and standart deviation of the mean; statistical uncertainty; sample standart deviation; Central limit theorem; box-plots; confidence level; effect of sample size; the concept of correlation.Observations and models; construction of an experiment; presentation of an experimental study.	
Design content : None	**Computer usage**: computational and graphics software are used in the numerical solution of the equations and preparation of presentations.

Course Learning Outcomes [relevant program outcomes in brackets]**:**

On successful completion of this course students will be able to

1. learn the probability distributions and solve the related problems (2).
2. learn statistical analysis of data including uncertainties (1, 2, 11).
3. have in-depth experience in sampling and experimental design (6).
4. gain skills in interpretation and graphical presentation of experimental data (6, 11).
5. gain skills in scientific thinking and writing scientific reports (6, 11).
6. gain skills in demonstration the experiments and present the results in the class (9, 11).

Recommended reading

1. *Experimentation*: An introduction to measurement theory and *Experimentation Design*: D. C. Baird, Prentice-Hall, Inc.1995.
2. *Introduction to Probability and Statistics for Engineers and Scientists*, S.M.Ross, Academic Press, 2000.

Teaching methods

1. Lecture and discussion
2. Demonstrations and videos
3. Problem solution activities
4. Group discussion and interpretation of observations
5. Problem assignments

Assessment methods (Related to course outcomes)**:**

1. Two mid-term examinations
2. Written tests and quizzes
3. Questions/problem assignments
4. Final exam
5. Classroom observation (attendance)

Student workload:

Preparatory reading	45 hrs
Lectures, discussions	45 hrs
Homework	30 hrs
Presentations	27 hrs
Final Exam	3 hrs

TOTAL …… 150 hrs … to match 25 x 6 ECTS

Prepared by : Nafiye Güneç KIYAK , 01.02.2010	**Revision Date :**