

Course Profile - Department of Physics

Course Number : PHYS 474	Course Title : Spectroscopy
Required / Elective : elective	Pre / Co-requisites : EE 361, PHYS 334
Catalog Description: Basic principles of spectroscopy; interaction of energy with matter; spectroscopic measurements and analysis; spin-orbit interaction; molecular structure and spectra; florescence and phosphorescence; Zeeman effect; mass spectroscopy; atomic absorption spectroscopy; electron paramagnetic spectroscopy; infrared spectroscopy; Raman spectroscopy; X-ray spectroscopy; Fourier transform spectroscopy.	Textbook / Required Material : Hollas J.M., <i>Modern Spectroscopy, 4th Edition</i> , Wiley 2004. ISBN 978-0470844168
Course Structure / Schedule : (3+0+0) 3 / 8 ECTS	
Extended Description : Introduction to spectroscopy, Interaction of energy with matter, Basic principles of spectroscopic techniques, Types of Spectroscopy and their applications, Spectroscopic techniques in technical and research areas, Absorption spectroscopy, emission spectroscopy and scattering spectroscopy, Ionized radiation and detection by spectroscopy; Alpha, beta and gamma spectroscopy, Nuclear spectroscopy and applications, Spectroscopic techniques in solid state physics, Florescence and phosphorescence, Atomic absorption spectroscopy, spectra of hydrogen atom, Mass spectroscopy, Infrared spectroscopy, Electron paramagnetic spectroscopy, X-ray spectroscopy, Raman spectroscopy, Fourier transform spectroscopy.	
Design content : None	Computer usage: computational and graphics software are used in the preparation of assignments and preparation of class presentations.
Course Learning Outcomes [relevant program outcomes in brackets]: On successful completion of this course students will be able to <ol style="list-style-type: none"> 1. learn the basic mechanism of spectroscopy and spectroscopic techniques (1). 2. became familiar with the most recent developments of spectroscopic techniques (1, 5). 3. gain experience on nuclear spectroscopy (7). 4. gain a knowledge of the applications of spectroscopic techniques in different fields (1, 5). 5. develop skills in solving spectroscopic problems with computational techniques (1, 3) 6. improve lab skills and familiarity with spectroscopic lab equipment (6, 11). 	

Recommended reading

1. Parson William W., *Modern Optical Spectroscopy: With Exercises and Examples from Biophysics and Biochemistry*, 2nd Edition, Springer 2009. ISBN 978-3540958956.
2. Andrews D.L., *Encyclopedia of Applied Spectroscopy*, Wiley-VCH 2009. ISBN 978-3527407736

Teaching methods

1. Lecture and discussion
2. Demonstrations and videos
3. Group discussion and interpretation of observations
4. Reading and assignments

Assessment methods (Related to course outcomes):

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

Student workload:

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|--------------------------|--------|
| 1. Preparatory reading | 45 hrs |
| 2. Lectures, discussions | 45 hrs |
| 3. Exercise sessions | 30 hrs |
| 4. Presentations | 27 hrs |
| 5. Final Exam | 3 hrs |

TOTAL **155 hrs ... to match 25 x 6 ECTS**

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