

University of Science and Technology of Hanoi Address: Building 2H, 18 Hoang Quoc Viet, Cau Giay, Hanoi Telephone/ Fax: +84-4 37 91 69 60 Email: <u>officeusth@usth.edu.vn</u> Website: http://www.usth.edu.vn

## **COURSE SYLLABUS**

Subject: Photonics and Optoelectronics Systems Lecturer: Dr. Dinh Van Trung **Academic field: Physics** 

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Academic year: 2013

## **COURSE DESCRIPTION**

Credit points					
Level	Undergraduate				
Teaching time Location	University of Science and Technology of Hanoi				
	Lecture	23 hrs			
Time Commitment	Exercises	05 hrs			
	Practicals	02 hrs			
	Total	30 hrs			
Prerequisites	None				
Recommended background knowledge	None				
Subject description:	This course will cover the basics of physical optics and photonics. I will also cover the applications of photonics such as fibre optic communication and photon detectors. A laboratory visit during the course will provide students with some experience of doing modern research in optics and photonics.				
Objectives & Out-come	<ul> <li>(Knowledge &amp;/ Skills gained via the course)</li> <li>The students will be able to:</li> <li>Understand and describe the basics of physical optics and photonics</li> <li>Understand the applications of optics and photonics</li> <li>Solve relevant problems</li> </ul>				
Assessment/ Evaluation	Attendance/Attitude Exercise(s) Practicals Mid-term test Final exam	10_% 20_% % % 			
Prescribed Textbook(s)	<ul> <li>[1] Fundamentals of Photonics, B.E.A Saleh &amp; M.C. Teich, 2<sup>nd</sup> edition</li> <li>[2] Laser Electronics, J.T. Verdeyen, 3<sup>rd</sup> edition</li> </ul>				



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[3] Fundamental of Physics, Halliday, Resnick, Walker, 6<sup>th</sup> edition.

## **COURSE CONTENTS & SCHEDULE**

S		Hours				
Clas	Contents		Exr.	Prc.	Ref./Resources	Assignment(s)
1	<ul> <li>[1] Topic 1: <i>Nature of light</i></li> <li>Physical properties of light</li> <li>Maxwell equations and EM waves</li> <li>Light spectrum</li> <li>Photon and quantum states of light</li> </ul>	03				
2	Topic: <i>Light propagation I</i> Absorption and dispersion Reflection and refraction at boundaries Fresnel equations, polarizers Crystal optics	02	01			
3	Topic: <i>Light propagation II</i> Interference and coherence Stellar interferometry Diffraction, Fresnel zones, zone plates Optical grating	02	01			
4	Topic: Fourier optics Optical Fourier transform Image formation Holography Optical image processing	02	01			
5	Midterm exam	02				
6	Topic: <i>Optical fibre</i> Planar and 2D dielectric waveguide Optical fibre, attenuation and dispersion Fibre-optic communication	02	01			
7	Topic: Physics of lasers	02	01			



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	Optical resonators				
	Interaction of photons with atoms				
	Laser oscillation				
	Characteristics of laser radiation				
	Pulsed lasers				
	Topic: Semiconductor photon sources	03			
8	Light emitting diodes				
	Semiconductor lasers				
	Semiconductor amplifiers				
	Topic: Photon detectors	02	01		
	Photoelectric effect and photomultiplier tube				
9	Properties of Semiconductor photo-detectors				
	Photoconductors				
	Photodiodes and Avalanche photodiodes				
	Noise in photon detectors				
10	Review	02			
10		00			
11	Laboratory visit	02			
				1	

Notes:

- Abbreviation: Lect. (lecture), Exr. (Exercise), Prc. (Practise).
- Exercises may include assignment, reports, student's presentation, homework, class exercises ... for each class sessions
- Practicals mostly refer to Lab- work or outside practice such as field trip.

## **Reference Literature:**

[1].	
[2].	
[3].	
[4].	