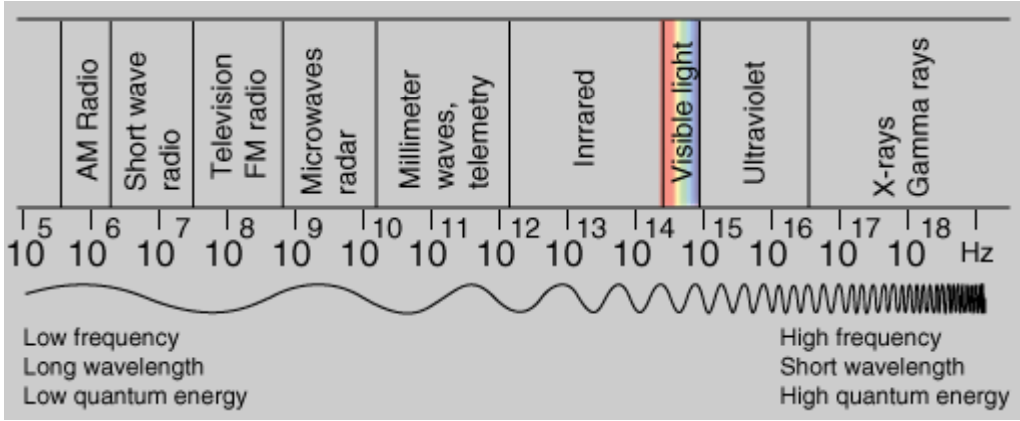
Lect. 1: Introduction

- *What is light?*

  - Wikipedia: EM radiation of a wavelength visible to human eye

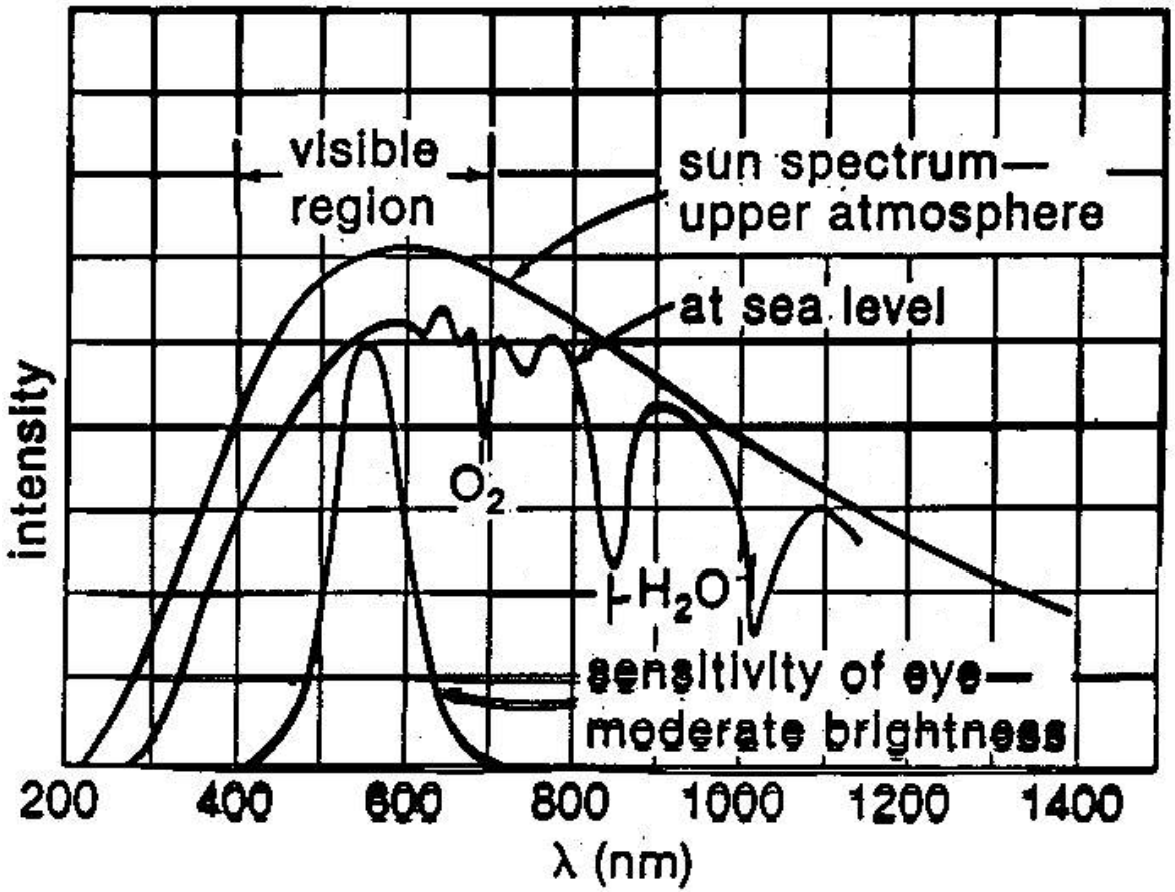


Visible light, Wavelength: 400-700 nm
Frequency: 430 – 750 THz
Photon energies: 1.65 - 3.1 eV

Why do we see only what we see?

Lect. 1: Introduction

Why do we see only what we see?

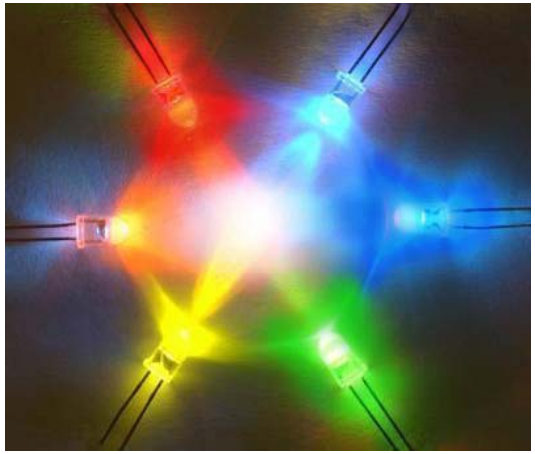


-Light has been most abundant EM waves for long time!

Lect. 1: Introduction

- *Why study light in EE?* Many applications

LED: Light Emitting Diode



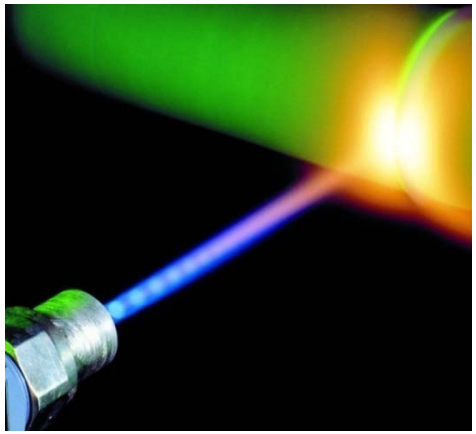
LEDs have much better efficiency and longer life time.

Expected to replace all the lighting systems, eventually

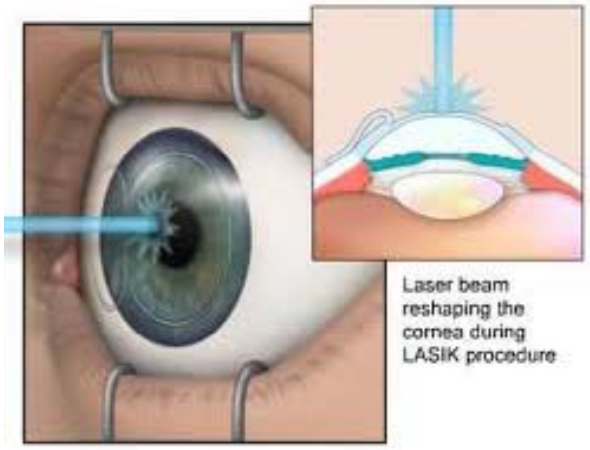
Lect. 1: Introduction

- *Why study light in EE?* Many applications

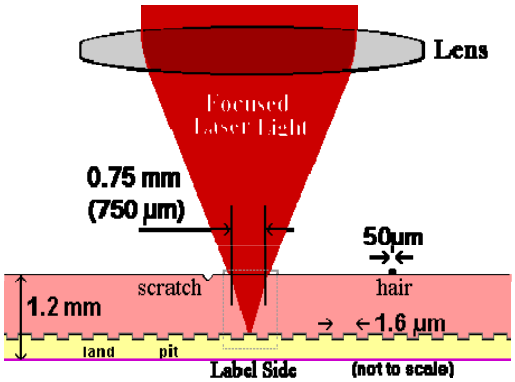
LASER: Light Amplification by Stimulated Emission Radiation



Material Processing



Laser Surgery

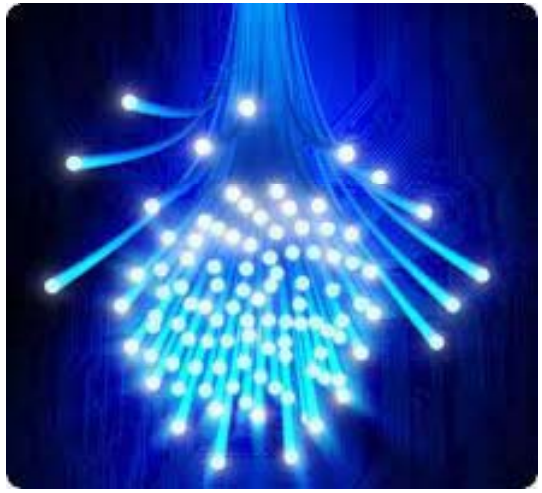


CD, DVD

Lect. 1: Introduction

- *Why study light in EE?* Many applications

Optical Fiber Communication



Light can travel inside fiber with very small loss

Key technology for internet revolution!

Lect. 1: Introduction

- *Why study light in EE?*

Many applications in Information Technology

Information Transmission: Optical Communication

Information Display: LCD, PDP, LED

Information Storage/Recovery: CD, DVD

Information Processing: Optical Computers, Sensors

Medical Applications

What are we going to do in this course?

Lect. 1: Introduction

- Goals: Understand what light is and learn how to use it

- Teaching Staffs
  - Lecturer: Prof. Woo-Young Choi (최우영)
    Room: B625, Tel: 2123-2874
    Email: wchoi@yonsei.ac.kr, Web: tera.yonsei.ac.kr
  - T.A.'s: Jeong-Min Lee(이정민): minlj@tera.yonsei.ac.kr
    Hyung-Yong Chung (정현용): mlchy@tera.yonsei.ac.kr
    Room: B629, Tel: 2123-7709

- Class Hours
  - Lecture: Mon. 2:00-3:50 pm, Wed. 9:00-9:50 pm at A625
  - Tutorial: Mon. 6:00-6:50 pm at A690
    (Homework solutions, make-up classes, etc, only when necessary)

- Prerequisite: Sufficient knowledge in Electromagnetics
  (전자기학1 , 전자기학2)

Lect. 1: Introduction

- Textbook:

  Class notes (Will be available in PDF before lecture at tera.yonsei.ac.kr)

  Optoelectronics and Photonics by Kasap

- Grades

  - 1 **Quiz:** 10 points
  - **3 Tests:** 25 points x 3 times = 75 points
  - 1 **Presentation in English**: 15 points

- Attendance: Random sampling

  Absent: - 0.5 point, Late: - 0.25 point

- Homeworks.: When necessary

  No homework: - 1.0 points, Suspected of copying: -3 points

Lect. 1: Introduction

- **Projects**

Each student is expected to choose a topic related to optoelectronics and make a in-class presentation in English. The presentation will be graded based on following: relevance to the selected topic to the course, the knowledge of the student on the topic, presentation skills.

- **Lunch Meeting**:

Students are encouraged to participate in lunch meetings with fellow students and professor. Lunch meetings will be held on Monday from 12:00 - 12:50 in my office. Sign-up sheets will be available. We can have free conversation on the course, future career plans, etc. Sandwiches and drinks will be provided. A sign-up sheet will be available next Monday.

Lect. 1: Introduction

- Class Schedule (Tentative and subject to changes)

  - Part 1: Lightwave (Review of EM2, Kasap Chapter 1)

  - Part 2: Waveguides (Kasap Chapter 2)

  - Part 3: Optoelectronic Devices (Kasap Chapter 4,5,7)

Lect. 1: Introduction

- Class Schedule (Tentative and subject to changes)

  - Part 1: Lightwave

Lect. 1: Introduction
Lect. 2: Light as EM waves
Lect. 3: Light propagation in medium
Lect. 4: Reflection and transmission
Lect. 5: Total internal reflection

Quiz 1: 9/20

Lect. 6: Interference
Lect. 7: Multiple dielectric interference
Lect. 8: Interferometers
Lect. 9: Diffraction
Lect. 10: Diffraction Gratings

Test 1: 10/4

Lect. 1: Introduction

- Class Schedule (Tentative and subject to changes)

  - Part 2: Waveguide

Lect. 11: Metallic waveguide
Lect. 12: Dielectric waveguide
Lect. 13: Waveguide devices
Lect. 14: Optical fiber
Lect. 15: Dispersion in optical fiber

Test 2: 11/1

Lect. 1: Introduction

- Class Schedule (Tentative and subject to changes)

-Part 3 : Optoelectronic Devices

Lect. 16: Light as a particle
Lect. 17: Interaction between light and matter
Lect. 18: Optical pumping
Lect. 19: LED
Lect. 20: Laser
Lect. 21: Semiconductor laser
Lect. 22: Single-mode semiconductor laser
Lect. 23: Photodetectors
Lect. 24: Noises in photodetectors
Lect. 25: Solar cells

Test 3: 11/29

September

일	월	화	수	목	금	토
			1 Lect. 1	2	3	4
5	6 Lect. 2,3	7	8 Lect. 4	9	10	11
12	13 Lect. 5	14	15 Lect. 6	16	17	18
19	20 Q1 Lect. 7	21	22 추석	23	24	25
26	27 Lect. 8,9	28	29 Lect. 10	30		

October

일	월	화	수	목	금	토
					1	2
3	4 TEST 1	5	6 T1 Review	7	8	9
10	11 Lect. 11,12	12	13 Lect. 13	14	15	16
17	18 Lect. 14,15	19	20	21	22	23
24 31	25	26	27 Lect. 16	28	29	30

Mid-Term Exams

November

일	월	화	수	목	금	토
	1 TEST 2	2	3 T2 Review	4	5	6
7	8 Lect. 17,18	9	10 Lect. 19	11	12	13
14	15 Lect. 20,21	16	17 Lect. 22	18	19	20
21	22 Lect. 23,24	23	24 Lect. 25	25	26	27
28	29 TEST 3	30				

December


일
월
화
수
목
금
토
1
T3 Review
2
3
4
5
6
Presentation
7
8
Presentation
9
10
11
12
13
Presentation
14
15
16
17
18
Final Exams
19
20
21
22
23
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30
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