

## SS812 LASER INSTRUMENTATION FOR BIOMEDICAL APPLICATIONS 3-1-0-4

Basic optical theory: nature of electromagnetic radiation, interaction of radiation with matter, reflection, refraction, polarization, Laser fundamentals, laser beam characteristics, Q-switching, mode locking, continuous wave, beam quality (laser cavity modes), types of lasers, energy and power.

Laser interaction with materials: Absorption, reflection, refraction and polarization, optical properties of materials, tissues – laser interaction with tissues - pathology of laser reaction in tissues - thermal effects - non thermal reactions of laser radiation.

Laser instrumentation: Doppler flowmetry - Laser flow cytometry - single cell separation - micro irradiation. Laser fluorescent micro irradiation - Laser eye instrumentation. Laser tissue transillumination & diaphanography - Speckle interferometry, reflectance in tumor diagnostics, holography - Application Safety with biomedical Lasers.

### TEXT BOOKS/REFERENCES:

1. Markolf H. Niemz, “*Laser-Tissue Interactions: Fundamentals and Applications*”, Springer, 2007.
2. Valerii Viktorovich Tuchin, “*Tissue Optics: Light Scattering Methods and Instruments for Medical Diagnosis*”, SPIE Publications 2007.
3. Leon Goldman, “*The Biomedical Laser Technology and Clinical Applications*”, SpringerVerlag, 1981.
4. Myron L. Wolbarsht, “*Laser Applications in Medicine and Biology*”, Springer, 1991.
  1. f thin films—O.S Heavens (Dover)