

Laser Physics Quick Reference

Key terms and formulas for Module 1 – Laser Physics & Energy Concepts.

Key Terms

- **LASER:** Light Amplification by Stimulated Emission of Radiation.
- **Monochromaticity:** Laser light of a single wavelength.
- **Coherence:** Photons traveling in phase and direction.
- **Collimation:** Light waves traveling parallel with minimal divergence.
- **Wavelength (λ):** Distance between peaks of a wave, measured in nanometers (nm). Determines which chromophore is targeted.
- **Fluence:** Energy per unit area delivered to tissue, measured in J/cm².
- **Pulse Duration:** Time the laser energy is delivered in one pulse (milliseconds).
- **Spot Size:** Diameter of the laser beam at the treatment surface.
- **Selective Photothermolysis:** Principle of selectively heating a chromophore while sparing surrounding tissue.
- **Chromophores:** Light-absorbing targets in tissue such as melanin, hemoglobin, water.

Key Formulas

- **Fluence (J/cm²) = Energy (Joules) ÷ Area (cm²)**
- **Area (cm²) = $\pi \times$ (Spot Radius in cm)²**
- **Power (Watts) = Energy (Joules) ÷ Time (seconds)**
- **Pulse Duration** should match the **Thermal Relaxation Time** of the target for safe and effective treatment.

This reference sheet can be used during theory modules for quick review.