

# EE506: Optical interferometry and laser metrology

## To be offered Fall 2021

### Course Outline

**Instructor:** Mario Marconi

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**Prerequisite[s]:** EE342, EE441 or equivalent basic laser course (*optional*).

**Course description:** The subject of the course will be focused in describing and analyzing different schemes of interferometers and interferometric measurements. The course will review basic concepts related with light interference such coherence, laser sources. We will emphasize applications of interferometers to high resolution metrology, microscopy, high resolution optical sensors (fiber optics), etc.. A significant component of the course will be focus on reading and critical discussion of research papers using the topics reviewed in class.

**Textbooks:** Notes provided by instructor. "Optical Interferometry", P. Hariharan.

Extra bibliography: "Optics", Hetch-Zajac. "Principles of Optics", Born and Wolf

### **Syllabus:**

Week 1:	Interferometry: Basis and developments
Week 2-3	Two beam interference (Wavefront division, Amplitude division)
Week 4-5	Coherence (Quasi monochromatic light, Mutual coherence function, Temporal coherence, Spatial coherence)
Week 6-7	Multiple beam interference
Week 8-9	Lasers (Laser modes, Single frequency operation, Frequency stabilization)
Week 10	Electronic phase measurements
Week 11	Measurements techniques, sensors
Week 12	Optical testing
Week 13	Interference microscopy, Interference spectroscopy, Interferometric sensors
Week 14	Break
Week 15-16	Review

**Grading:** Students will complete 3 series of problems (25% each) that will be assigned during the semester. The last assignment (25%) will consist of answering a set of questions on a research paper that will be assigned before the Fall break. There is no *in class* evaluation, all assignments will be completed at home.