

## **ECE 673 - Thin Film Growth** **Spring 2023**



**Instructor:** Carmen Menoni - Electrical & Computer Engineering, Chemistry and School of Biomedical Engineering – (Carmen.Menoni@colostate.edu)

**Course objective:** This course introduces students to thin film growth methodologies, to the chemical and physical mechanisms that control thin film deposition and to the applications of thin film growth for the engineering of multilayer thin film structures.

**Course description:** This course will cover fundamentals of thin film growth and of interference coatings. The course is half lecture and half laboratory. The breath of the class will be such to attract students from Engineering, Chemistry and Physics.

**Credits:** 3

**Pre-requisites:** A previous class in thermodynamics (i.e. MECH 337; PH 361)

**Text:** Notes provided by instructor

Supporting literature: "Materials science of thin films", M. Ohring

"Optical Interference coatings", N. Kaiser & Hans Pulker

"Handbook of Thin Film Deposition," Seshan Krishna, 2012 (CSU e-book)

**Class Schedule:** M,W 5-6.15 PM

**Classroom:** B4

**Class website:** All material for this class is on CANVAS

### **Syllabus:**

	Topics
1	Structural and electronic properties of solids - review
2	Thermodynamics of thin film materials
3	Nucleation and growth
4	Thin film growth
5	Vacuum Science and Technology
6	Ion beam sputtering
7	Ion beam sputtering systems
8	Characteristics of ion beam sputtered thin films
9	Magnetron Sputtering; DC and RF
10	Evaporation
11	Ion beam bombardment of thin films
12	Thin film diagnostics
13	Glasses versus sputtered thin films
14	Stress in thin films
15	Dielectric interference coatings
16	Interference coatings for high power lasers
17	Interference coatings for gravitational wave detectors

### **Grading:**

Midterm: 30%; Homework and in-class paper presentations: 20%; Laboratory practices: 20%; Final Project-Paper review: 30%.

Laboratory practices will require a lab report. In class presentations will start about middle of the semester. Each student will give a 10 min oral presentation discussing a paper related to class topics. The oral presentation and power point presentation will equally count towards the grade. The final project is a paper critique. Both oral presentation and power point slides will be graded and will weight equally. All material is uploaded into CANVAS.

**PLEASE TURN OFF ELECTRONIC DEVICES DURING CLASS**