ECE 673 - *Thin Film Growth*

Fall 2019

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: "Physical Vapor Deposition of Thin Films, J.E. Mahan,
"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:

Week 1 – Thin Film growth (1 week)	Fundamentals of condensation, nucleation and growth.
Week 2 - Introduction to Thin film growth methods	Sputtering
Week 3	Laboratory Practice
Week 4 - Introduction to Thin film growth methods	Sputtering of metal oxides and of metals
Week 5	Laboratory Practice
Week 6– Thin film growth diagnostics	Characterization and monitoring
Week 7.	Laboratory Practice
Week 8 – Film morphology	Impact of process conditions on film morphology Methods of assessment Mechanical stress in thin films
Week 9	Laboratory Practice
Week 10 –Photonic structures as interference devices	Fundamental of light propagation Design of interference coatings for operation from the infrared to the soft x-ray
Week 11 –Specialized coatings	Mid-infrared and visible coatings Extreme ultraviolet coatings LIGO coatings
Week 12	Laboratory Practice
Week 13	Student's presentations Final Project-Paper review

Grading: Midterm: 30%**;** Laboratory Practice Report: 30%, In Class Presentations: 20%; Final Project-Paper review: 20%.
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.

PLEASE TURN OFF ELECTRONIC DEVICES DURING CLASS