Course Outline for: VACT 2302 Thin Film Properties 2

A. Course Description

1. Number of credits: 1
2. Lecture hours per week: 3
3. Prerequisites: VACT 2301
4. Corequisites: none
5. MnTC Goals: none

Thin films have many desirable properties that can only be achieved through specialized material deposition processes. These properties can vary and are dependent on the many factors impacting the deposition process. In this course we explore electrical and optical properties of materials. The physical vapor deposition process, a type of vacuum deposition method, is used to create different thin film samples which demonstrate these material properties. Characterization tools are used to measure the extent to which these material properties are present in the deposited material.

B. Date last reviewed/updated: March 2023

C. Outline of Major Content Areas

1. Electrical Properties of Materials
2. Optical Properties of Materials
3. Thin Film Deposition and Characterization

D. Course Learning Outcomes

Upon successful completion of the course, the student will be able to:

1. Describe the phenomenon of electron flow through a material.
2. Classify materials on their ability to conduct electricity and describe the electron band model for each class.
3. Describe the difference between an intrinsic and extrinsic semiconductor material.
4. Describe the phenomenon of piezoelectricity.
5. Explain the ways electromagnetic energy can interact with a solid.
6. Describe the relationship between frequency, wavelength and energy of electromagnetic radiation.
7. Explain why some materials are visibly opaque and others are transparent.

E. Methods for Assessing Student Learning

Methods for assessment may include, but are not limited to, the following:

1. Unit quizzes
2. A summative exam
3. Assessment of operation of thin film deposition and characterization equipment, in person or remote.
4. Homework assignments

5. Discussions
6. Collaborative projects
7. Other quizzes

F. Special Information

This course is the third of 3 modular 1-credit courses VACT 2300 Material Science for Thin Film Deposition), VACT 2301 (Thin Film Properties I), and VACT 2302 that together are equivalent to VACT 2297 Thin Film Deposition.

Course instruction includes access to a thin film deposition equipment system to support material deposition activities and characterization instruments for measurement and data collection exercises.