

**Course Outline for:** VACT 2300 Materials Science for Thin Film Deposition**A. Course Description**

1. Number of credits: 1
2. Lecture hours per week: 1
3. Prerequisites: VACT 1292, VACT 1294, or VACT 2293
4. Corequisites: none
5. MnTC Goals: none

Thin film deposition is the process of applying thin solid film coatings to a substrate. To understand how deposition takes place and the resultant properties, a basic understanding of material science is required. This course will look at how chemical elements combine to make solid materials and how we can apply this knowledge to create thin films using physical vapor deposition techniques.

**B. Date last reviewed/updated:** June 2023**C. Outline of Major Content Areas**

1. Applications for Thin Films
2. Material Science
  - a. Classification of solid materials
  - b. Material structure domains
  - c. Chemical bonding
  - d. Crystalline lattices
  - e. Crystalline defects
  - f. Diffusion
3. Thin Film Growth
4. Deposition Techniques
  - a. Sputtering
  - b. Evaporation

**D. Course Learning Outcomes**

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

1. Identify applications where thin films are used.
2. Identify solid materials by their classification.
3. Describe the process of chemical bonding and list the different types.
4. List the different types of material structures and distinguish between them.
5. Describe the steps of thin film growth on a substrate.
6. List examples of surface contamination and how to prevent them.
7. Describe the process of physical vapor deposition for sputtering and evaporation.

**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. Assessments may include
  - a. Homework assignments
  - b. Discussions
  - c. Collaborative projects
  - d. Other quizzes

**F. Special Information**

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