

**Course Outline for:** VACT 2292 High Vacuum Applications**A. Course Description**

1. Number of credits: 1
2. Lecture hours per week: 1
3. Prerequisites: VACT 2291
4. Corequisites: None
5. MnTC Goals: None

Vacuum technology is the field whereby very low-pressure environments are created, maintained, and analyzed, such as those needed in the fields of semiconductor manufacturing, glass coating and research. VACT 2292 focuses on the application of high vacuum systems to practical manufacturing processes and extending the range of vacuum systems into the ultra-high vacuum regime.

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

1. Upstream and downstream pressure control applied to high vacuum systems.
2. Overview of the equipment used to generate industrial plasmas.
3. Pumping and pressure measuring equipment for ultra-high vacuum systems.
4. Operational requirements necessary to improve vacuum system performance into the ultra-high vacuum range.
5. Practical applications of maintenance and troubleshooting skills for vacuum systems
6. Safety considerations related to operational high vacuum systems.

**D. Course Learning Outcomes**

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

1. Explain and demonstrate operation of an upstream and downstream pressure control system.
2. Explain and apply the operational concepts behind the creation of ultra-high vacuum.
3. Describe the advanced pumping and pressure measuring equipment required to create ultra-high vacuums.
4. Identify and explain the function of the components present in an operational vacuum deposition system.
5. Describe maintenance tasks that prevent performance problems in a vacuum system.
6. Demonstrate and use troubleshooting skills to assess and resolve performance problems in a vacuum system.
7. Identify methods for mitigating the hazards related to the operation of high vacuum systems.

**E. Methods for Assessing Student Learning**

Assessment methods may include, but are not limited to, the following:

1. Unit quizzes
2. A summative exam
3. Assessment of operation of high vacuum equipment, in person or remote.
4. Assessments may include:
  - a. Homework assignments
  - b. Discussions
  - c. Collaborative projects
  - d. Other quizzes

**F. Special Information**

This course is the third of 3 modular 1-credit courses VACT 2290 (High Vacuum Equipment), VACT 2291 (High Vacuum Measurement), and VACT 2292 that together are equivalent to VACT 2293 Vacuum Analysis and Troubleshooting.

Course instruction includes access to a high vacuum equipment trainer system to support measurement and data collection exercises.