**COURSE SYLLABUS**

|  |
| --- |
| **Course Title**：Vacuum Thin Film Technology |
| **Credits/Hours** | 3 /3 | **Course Number** | 158042 | **□Required ■Elective** |
| **Course Description**This course covers the fundamental and thin-film growth aspects, basic vacuum science and technology, plasma, sputtering and other physical vapor deposition methods, chemical vapor deposition, epitaxy, and thin film properties. |
| **Topics** |
| **Topic** | **Content** |
| Introduction to Vacuum Thin Film Technology  | 1. Introduction to thin films and their applications2. Fundamental aspects 3. Thin-film growth aspects |
| Vacuum Science and Technology | 1. Introduction2. Popular types of vacuum pumps3. Pumping System |
| Plasma  | 1. Plasma definition and characteristics2. Plasmas, Discharges, and Arcs3. Fundamentals of Plasma Physics 4. Reactions in Plasmas |
| Sputtering | 1. DC, AC, and reactive sputtering processes2. Magnetron sputtering 3. High power impulse magnetron sputtering (HiPIMS) |
| Physical Vapor Deposition (PVD) | 1. Thermal evaporation2. Electron beam evaporation3. Laser ablation 4. Ion beam assisted evaporation 5. Molecular beam epitaxy |
| Chemical Vapor Deposition (CVD) | 1. Reaction types2. Thermodynamics of CVD3. Gas transport4. Film growth kinetics5. Thermal CVD processes6. Plasma-enhanced CVD processes 7. Some CVD Materials Issues |
| Epitaxy | 1. Epitaxial Relationship, Lattice misfit, growth modes.2. Types and sources of defects in epitaxial films3. Epitaxy of Compound Semiconductors  |
| Film properties | 1. Film structures2. Crystallinity, adhesion, roughness, damage3. Film surface properties4. Tensile and compressive stress5. Modification of film properties |