**COURSE SYLLABUS**

|  |
| --- |
| **Course Title**：Intelligent Optical System and Sensing Applications |
| **Credits / Hours** | 3/3 | **Course Number** | 15800S | **□Required ■Elective** |
| **Course Description**Introduce various optical components and the principles of various spectroscopic techniques and utilize them for optical sensor detection applications (including biomedical sample analysis and material science analysis).\*Text Book: Self-edited lecture notes\*Prerequisites: Optoelectronics and Photonics, Semiconductor physics |
| **Course Topics** |
| **Topic** | **Content** |
| 1. Principles of optics
 | Knowledge of optical components and system concepts, including:1. Optical mechanism and principle of components2. Optical component specifications3. Czerny turner spectrometer system |
| 1. Laser type and classification
 | knowledge of lasers and common sense of using safety, including:1. Laser classification and type2. Use safety regulations and restrictions3. Principle of laser light path |
| 1. Interaction of light and matter
 | Strengthen semiconductor physics and its interaction with light, including:1. Review of Semiconductor Physics2. Interaction between light and matter3. Photoluminescence, Raman scattering |
| 1. Spectrometer setup
 | Ability to set up a simple spectrometer system, including:1. Spectrometer assembly2. Spectrometer calibration |
| 1. Spectroscopy technique
 | Capable of spectral analysis, including:1. Teaching of Spectral Analysis Software2. Use of RRuff database |
| 1. Smart algorithm
 | Ability to use PCA/PLS smart calculation, including:1. Optical peak fitting2. Principal component analysis technology |
| 1. Sensing applications
 | Use optical spectroscopy to study materials (biomedicine, semiconductor, organic) intelligently, including:1. Optical sensing practices2. Substance classification calculation practice |