**COURSE SYLLABUS**

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| **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 components  2. Optical component specifications  3. Czerny turner spectrometer system | | |
| 1. Laser type and classification | | knowledge of lasers and common sense of using safety, including:  1. Laser classification and type  2. Use safety regulations and restrictions  3. Principle of laser light path | | |
| 1. Interaction of light and matter | | Strengthen semiconductor physics and its interaction with light, including:  1. Review of Semiconductor Physics  2. Interaction between light and matter  3. Photoluminescence, Raman scattering | | |
| 1. Spectrometer setup | | Ability to set up a simple spectrometer system, including:  1. Spectrometer assembly  2. Spectrometer calibration | | |
| 1. Spectroscopy technique | | Capable of spectral analysis, including:  1. Teaching of Spectral Analysis Software  2. Use of RRuff database | | |
| 1. Smart algorithm | | Ability to use PCA/PLS smart calculation, including:  1. Optical peak fitting  2. Principal component analysis technology | | |
| 1. Sensing applications | | Use optical spectroscopy to study materials (biomedicine, semiconductor, organic) intelligently, including:  1. Optical sensing practices  2. Substance classification calculation practice | | |