3．電気電子情報工学系　Electrical, Electronics and Computer Engineering Field			**EEC-F1**
授業科目名 Course Title	半導体工学 Semiconductor Engineering	単位数 Credit	**2**
担当教員 Instructor	塩島　謙次、アスバル　ジョエル タクラ、 牧野　哲征、今林　弘毅 SHIOJIMA Kenji, ASUBAR JOEL TACLA, MAKINO Takayuki, IMABAYASHI Hiroki	開講学期 Semester	秋学期 AUTUMN SEMESTER
キーワード Keywords	Crystal structure, semiconductor, thermodynamics, thin film	曜日/時限 Day & Time	

授業概要　Course summary

結晶格子、金属-半導体界面、半導体デバイス、熱力学、統計力学、薄膜工学を理解する。

This course deals with crystal lattices, metal/semiconductor interfaces, semiconductor devices, thermodynamics, statistical mechanics, and thin film technology.

到達目標　Course goal

To understand crystal properties in solid, electrical properties of metal/semiconductor interfaces, semiconductor devices and materials, thermodynamics, and fabrication and characterization of thin semiconductor films.

授業内容　Course description

1. Semiconductor materials (Shiojima)
2. Electrical properties of metal/semiconductor interfaces (Shiojima)
3. Fabrication process of metal/semiconductor interfaces (Shiojima)
4. Characterization techniques of metal/semiconductor interfaces (Shiojima)
5. Intrinsic Semiconductor: crystal structures, properties and energy band diagram (Asubar)
6. Extrinsic Semiconductor: P and N type (Asubar)
7. PN junction: physics and energy band diagram (Asubar)
8. PN junction: current and voltage characteristics (Asubar)
9. Thermodynamics laws (Makino)
10. Entropy in thermodynamics (Makino)
11. Classical statistical mechanics (Makino)
12. Quantum statistical mechanics (Makino)
13. Structural characteristics of semiconductor thin film (Imabayashi)
14. Characterization of semiconductor thin film (Imabayashi)
15. Applications of semiconductor thin films (Imabayashi)

準備学習（予習・復習）等　Preparation / Review

Those who take this course must have in-depth understanding mathematic calculations, energy band diagrams, wave equations, and thermodynamics.

授業形式　Class style

ゼミナール方式　（対面、または WEB 上）

Seminar（face-to-face or on web）

成績評価の方法・基準　Method of evaluation
レポート、テスト Report and Examination
教科書・参考書等　Textbook and material
半導体デバイス：Semiconductor Devices (Simon M. Sze)、Semiconductor Engineering (Kiyoshi Takahashi), 統計力学 : Statistical Mechanics (Claudine Hermann, Springer Verlag)、薄膜工学 : Thin-film Engineering (S. Yoshida, T. Kondo)
受講要件・予備知識　Prerequisite
ベクトル解析、半導体工学、熱力学、力学 vector analysis, semiconductor engineering, thermodynamics, Newtonian dynamics,
その他の注意事項　Note