



## UMT311 August 0:1

### Functional Materials Laboratory

#### Instructor

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#### Department: Materials Engineering

Course Time: Friday 2:00-5:00 pm

Lecture venue: UG Labroatory, Ground floor

Detailed Course Page:

### Announcements

#### Brief description of the course

Students are typically divided into two students per group and they independently perform (with TA's supervision) the listed experiments.

#### Prerequisites

None

#### Syllabus

- 1) Four-point resistance measurements (In-line and van der Pauw geometry)
- 2) Seebeck coefficient determination of unknown materials
- 3) Determination of Piezoelectric coefficient of poly(vinylidene fluoride) (PVDF) film
- 4) Determination of semiconductor polarity through absolute Seebeck coefficient measurement
- 5) Determination of magnetic Curie temperature of Ni from resistivity measurements
- 6) Calculation of fill factor and efficiency of a solar panel from I-V characteristics
- 7) Hall effect measurement of germanium crystals
- 8) Dielectric constant determination of Barium titanate

9) Potentiostatic and galvanostatic measurements of EDLC (electric double layer capacitor), pseudocapacitor and a battery

10) Band gap determination of oxide thin films using UV-visible spectroscopy\*

### **Course outcomes**

The students receive an exposure to a large range of functional properties, starting from precise resistance measurement to Seebeck coefficient determination, determination of piezoelectric constant, hall-effect measurements, Curie temperature determination of a ferromagnet, figure of merit of a solar cell, exposure to UV-visible spectroscopy for band gap determination and exposure to electrochemistry in terms of capacity and Coulombic efficiency of supercapacitor and Li-ion batteries.

### **Grading policy**

Lab performance (50%)+ Written examination (50%)

### **Assignments**

### **Resources**

Laboratory Manual