MSE 302 – Electronic Materials

Fall, 2015

Objective: To introduce fundamental concepts necessary to understand electronic properties of various classes of materials, including energy band structure; transport of mass, charge and energy in solids.

Class Time: Tuesday and Thursday 9:10-10:25am, Sloan 169

Instructor: Prof. Min-Kyu Song (Office: EE/ME 159, E-mail: minkyu.song@wsu.edu)

Office Hours: You are welcome to stop by anytime, but preferably by e-mail appointment. You are strongly encouraged to ask questions to Prof. Song in person.

TA: Shuo Feng (Office: ETRL 130, E-mail: shuo.feng@wsu.edu)
TA Office Hours: Monday, Wednesday, Friday 1:00-2:00pm

Prerequisite: CHEM 105; PHYSICS 202; Atomic structure; Electricity and Magnetism

Textbook: Required text: *Principles of Electronic Materials and Devices: 3rd Edition*, by S.O. Kasap, McGraw-Hill, 2006

There will be lecture notes on *Blackboard*: https://learn.wsu.edu/webapps/login

Reference: *Electronic Properties of Materials: 3rd/4th Edition*, by R.E. Hummel, Springer, 2000/2011

Topics to be Covered:
1. Crystal structures and bonding (Chapter 1)
2. Electrical and thermal conductivity (Chapter 2)
3. Introduction to quantum mechanics (Chapter 3)
4. Band gaps and structure (Chapter 4)
5. Intrinsic and extrinsic semiconductors, p-n junction (Chapter 5, 6)
6. Magnetic properties (Chapter 7)
7. Dielectric and piezoelectric properties (Chapter 8)
8. Semiconductor fabrication (Guest lecture)
9. Optical properties (Chapter 9, if time allows)

Homework: Homework will be assigned periodically but NOT collected/graded. Problems are designed to help students understand the lecture materials and shall help to prepare for the tests. Solutions will be available as study aids.

Pop Quizzes: Several (unannounced) quizzes will be given in the "beginning" of lecture. These 15-minute quizzes will likely be simple short answers asking you to give some

definitions and draw some schematics to gauge your conceptual knowledge. It will be closed book and notes. One lowest quiz score will be dropped.

Test Policy: Three tests will be given during the semester in addition to a final examination. The three tests during the term will be given during the standard lecture time. There are no excuses for missed tests other than those certified by university or medical officers. Exams will be closed book and notes. Equations will be given and you will be responsible to recognize which ones to use. All exams will be counted the same and the final exam will not be cumulative.

Final Exam: There will be a final examination on December 16, Wednesday, 2015, 10:10am-12:10pm. Final exam will NOT be rescheduled for the purpose of leaving the institution before the close of semester.

Grading: The final grade will be determined by
3 Mid-terms – 60% (20% each)
Final exam – 20%
Quizzes – 20%

It is anticipated that the grading scale will be as follows (minus and plus grades will be used as appropriate):

As	90-100%
Bs	80-<90%
Cs	70-<80%
Ds	60-<70%
F	<60%

Class Policy: Students are expected to attend all classes on time, although attendance will not be taken. Please do not use phones. No food (except drink) allowed. No camera during lectures.

Students w/ Disabilities: Reasonable accommodations are available for students with a documented disability. If you have a disability and may need accommodations to fully participate in this class, please visit the Disability Resource Center (DRC). All accommodations MUST be approved through the DRC (Admin Annex Building, Room 205). Please stop by or call 509-335-3417 to make an appointment with a disability specialist.

Academic Honesty: I encourage you to work with classmates on assignments. However, each student must turn in original work. No copying will be accepted. Academic integrity is the cornerstone of the university. Any student who attempts to gain an unfair advantage over other students by cheating, will fail the assignment and be reported to the Office Student Standards and Accountability. Cheating is defined in the Standards for Student Conduct WAC 504-26-010 (3). http://app.leg.wa.gov/WAC/default.aspx?cite=504-26-010