Lecture: MWF 10:30-11:20 AM, WANG 2579. Lectures will be recorded in the classroom studio for students taking the course off campus through Purdue Engineering Professional Education (EPE). The recorded lectures will also be available to on-campus students.

Instructor: Prof. Elliott Slamovich, ARMS 2307, 765-494-6853, elliotts@purdue.edu.

Office Hours: Contact me by phone or email at any time. I will arrange office hours at specific times if needed.

Course Objectives
Understand the fundamental basis for materials phenomena in terms of the hierarchy of structures (e.g., atomic, molecular, crystal, grain) and their relations to properties responses and processing. Develop a foundation for advanced studies in materials engineering and related fields.

Description
Fundamental relationships between the internal structure, properties and processing in all classes of engineering materials. Comprehensive coverage spanning physical, chemical, thermal, mechanical, electrical, magnetic, and optical responses. The course is intended for materials researchers from all backgrounds, as well as engineers working in product design, development and manufacturing who seek a deeper understanding of the full spectrum of engineering materials.

Prerequisites
Graduate standing

Textbook

Additional readings will be assigned from classic and recent papers in the literature and other sources.

Website: Course information, homework and other course resources will be posted on Blackboard.
**Topic Outline by Week:**

1. Introduction, bonding and crystal structure
2. Non-crystalline and molecular structure
3. Mechanical properties (elastic)
4. Mechanical properties (plastic and time-dependent)
5. Fracture of Materials
6. Diffusion
7. Phase equilibrium and phase diagrams
8. Kinetics and phase transformations
9. Metal Alloys and Processing
10. Processing of Glasses and Ceramics
11. Processing of Polymers
12. Composites
13. Corrosion
14. Electrical properties
15. Thermal properties
16. Magnetic properties
17. Optical properties

**Assessment and Grading**
Grading will be based on written exams. There will be monthly in-class exams (3 x 20% = 60%) and a comprehensive final exam (40%). Homework will be assigned about weekly, but not graded. The class median will be used to determine the A-/B+ cutoff.

**Emergency Policies and Procedures**
Fire, weather, and civil emergency procedures specific to the WANG 2579 will be reviewed in class. Information on emergency preparedness at Purdue is available on the Purdue homepage and at [http://www.purdue.edu/emergency_preparedness/](http://www.purdue.edu/emergency_preparedness/). In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances. These changes would be posted on Blackboard. In case of an extended disruption in which classes on campus are suspended the course will continue to the extent possible via Blackboard. If you do not have Internet access from your home, please send an e-mail message to Prof. Slamovich indicating this so that we can make an alternate plan for remote communication (e.g., telephone) if classes are suspended.

**Academic Dishonesty Policy**
Purdue University Regulations, Part 5, Section III-B-2-a describes the formal policies governing academic dishonesty. A guide providing specific examples, tips, and consequences is available at [http://www.purdue.edu/odos/osrr/academicintegritybrochure.php](http://www.purdue.edu/odos/osrr/academicintegritybrochure.php).