MSE 102 - BONDING, CRYSTALLOGRAPHY, AND CRYSTAL DEFECTS (3 UNITS)

COURSE OVERVIEW

SUMMARY

MSE 102 is a course which builds off the concepts introduced in MSE 45, and offers a deeper look at the atomic-scale properties of materials As the title implies, the course is divided into (roughly) three parts: bonding, crystallography, and crystal defects. This course is required for the MSE minor.

PREREQUISITES

MSE 45 (mse45.html)

Not official prerequisites, but a good understanding of Math 53 and 54 are definitely needed.

TOPICS COVERED

- Bonding in solids, rudimentary quantum mechanics
- Classification of metals, semiconductors, insulators
- Crystal systems
- Group theory**
- Point, line, and planar defects in crystals
- Crystallographic and defect analysis
- Tensors

- Relationship to physical and mechanical properties

**The treatment of group theory in the MSE department is quite different from Chem 104A and should not be taken as a substitute. It is also important to note that some conventions in the engineering field are different than the chemistry field in regards to symmetry and group theory.

WORKLOAD

COURSEWORK

- List of stuff required from students

TIME COMMITMENT

Three hours of lecture per week, plus an optional two hour discussion section in the evening which is meant to help with the homework and occasionally cover extra topics. Problem sets are meant to be challenging on their own, but significant help is given at office hours and in discussion. These problem sets can take 1-2 hours for a student with group theory experience, and up to 5 hours for students with no experience in group theory or quantum mechanics.

CHOOSING THE COURSE

WHEN TO TAKE

This class is best taken directly after MSE 45.

I took this class at the same time as Chem 104A. Learning group theory from the MSE and chemistry perspectives is interesting, but these classes do not necessarily need to be taken together.

WHAT NEXT?

Students typically take MSE 103 (mse103.html) and MSE 104 (mse104.html) after this class.

ADDITIONAL COMMENTS AND TIPS

In my opinion, this class is the MSE department's equivalent of Chem 104A and Chem 120A. It covers a lot of topics in a short amount of time, but can be quite rewarding. Personally, I found it interesting to learn about bonding in the solid state because chemistry classes rarely focus on extended materials. Thinking about symmetry in the solid state can be challenging compared to molecular symmetry.

Also, discussions are really important for this class, even though they are optional!

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