COLLEGE OF CHEMISTRY COURSE GUIDE (../INDEX.HTML)

CHEM C150/MSE C150 - INTRODUCTION TO MATERIALS CHEMISTRY (3 UNITS)

COURSE OVERVIEW

SUMMARY

Chemistry C150 is an introductory course to materials chemistry, focusing specifically on the way in which atomic-level interactions dictate the properties of bulk matter. The course is taught from the perspective of a chemist and focuses more on atomic interactions than on physical and chemical characteristics of bulk materials, which is different than how materials science classes are often taught. The course is a survey class: between 1 and 4 days are spent on each topic (see below), and there are 9 topics in total. The last few weeks of the class consist of presentations on topics chosen by students relating to materials chemistry. Each student also writes a report on the chosen topic.

PREREQUISITES

CHEM 4B or equivalent(Required) with grade of C- or higher. CHEM 104A is recommended.

Course is only offered in the spring

TOPICS COVERED

- Crystal Structures
- Synthetic methods
- Electronic properties of materials

    - Band structure diagrams, crystal orbitals, Bloch's theorem, density of states diagrams
- Magentic properties of materials
    - Magnetic induction, ferromagnetism, paramagnetism, diamagnetism, magnetic interaction mechanisms, magnetic hysteresis
- Optical properties of materials
    - Refraction, lasers, photovoltaics, physical appearance of materials
- Properties of nanomaterials
    - Synthesis of nanomaterials, quantum confinement, spectroscopic methods
- Porous materials
- Polymers
- Biomaterials

WORKLOAD

COURSEWORK

- 4 problem sets
- 2 midterms
- 1 final project consisting of a paper (due before finals week) and presentation (in-class) on topic related to materials chemistry

TIME COMMITMENT

3 hours of lecture per week, 5 hours per problem set.

CHOOSING THE COURSE

WHEN TO TAKE

The class is predominantly juniors and seniors, as this is an upper-division elective. This class is not time-intensive, so feel free to take during a harder semester.

WHAT NEXT?

- MSE 102: Crystallography (mse102.html)
- MSE 104: Materials Characterization (mse104.html)
- CHEM 253: Materials Chemistry I (chem253a.html)
- PHYS: 141A: Solid State Physics (phys141a.html)

ADDITIONAL COMMENTS AND TIPS

The special projects can focus on a part of materials chemistry that you are specifically interested in. Many suggestions for topics will be included in lectures throughout the semester.

This course is necessary for the materials chemistry concentration in the B.S. Chemistry degree.

This class is more theoretical than computational. Also, it is a true survey class – no topic is explored in the depth that a full semester on the topic would. But enough is learned about each topic to be able to talk about it and have an idea of what it's about.

Written by: Alex Oanta

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