All we need is love, but all we get is work

1. Introduction

1.1 General Remarks

What follows is no longer relevant as far as lecture courses are concerned. From here to the end of chapter 4 the content is more or less identical to the same chapters in the Hyperscript "Electronic Materials".

Some Important Links

For a detailed <u>table of contents</u> use the link

- The organization, timetable, etc. for the running term can be found in the link.
- If you like to read <u>prefaces</u>, just click.

For book recommendations: Consult the list of books

What is Special About this Course

The lecture course "Electronic Materials" has a somewhat special status for two reasons:

- **1.** It is far to short to really cover the topic appropriately, but yet, *it overlaps with other courses*. The reason for this is the mix of students who are required to take this course (see below).
- 2. It had a special format for the exercise part ¹).

Unfortunately, in the fall term of **2004**, this exercise format had to be abandoned for various reasons in favor of the more classical format.

Relation to Other Courses

This graduate course "Electronic Materials" (in German: Werkstoffe der Elektrotechnik und Sensorik I) is a *required* course for

Study Course
1. All Materials Science Diploma students
2. <i>All</i> Master of Mat. Science and Engineering students.
3. All Electrical Engineering Diploma students.
4. <i>All</i> "Wirtschafts-Ingenieur ET&IT" Diploma students.

Exactly what "required" means depends on your study course - look up your "Prüfungsordnung". Essentially the following rules obtain:

The first three study courses must pass the written examination, the last one must obtain the "Schein" for the exercise class

Even if you are not required to obtain the exercise "Schein" or the 1.5 ECTS "Credit Points", it is highly recommended to participate in the exercise class since it is a preparation for the examination!

It interacts with several other courses in the materials science and electrical engineering curriculum. There is considerable overlap with the following courses

Silicon Technology I + II (In German: Halbleitertechnologie I + II)

This course is required for Matwiss students in the Diploma track and electrical engineers specializing in solid state electronics.

It contains everything taught in the **Si**-technology section of "Electronic Materials". However, since the bulk of the electrical engineers will not be exposed to **Si**-technology anywhere else, "Electronic Materials" will cover the subject briefly. For all others, this part can be seen as an introduction to "Silicon Technology I + II"

Solid State Physics for Engineers II

- This course is required for Matwiss students in the Diploma and Master track and electrical engineers specializing in solid state electronics.
- Dielectrics and magnetic materials will be covered in depth and from a more theoretical background. Again, the relevant chapters in "Electronic Materials" may be seen as introduction by those students enrolling in "Solid State II"; for the others it is an essential component of electrical engineering.

The course has a very special relation to "Introduction to Materials Science I + II", which is a required course for all engineering (undergraduate) students.

- "Electronic Materials" can be seen as part III of this series, because it covers the two major subjects left open in "Introduction to Materials Science I + II": *dielectrics* and *magnetic materials*. Moreover, the **Si**-technology part begins where the semiconductor part of "Introduction to Materials Science I + II" ends.
- However, "Electronic Materials" is fully self-contained and can be taken by itself, provided the basic requirements are met.
- For details of the contents of "Introduction to "Materials Science I + II" refer to the Hyperscripts (in German) <u>MaWi I</u> MaWi II

Sensors I (In German: "Werkstoffe der Elektrotechnik und Sensorik II")

- Required for all Materials Science students in the diploma track. (Used to be required for all electrical engineers).
- Continues "Electronic Materials" with emphasize on sensor applications and ionic materials, but is self-contained and can be taken by itself.
- "Electronic Materials" will include a brief chapter concerning ionic materials for those who do not take "Sensors I"

Semiconductors

This course overlaps a little bit with "Electronic Materials", but essentially continues where Electronic Materials ends for Semiconductors.

Background Knowledge

Mathematics

The course does not employ a lot of math. You should be familiar, however, with complex numbers, Fourier transforms and differential equations.

General Physics and Chemistry

A general undergraduate level of basic physics should be sufficient. You should be comfortable with units and conversion between units.

General Materials Science

You must know basic crystallography, quantum theory and thermodynamics.