

Electrical Engineers usually have little specialized knowledge of chemical reactions or solid state mechanics. And yet, our ability to fabricate semiconductor devices depends critically on our understanding of these items.

**Murarka and Peckerar
Preface to their text book**

1. Introduction

1.1 Scope of the Course

1.1.1 General Remarks

Some Important Links

- For a detailed [table of contents](#) use the link
- The [organization, timetable, etc.](#) for the running term can be found in the link.
- If you like to read [prefaces](#), 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. <i>All</i> Materials Science Diploma students
2. <i>All</i> Master of Mat. Science and Engineering students.
3. <i>All</i> 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) [MaWi I](#) [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.

¹⁾ Conventional exercises were abandoned in favor of "professional" presentations including a paper to topics that are within the scope of the course but will not be covered in a regular class. A list of the topics is given in the "[Running Term](#)" folder; the [rules for the seminar](#) will be found in the link. The contents and the style of the presentation will be discussed. For details use the [link](#).