

MATS7AD ELECTRIC AND THERMAL PROPERTIES OF MATERIALS

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| MATS7AD | | ECTS Credits : 2 | Semester : S7 |
| Electric and thermal properties of materials | | Duration : 21 hours | |
| Person(s) in charge: | | | |
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| Keywords: | | | |
| Physics of solids, electronic properties, thermal properties, electron, phonon | | | |
| Prerequisites: | | | |
| Basics in quantum physics, statistics physics, crystallography (SM032) | | | |
| Objective: | | | |
| Be able to explain the origin of electric and thermal transport of materials with modern physics concepts. | | | |
| Contents: | | | |
| <p>The electric and/or thermal properties of materials are at the very core of numerous industrial activities: production, energy storage and transmission, metallurgy, construction, aerospace, automobile, environment, chemistry and biology. Design and develop new materials with electrical and thermal properties require understanding of matter at microscopic scale. Indeed, electrons and phonons behaviour in the matter is responsible for the isolating or conducting capacity of a material.</p> <p>The course has 6 parts and will approach the following themes:</p> <ul style="list-style-type: none">• Introduction of phenomenons of charge and heat transport• Model of free electron• Impact of crystalline periodicity on electronic properties• Dynamics of electrons• Thermal and phononic properties | | | |
| Abilities: | | | |
| Level | Description and operational verbs | | |
| Know | The different models approached in class in order to describe electrical and thermal transport. | | |
| Understand | Why some materials conduct electricity and others don't. Microscopic mechanism which are responsible for heat transport in materials. | | |
| Apply | Methods and approaches seen in class on related topics. | | |
| Analyse | Be able to analyse the notions seen in class and to keep a critical mind on their consequences. | | |
| Summarise | | | |
| Assess | Assessment on the knowledge and understanding of the course. Assessment on the analysis and restitution capacity on a subject close to the class. | | |
| Assessment: | | | |

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| <input checked="" type="checkbox"/> Written Test | <input checked="" type="checkbox"/> Continuous Control | <input checked="" type="checkbox"/> Oral report | <input type="checkbox"/> Project | <input type="checkbox"/> Written Report |
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