CH-444

Electronic spectroscopy

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Cursus	Sem.	Type
Chimiste	MA1, MA3	Opt.
Photonics		Opt.

Language of teaching	English
Credits	3
Session	Winter
Semester	Fall
Exam	Oral
Workload	90h
Weeks	14
Hours	**3 weekly**
Courses	2 weekly
Exercises	1 weekly
Number of positions	

Summary

This course focuses on the electronic structure of atoms, diatomic and polyatomic molecules in order to understand their ultraviolet-visible absorption and photoelectron spectra.

Content

- Review of quantum mechanics and light-matter interaction
- Group theory for spectroscopy
- Atomic spectroscopy
- Vibrational spectroscopy
- Electronic spectroscopy of diatomic and polyatomic molecules
- Photoelectron spectroscopy

Keywords

Atomic and molecular spectroscopy, light matter interaction, electronic structure, photoelectron spectroscopy, UV-VIS spectra, vibrational spectra

Learning Prerequisites

Recommended courses

Spectroscopy, Physical Chemistry

Learning Outcomes

By the end of the course, the student must be able to:

- Apply quantum mechanical model systems to handle the interaction of atoms and molecules with electromagnetic radiation
- Explain the general features of absorption and photoelectron spectra and their dependence on the sample properties
- Identify the point group of a molecule
- Construct representations of point groups and decompose them into irreducible representation
- Identify the symmetry of vibrational and electronic states using character tables
- Construct electronic configurations and term symbols for atoms and molecules
- Derive explain and apply spectroscopic transition rules for electronic transitions in atoms and molecules
- Explain and identify radiative and non-radiative relaxation processes of excited molecular states

Transversal skills

- Assess progress against the plan, and adapt the plan as appropriate.
- Set objectives and design an action plan to reach those objectives.
- Use a work methodology appropriate to the task.
- Access and evaluate appropriate sources of information.

Assessment methods

70% oral exam, 30% homework assignments

Resources

Bibliography

Modern Spectroscopy / Hollas

Ressources en bibliothèque

- Modern spectroscopy / Hollas