

CH-343

**Spectroscopy**

Drabbels Marcel

<b>Cursus</b>	<b>Sem.</b>	<b>Type</b>
Chemistry and chemical engineering	BA4	Obl.

Language of teaching	English
Credits	3
Session	Summer
Semester	Spring
Exam	Oral
Workload	90h
Weeks	14
<b>Hours</b>	<b>3 weekly</b>
Lecture	2 weekly
Exercises	1 weekly
<b>Number of positions</b>	

**Summary**

Introduction into optical spectroscopy of molecules

**Content**

- Overview of Molecular Spectroscopy
- Molecular Symmetry and Molecular Spectroscopy
- Rotational Spectroscopy
- Vibrational Spectroscopy
- Electronic Spectroscopy

**Learning Prerequisites****Recommended courses**

Quantum Chemistry

**Learning Outcomes**

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

- Discuss the Born Oppenheimer approximation and its consequences
- Derive line intensities of transitions
- Derive rotational energy levels of different types of molecules
- Analyze rotational spectra
- Derive vibrational energy levels of molecules
- Analyze rovibrational spectra
- Describe Raman spectroscopy
- Analyze Raman spectra
- Formulate the Franck Condon principle
- Analyze rovibronic spectra of diatomic molecules
- Work out / Determine selection rules using group theory

**Teaching methods**

Ex Cathedra with excercise sessions

### Expected student activities

Work on the excercises at home

### Assessment methods

Oral exam

### Resources

#### Bibliography

Primary References:

- J. M. Hollas, *Molecular Spectroscopy*
- C. H. Townes and A. L. Schawlow, *Microwave Spectroscopy*
- D. A. McQuarrie, *Quantum Chemistry*

Secondary References:

- G. Herzberg, *Molecular Spectra and Molecular Structure. I. Spectra of Diatomic Molecules*
- G. Herzberg, *Molecular Spectra and Molecular Structure. II. Infrared and Raman Spectra of Polyatomic Molecules*
- G. Herzberg, *Molecular Spectra and Molecular Structure. III. Electronic Spectra and Electronic Structure of Polyatomic Molecules*

#### Ressources en bibliothèque

- [Modern spectroscopy / Hollas](#)
- [Quantum chemistry / McQuarrie](#)
- [Spectra of diatomic molecules / Herzberg](#)
- [Microwave spectroscopy / Townes](#)
- [Infrared and Raman spectra of polyatomic molecules / Herzberg](#)
- [Electronic spectra and electronic structure of polyatomic molecules / Herzberg](#)

#### Moodle Link

- <https://go.epfl.ch/CH-343>