## Spectroscopy in Inorganic Chemistry

**When:** Tuesday 6:00-8:50pm  
**Location:** SMT 240

**Instructor:** Prof. Jenny Lockard  
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**Office Hours:** by appointment  
**Final Exam date:** 05/09/23

### Required Text:
Course materials provided by instructor

### Grading:
- In-Class presentation: 20%
- Midterm: 40%
- Final: 40%

### Course Description/Learning Outcomes:
This physical inorganic course will cover a range of spectroscopy methods and their applications to inorganic (primarily transition metal-based) complexes and materials. Once this course is successfully completed students will have mastered several fundamental concepts, such as basic theory of spectroscopy, molecular symmetry and ligand field theory and learned about the applications of specific spectroscopy methods that target different types of transitions (valence, core, vibrational, spin etc) in inorganic systems. The course will have a mix of quantitative and descriptive aspects. Recommended pre-requisite courses include undergraduate Inorganic Chemistry, Physical Chemistry, Multivariable Calculus and Linear Algebra.

### Topics covered:

I.) Review of fundamental concepts
- Fundamental theory of spectroscopy
- Molecular symmetry and group theory
- Crystal/Ligand Field theory

II.) Low energy “excited state” spectroscopy methods
- UV-vis absorption and emission spectroscopy
- CD and MCD spectroscopy
- vibrational spectroscopy

III.) High energy “excited state” spectroscopy methods
- X-ray Photoelectron Spectroscopy
- X-ray Absorption spectroscopy
- X-ray emission spectroscopy

IV.) “Ground state” spectroscopy methods
- EPR
- NMR
- Mossbauer
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**Religious Holiday Policy and Accommodations:** Students are advised to provide timely notification to instructors about necessary absences for religious observances and are responsible for making up the work or exams according to an agreed-upon schedule. The Division of Student Affairs is available to verify absences for religious observance, as needed: (973) 353-5063 or [DeanofStudents@newark.rutgers.edu](mailto:DeanofStudents@newark.rutgers.edu).

**Counseling Services:** Counseling Center Room 101, Blumenthal Hall, (973) 353-5805 or [http://counseling.newark.rutgers.edu/](http://counseling.newark.rutgers.edu/).

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