

**UNIVERSITY OF CALGARY
FACULTY OF SCIENCE
DEPARTMENT OF CHEMISTRY
COURSE OUTLINE
WINTER 2019**

1. Course: CHEMISTRY 471, Physical Chemistry: Kinetics and Spectroscopy

LEC	DAYS	TIME	ROOM	INSTRUCTOR	OFFICE	EMAIL	OFFICE HOURS
L01	MWF	12:00-12:50	SS 101	Dr. Max Anikovskiy	EEEL 237A	m.anikovskiy	By appointment
T01	Tu	9:30-10:30	SA 235	Dr. Roxanne Jackson	t.b.d.	rjjackso	By appointment
T02	F	9:00-10:00	ST 059	Dr. Max Anikovskiy	EEEL 237A	m.anikovskiy	By appointment

Desire 2 Learn (D2L) CHEM 471 L01 – (Winter 2019)

Departmental Office: Room SA 229, Tel: 403-220-5341, e-mail: chem.info@ucalgary.ca

2. Course Description: Vibrational, electronic and magnetic resonance spectra. Reaction kinetics and transport properties in the gas phase and in solution. Catalysis. Laboratory: Experimental measurements, interpretations, and calculations relating to the topics discussed in lectures.

3. Recommended/ Required Textbook(s):

1) *"Quantum chemistry and spectroscopy"*, 4th Edition, by Thomas Engel, Pearson

2) *"Thermodynamics, statistical thermodynamics, and kinetics"*, 4th Edition, by Thomas Engel and Philip Reid, Pearson

4. Topics Covered and Suggested Readings:

Course Content

Kinetics Section

Collision theory
Arrhenius behaviour
Kinetics of complex reactions
Diffusion & Diffusion-limited reactions
Potential energy surfaces and activated complex theory
Examples taken from Chapter 19 (textbook 2)

Molecular spectroscopy Section

Introduction to spectroscopy
Rotational and Vibrational Spectra
Electronic Spectroscopy
Spontaneous emission & lasers
Nuclear magnetic resonance spectroscopy

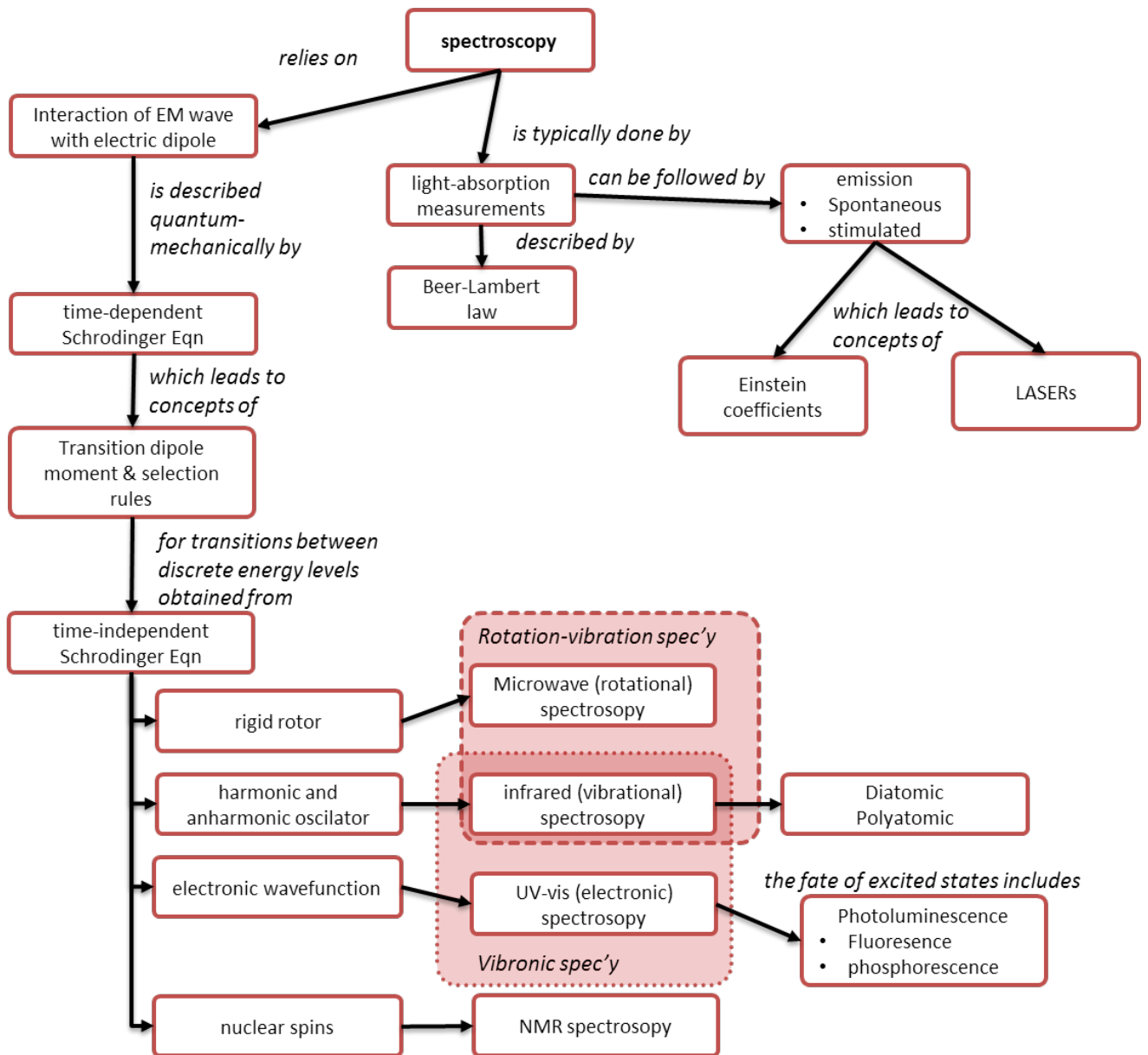
Chapter in Textbooks

(not all sections will be covered)

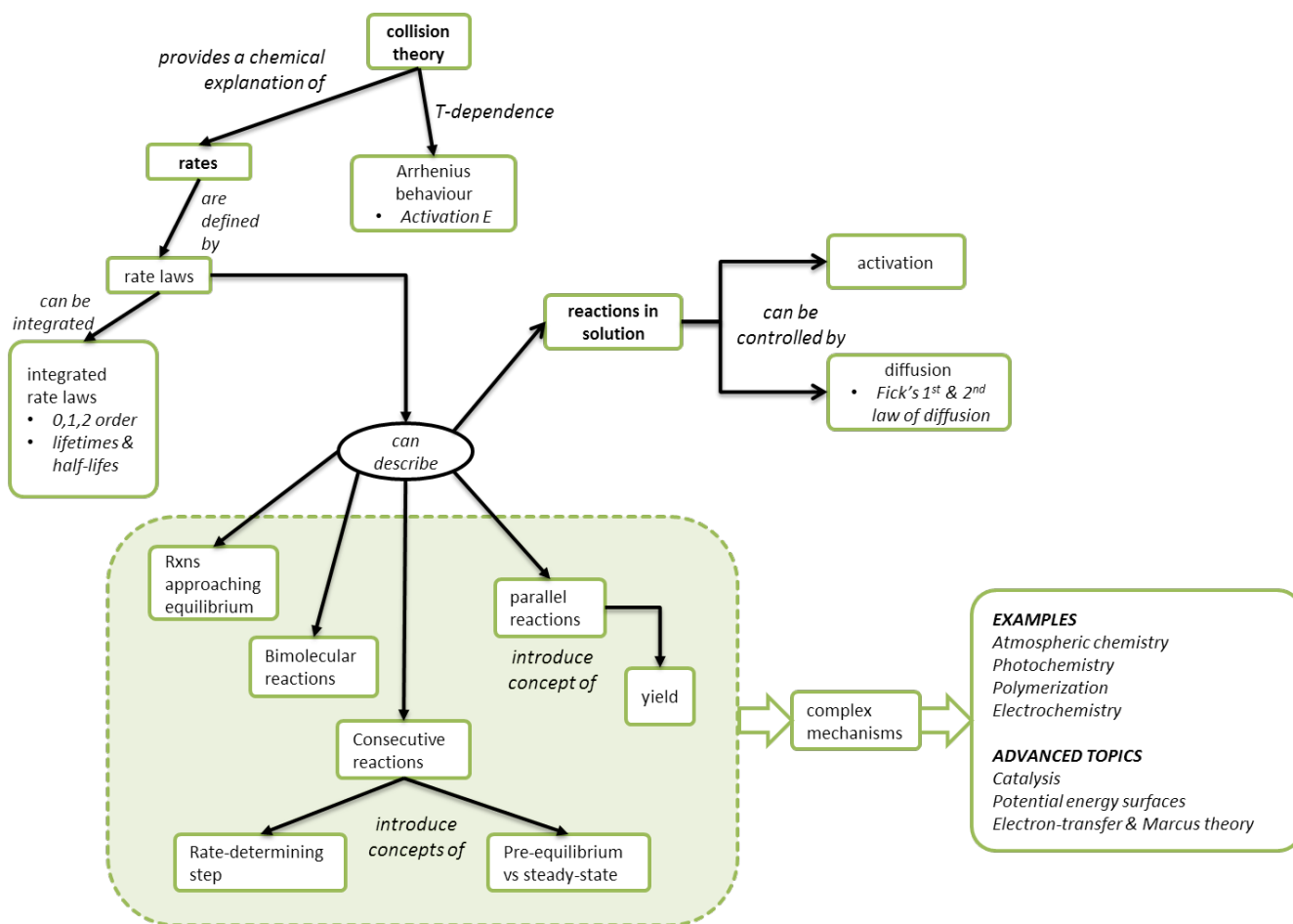
**Textbook 2: Chapter 16, Sections 6-7
Chapter 18, Section 9
Chapter 18, Sections 7, 8, 10
Chapter 17, Sections 2, 3
Chapter 18, Sections 13, 14, 15**

**Textbook 1: Chapter 8,
Sections 1, 3-6
Chapter 14, Sections 1,3-8
Chapter 8, Section 2 and Chapter 11,
Section 7
Chapter 17, Sections 1-9**

CHEM 471 Concept map: Spectroscopy



CHEM 471 Concept map: Kinetics



4. Laboratory Experiments: (12 weeks, 3 hours/ week)

The Kinetics Isotope Effect

Determination of the Bond Dissociation Energies of Bromine and Iodine from their Absorption Spectra

The Effects of Solvent Environment on Fluorescence Spectra

Independent Kinetics or Spectroscopy Project

Department Approval: Approved by Department Head

Date: Jan 10, 2019