SYLLABUS

Introduction:

All of chemistry, including bonding, reactions, thermodynamics, kinetics, and material properties, ultimately emerges from the motion and behavior of atoms and molecules. Quantum mechanics, a model to describe this motion and behavior, is one of the most accurate and fruitful theoretical frameworks in the history of science. *The value in knowing quantum mechanics comes from its predictive power*. The better you know quantum mechanics, the better you will understand what causes the atoms to act the way they do that results in the chemistry that we observe and use.

Course:	**Chemistry 3027** Physical Chemistry II Laboratory – Quantum Chemistry and Molecular Spectroscopy Section 1: Tuesday 1:30 – 5:00 PM in Sator Hall room 208 Section 2: Thursday 1:30 – 5:00 PM in Sator Hall room 208 There is no final exam for this course.
Instructor:	Dr. Lane Votapka Office location: Rohr Science room 322 Office hours: MWF 2:45 – 5:00 PM and by appointment Phone: 619-849-2270 Email: lvotapka@pointloma.edu (I will be able to answer emails between 8 AM and 6 PM).
Text:	There is no textbook for this course. Lab handouts will be distributed by hand or downloaded from the course website.
Course Description:	This laboratory course has been designed to accompany CHE 3026, which is an investigation of matter from a quantum chemistry perspective with particular emphasis on the theoretical concepts and their implications for molecular spectroscopy.
Learning Outcomes:	Upon completing this course you will: 1. Have developed more sophisticated mental models of wave functions, energy levels, atomic structures, chemical bonding, spectroscopy, computational chemistry, and statistical mechanics as grounded in the fundamentals of quantum theory. 2. Be able to use spectroscopic and computational techniques to probe the details of atomic and molecular systems.
Lab Reports and Presentations	There will be six experiments in total, one approximately every two weeks. Two weeks after starting an experiment, right before starting the

next experiment, you will need to submit your lab report, make a presentation, or conduct a "chalk talk". More details about these assignments will be described in the first few lab sessions or through handouts, or both.

Attendance: Regular and punctual attendance at all classes is considered essential to optimum academic achievement. If the student is absent from more than 10 percent of class meetings, the faculty member can file a written report which may result in de-enrollment. If the absences exceed 20 percent, the student may be de-enrolled without notice until the university drop date or, after that date, receive the appropriate grade for their work and participation. See Academic Policies in the Undergraduate Academic Catalog.

ADDITIONAL NOTE: The above paragraph is the official PLNU policy, but I think that the timing of this lab course can be a bit more flexible than usual. Everyone should plan to arrive at the beginning of the section time on the first day of an experiment for your fellow students' presentations and my instructions for how to conduct that week's experiment. After that, since equipment is scarce, we will have to take turns using equipment, and you are free to come and go if it isn't your turn to run the experiment. If you've already performed your experiment for that week, you don't have to come in, but I will try to accommodate you during that time to answer your questions or allow you to re-conduct your experiment if you desire to.

Grading: You'll submit six reports, presentations, or chalk talks, but I'll drop the lowest grade. That leaves five lab reports, presentations, or chalk talks at 20% each.

A	90%	C	70%
A-	88%	C-	68%
B+	86%	D+	66%
B	80%	D	60%
B-	78%	D-	58%
C+	76%	F	< 58%

Lecture: CHE 3026 is a separate lecture course related to this material

PLNU Mission To teach ~ to shape ~ to send

Point Loma Nazarene University exists to provide higher education in a vital Christian community where minds are engaged and challenged, character is modeled and formed, and service is an expression of faith. Being of Wesleyan heritage, we strive to be a learning community where grace is foundational, truth is pursued, and holiness is a way of life.

Course Credit Hour Information	In the interest of providing sufficient time to accomplish the state Course Learning Outcomes, this class meets the PLNU credit hour policy for a 1 unit class delivered over 16 weeks. Specific details about how the class meets the credit hour requirement can be provided upon request.
PLNU copyright policy	Point Loma Nazarene University, as a non-profit educational institution, is entitled by law to use materials protected by the US Copyright Act for classroom education. Any use of those materials outside the class may violate the law.
PLNU Academic Honesty Policy	Students should demonstrate academic honesty by doing original work and by giving appropriate credit to the ideas of others. Academic dishonesty is the act of presenting information, ideas, and/or concepts as one's own when in reality they are the results of another person's creativity and effort. A faculty member who believes a situation involving academic dishonesty has been detected may assign a failing grade for that assignment or examination, or, depending on the seriousness of the offense, for the course. Faculty should follow and students may appeal using the procedure in the university Catalog. See Academic Policies for definitions of kinds of academic dishonesty and for further policy information.
PLNU Academic Accommodations policy	While all students are expected to meet the minimum standards for completion of this course as established by the instructor, students with disabilities may require academic adjustments, modifications or auxiliary aids/services. At Point Loma Nazarene University (PLNU), these students are requested to register with the Disability Resource Center (DRC), located in the Bond Academic Center. (DRC@pointloma.edu or 619-849-2486). The DRC's policies and procedures for assisting such students in the development of an appropriate academic adjustment plan (AP) allows PLNU to comply with Section 504 of the Rehabilitation Act and the Americans with Disabilities Act. Section 504 (a) prohibits discrimination against students with special needs and guarantees all qualified students equal access to and benefits of PLNU programs and activities. After the student files the required documentation, the DRC, in conjunction with the student, will develop an AP to meet that student's specific learning needs. The DRC will thereafter email the student's AP to all faculty who teach courses in which the student is enrolled each semester. The AP must be implemented in all such courses. If students do not wish to avail themselves of some or all of the elements of their AP in a particular course, it is the responsibility of those students to notify their professor in that course. PLNU highly recommends that DRC students speak with their professors during the first two weeks of each semester about the applicability of their AP in that particular course and/or if they do not desire to take advantage of some or all of the elements of their AP in that course.

Laboratory Schedule –Tentative--:

Section 1	**Section 2**	**Experiment**
Sept 3	Sept 5	First week of classes: no lab meetings. Bootcamp on Sept 5, 1:00-5:00 PM in Latter 102
Sept 10, 17	Sept 12, 19	Lab 1: The Photoelectric Effect
Sept 24, Oct 1	Sept 26, Oct 3	Lab 2: Conjugated Dyes
Oct 8, 15	Oct 10, 17	Lab 3: Rotational and Vibrational Spectroscopy of HCl and DCl
Oct 22	Oct 24	Special Topic
Oct 29, Nov 5	Oct 31, Nov 7	Lab 4: Computational Chemistry I
Nov 12, 19	Nov 14, 21	Lab 5: Computational Chemistry II
Nov 26	Nov 28	Thanksgiving break: no lab meetings
Dec 3, Dec 10	Dec 5, 12	Lab 6: Fluorimetry