San José State University
College of Science/Department of Chemistry
CHEM 146, Physical-Inorganic Techniques, Spring 2015

Course and Contact Information

Instructor: Buddhima Siriwardena-Mahanama, Ph.D.
Office Location: DH 001
Telephone: (408) 924-4973
Email: buddhima.siriwardena-mahanama@sjsu.edu
Office Hours: Friday, 4:00–5:00 p.m., and by appointment
Class Days/Time: Seminar: Section 1, Friday, 9:00 a.m.–9:50 a.m.
Laboratory: Section 2, Friday, 10:00 a.m.–4:00 p.m.
Classroom: Duncan Hall 010

Prerequisites: A letter grade of “C” or better (“C−” not accepted) in CHEM 100W, 101, 145, and 162L
Pre/Corequisite: CHEM 155

Course Description (from SJSU Course Catalog)
Application of advanced instrumental and preparative techniques to the study if structure, reactivity, and spectroscopy of inorganic and organic substances including materials. This is a capstone course.

Course Learning Outcomes (CLO)
Upon successful completion of this course, students will be able to:

1. CLO 1 Employ proper laboratory procedures including safety, handling chemicals, and waste disposal.
2. CLO 2 Maintain an organized and accurate laboratory note book.
3. CLO 3 Understand and implement experimental protocols to analyze inorganic and organic compounds using modern techniques and instrumentation.
4. CLO 4 Apply previously learned concepts in chemistry and knowledge gained from searching scientific literature to effectively design and implement physical-inorganic experiments.
5. CLO 5 Analyze and interpret experimental results and arrive at reasonable conclusions.
6. CLO 6 Communicate findings effectively through scientific oral presentations and report writing.
Chemistry Program Learning Objectives covered by CHEM 146:

1. PLO 1 Demonstrate understanding of core concepts, methods and limits of scientific investigation to effectively solve problems in inorganic chemistry.

2. PLO 4 Demonstrate understanding of core concepts, methods and limits of scientific investigation to effectively solve problems in physical chemistry.

3. PLO 6 Answer questions regarding safe practices in the laboratory and chemical safety.

4. PLO 7 Demonstrate safe laboratory skills (including proper handling of materials and chemical waste) for particular laboratory experiments.

5. PLO 9 Effectively present a scientific paper orally applying the scientific approach, as at an American Chemical Society symposium.

6. PLO 10 Write a formal scientific laboratory report which applies the scientific approach to address a chemical problem and follows the format and style of an article in a peer-reviewed American Chemical Society journal.

**Required Texts/Readings**

**Textbook**

There is no specific textbook for CHEM 146.

**Other Readings**

Basic physical, analytical and inorganic textbooks will be helpful. Journal articles will be an important source of information because the experiments will be largely from current chemistry literature.

This course will also make use of the chemical literature found in the library. You may need to consult previous inorganic or instrumental methods texts as review and/or make use of various databases including Electronic Journal Index (on-campus access at http://www.sjlibrary.org/research/ejournals/index.htm), SciFinder Scholar (on-campus login access at http://www.sjlibrary.org/research/databases/index.htm?getType=3), MSDS (http://sjsu.chemwatchna.com/), www.scholar.google.com, and Web of Science (http://apps.isiknowledge.com/WOS_GeneralSearch_input.do?product=WOS&search_mode=GeneralSearch&S ID=3E69156N1C7ApjempBI&preferencesSaved=). Please note that some of them may only work with Internet Explorer. You should have a student library account with the King Library that allows you to access the library electronic databases. If you plan to access the library services from off-campus, you may need to obtain a password and/or proxy in order to do so. Check the Library website for more information.

**Other equipment/material requirements**

A bound 8.5” × 11” quadrille lined laboratory notebook with duplicate pages (ex: National #43-591) and a scientific calculator.

**Library Liaison**

Name: Jennifer Dinalo
Email address: jen.dinalo@sjsu.edu
Telephone: (408) 808-2038
Course Requirements and Assignments

SJSU classes are designed such that in order to be successful, it is expected that students will spend a minimum of forty-five hours for each unit of credit (normally three hours per unit per week), including preparing for class, participating in course activities, completing assignments, and so on. More details about student workload can be found in University Policy S12-3 at http://www.sjsu.edu/senate/docs/S12-3.pdf.

Seminars (Friday, 9:00 a.m.–9:50 a.m.): theoretical, fundamental, and technical aspects underlying the research projects that will be performed during the laboratory sessions throughout the semester will be discussed.

Laboratory sessions (Friday, 10:00 a.m.–4:00 p.m.): Students are expected to plan and implement a semester-long research project that will be assigned to them on the first day of class. No experimental procedures will be provided. Students are required to search relevant scientific literature and come up with an experimental design followed by performing the designed experiments as well as recording, analyzing, interpreting, and presenting the results obtained. Students will be working with lanthanide(III) ions, specifically europium(III) or terbium(III) in solution, and investigating the photophysical properties of the coordination complexes formed in situ between Ln$^{3+}$ ions and tetracycline derivatives (oxytetracycline or doxycycline). Investigation of photophysical properties will be carried out using UV-visible, phosphorescence, and fluorescence spectroscopy techniques.

Assignments: include a project proposal for the assigned project, three progress reports on the assigned project, a mid-term oral presentation on literature relevant to assigned project, a final oral presentation on the assigned project, a final report on the assigned project, and a final examination. In addition, students are required to maintain a neat and organized laboratory notebook with all experimental details of the experiments being performed, description of the results obtained, and reasonable conclusions made. Students are required to submit their laboratory notebooks at the end of the semester.

Written assignments: All written assignments are expected to be formal scientific reports written according to ACS journal (Inorganic Chemistry) guidelines. All written assignments are required to be submitted in electronic form as well as paper form. Detailed information on written assignments will be provided in class later in the semester.

Oral presentations: There will be two oral presentations including a mid-term oral presentation (8–10 min) on literature relevant to the assigned project and a final oral presentation (12–15 min) on the assigned semester-long project. Guidelines and details of the two oral presentations will be provided in class later in the semester.

Final examination: will be held at the end of the semester. The final exam will include the fundamental, theoretical, and technical information provided in seminars as well as the semester-long projects. Any form of cheating will not be tolerated and will result in a zero grade in the examination.

Grading Policy

Grading will be done as outlined below:

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Points</th>
<th>Percentage (%)</th>
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</thead>
<tbody>
<tr>
<td>Project proposal</td>
<td>40</td>
<td>8</td>
</tr>
<tr>
<td>Three progress reports</td>
<td>30 (3×10)</td>
<td>6</td>
</tr>
<tr>
<td>Laboratory notebook</td>
<td>30</td>
<td>6</td>
</tr>
<tr>
<td>Mid-term oral presentation</td>
<td>100</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Percentage, %</td>
<td>Letter Grade</td>
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<tr>
<td>--------------------------------</td>
<td>---------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Final oral presentation</td>
<td>100</td>
<td>20</td>
</tr>
<tr>
<td>Final written report</td>
<td>100</td>
<td>20</td>
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<tr>
<td>Final examination</td>
<td>100</td>
<td>20</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>500</strong></td>
<td><strong>100</strong></td>
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</tbody>
</table>

Grades will be calculated as a percentage of the points earned out of the total points possible and a letter grade will be assigned based on the scale given below:

**Classroom Protocol**

**Attendance policy:** attendance at all course functions is mandatory. However, under unavoidable circumstances, students are required to provide explanations in writing with supporting documentation from authorized personnel. Attendance of 80% or higher is required to receive a passing grade in the course.

**Safety quiz:** all students are required to take a safety quiz on the first day of class and pass with a score of 80% or higher in two attempts to remain enrolled in the course.

**Laboratory sessions:** students are required to adhere to safety regulations outlined during the first day of class at all times, and persistent failure to adhere to safety protocols will result in a failing grade in the course. Experiments unrelated to the assigned project will not be allowed in the laboratory under any circumstances, and students engaging in such experiments will be withdrawn from the laboratory immediately.

**Collaborative work:** working on the assigned project can be carried out in groups of two or three. However, every member in a group is required to contribute equally to the assigned project. In addition, every member is required to maintain their own laboratory notebook, submit their own written reports, and do their own oral presentations. Plagiarism of any sort will not be tolerated. Students who do not submit their own work will receive a zero on that particular assignment, and continuing to do so will result in a failing grade in the course.

**Assignment deadlines:** all assignments are required to be submitted on or before the assigned deadline. No assignments will be accepted after the deadline, and will result in a zero grade for that assignment.

**Makeup sessions:** there will be no makeup sessions for missed laboratory sessions, oral presentations, and the final examination.

**University Policies**

**General Expectations, Rights and Responsibilities of the Student Policy**

As members of the academic community, students accept both the rights and responsibilities incumbent upon all members of the institution. Students are encouraged to familiarize themselves with SJSU’s policies and practices pertaining to the procedures to follow if and when questions or concerns about a class arises. See University Policy S90–5 at http://www.sjsu.edu senate/docs/S90-5.pdf. More detailed information on a variety
of related topics is available in the SJSU catalog, at http://info.sjsu.edu/web-dbgen/narr/catalog/rec-12234.12506.html. In general, it is recommended that students begin by seeking clarification or discussing concerns with their instructor. If such conversation is not possible, or if it does not serve to address the issue, it is recommended that the student contact the Department Chair as a next step.

Dropping and Adding
Students are responsible for understanding the policies and procedures about add/drop, grade forgiveness, etc. Refer to the current semester’s Catalog Policies section at http://info.sjsu.edu/static/catalog/policies.html. Add/drop deadlines can be found on the current academic year calendars document on the Academic Calendars webpage at http://www.sjsu.edu/provost/services/academic_calendars/. The Late Drop Policy is available at http://www.sjsu.edu/aars/policies/latedrops/policy/. Students should be aware of the current deadlines and penalties for dropping classes.

Information about the latest changes and news is available at the Advising Hub at http://www.sjsu.edu/advising/.

SJSU registrar deadlines for Spring 2015 are given below:
Last day to drop: Tuesday, February 3
Last day to add: Tuesday, February 10
Last day to withdraw: Thursday, April 23

Academic integrity
Your commitment, as a student, to learning is evidenced by your enrollment at San Jose State University. The University Academic Integrity Policy S07-2 at http://www.sjsu.edu/senate/docs/S07-2.pdf requires you to be honest in all your academic course work. Faculty members are required to report all infractions to the office of Student Conduct and Ethical Development. The Student Conduct and Ethical Development website is available at http://www.sjsu.edu/studentconduct/.

Campus Policy in Compliance with the American Disabilities Act
If you need course adaptations or accommodations because of a disability, or if you need to make special arrangements in case the building must be evacuated, please make an appointment with me as soon as possible, or see me during office hours. Presidential Directive 97-03 at http://www.sjsu.edu/president/docs/directives/PD_1997-03.pdf requires that students with disabilities requesting accommodations must register with the Accessible Education Center (AEC) at http://www.sjsu.edu/aec to establish a record of their disability.

Accommodation to Students' Religious Holidays
San José State University shall provide accommodation on any graded class work or activities for students wishing to observe religious holidays when such observances require students to be absent from class. It is the responsibility of the student to inform the instructor, in writing, about such holidays before the add deadline at the start of each semester. If such holidays occur before the add deadline, the student must notify the instructor, in writing, at least three days before the date that he/she will be absent. It is the responsibility of the instructor to make every reasonable effort to honor the student request without penalty, and of the student to make up the work missed.

Student Technology Resources
Computer labs for student use are available in the Academic Success Center at http://www.sjsu.edu/at/asc/ located on the 1st floor of Clark Hall and in the Associated Students Lab on the 2nd floor of the Student Union. Additional computer labs may be available in your department/college. Computers are also available in the
Martin Luther King Library. A wide variety of audio-visual equipment is available for student checkout from Media Services located in IRC 112. These items include DV and HD digital camcorders; digital still cameras; video, slide and overhead projectors; DVD, CD, and audiotape players; sound systems, wireless microphones, projection screens and monitors.

**SJSU Peer Connections**

Peer Connections, a campus-wide resource for mentoring and tutoring, strives to inspire students to develop their potential as independent learners while they learn to successfully navigate through their university experience. You are encouraged to take advantage of their services which include course-content based tutoring, enhanced study and time management skills, more effective critical thinking strategies, decision making and problem-solving abilities, and campus resource referrals.

In addition to offering small group, individual, and drop-in tutoring for a number of undergraduate courses, consultation with mentors is available on a drop-in or by appointment basis. Workshops are offered on a wide variety of topics including preparing for the Writing Skills Test (WST), improving your learning and memory, alleviating procrastination, surviving your first semester at SJSU, and other related topics. A computer lab and study space are also available for student use in Room 600 of Student Services Center (SSC).

Peer Connections is located in three locations: SSC, Room 600 (10th Street Garage on the corner of 10th and San Fernando Street), at the 1st floor entrance of Clark Hall, and in the Living Learning Center (LLC) in Campus Village Housing Building B. Visit Peer Connections website at http://peerconnections.sjsu.edu for more information.

**SJSU Writing Center**

The SJSU Writing Center is located in Clark Hall, Suite 126. All Writing Specialists have gone through a rigorous hiring process, and they are well trained to assist all students at all levels within all disciplines to become better writers. In addition to one-on-one tutoring services, the Writing Center also offers workshops every semester on a variety of writing topics. To make an appointment or to refer to the numerous online resources offered through the Writing Center, visit the Writing Center website at http://www.sjsu.edu/writingcenter. For additional resources and updated information, follow the Writing Center on Twitter and become a fan of the SJSU Writing Center on Facebook. (Note: You need to have a QR Reader to scan this code.)

**SJSU Counseling Services**

The SJSU Counseling Services is located on the corner of 7th Street and San Fernando Street, in Room 201, Administration Building. Professional psychologists, social workers, and counselors are available to provide consultations on issues of student mental health, campus climate or psychological and academic issues on an individual, couple, or group basis. To schedule an appointment or learn more information, visit Counseling Services website at http://www.sjsu.edu/counseling.
The schedule is subject to change with fair notice: changes will be announced in class and posted on the notice board outside of DH 010.

### Course Schedule

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topics, Readings, Assignments, Deadlines</th>
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<tbody>
<tr>
<td>1</td>
<td>Jan 23</td>
<td>Course Introduction, green sheet, safety quiz, library resources, and check-in</td>
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<tr>
<td>2</td>
<td>Jan 30</td>
<td>Assignment, discussion, and planning of semester-long project</td>
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<td>Feb 3</td>
<td><strong>Deadline to submit project proposal for assigned project</strong></td>
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<td>3</td>
<td>Feb 6</td>
<td>Begin working on assigned project</td>
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<td>4</td>
<td>Feb 13</td>
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<td>5</td>
<td>Feb 20</td>
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<tr>
<td>6</td>
<td>Feb 27</td>
<td><strong>Deadline to submit progress report 1 on assigned project</strong></td>
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<tr>
<td>7</td>
<td>Mar 6</td>
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<tr>
<td>8</td>
<td>Mar 13</td>
<td>Midterm oral presentation on literature relevant to assigned project</td>
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<td>9</td>
<td>Mar 20</td>
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<tr>
<td>10</td>
<td>Mar 27</td>
<td>No class due to Spring recess</td>
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<tr>
<td>11</td>
<td>Apr 3</td>
<td><strong>Deadline to submit progress report 2 on assigned project</strong></td>
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<td>12</td>
<td>Apr 10</td>
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<td>13</td>
<td>Apr 17</td>
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<td>14</td>
<td>Apr 24</td>
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<td>15</td>
<td>May 1</td>
<td>Last day of laboratory work and check-out</td>
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<td><strong>Deadline to submit progress report 3, laboratory note book, and final report on assigned project</strong></td>
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<td>May 8</td>
<td>Final oral presentation on assigned project, 9:00 a.m.–1:00 p.m. (tentative)</td>
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<td></td>
<td>May 15</td>
<td>Final Examination, 10:00 a.m.–12:00 p.m. in DH 010 (tentative)</td>
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