### Instructor:
Maria Matyska-Pesek, Ph.D.

### Office Location:
DH-501

### Telephone:
408-9244951

### Email:
maria.matyska-pesek@sjsu.edu

### Office Hours:
T, Th 1:30 to 2:20 and by appointment

### Class Days/Time:
Section 02 T, Th 10:30 am - 1:20 pm  
Section 03 T, Th 2:30 pm - 5:20 pm  
DH-413

### Classroom:

### Prerequisites:
Chem 1B with Grade “C” or better (“C-“ not accepted)

### Course Fees:
Inquire in DH-518

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**Faculty Web Page (svseparation.com)**

Course materials such as syllabus, handouts, notes, assignment instructions, etc. can be found on Canvas web page at URL: [https://sjsu.instructure.com](https://sjsu.instructure.com), Username: SJSU 9-digit ID. You are responsible for regularly checking with the messaging system through Canvas to learn any updates.

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**Course Description**

Chem 055 Quantitative Analysis  
Introduction to theories and techniques of chemical analysis. Lab 6 hours.  
4 units

**BS/BA CHEMISTRY PROGRAM LEARNING OUTCOMES ADDRESSED BY Chem 55 - lab**

PLO #3 - Demonstrate understanding of core concepts and to effectively solve problems in analytical chemistry.
PLO #6 - Answer questions regarding safe practices in the laboratory and chemical safety.

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

COURSE LEARNING OUTCOMES FOR Chem 55
Upon successful completion of this course, students will be able to:

CLO #1 Perform accurate and precise analysis in the field of analytical chemistry
CLO #2 He or she will be able to keep records of all performed analysis in the manner which is required in modern analytical laboratory.
CLO #3 Student will be able to do statistical analysis and evaluate repetability of obtained results
CLO #4 Perform quantitative and qualitative analysis of known standards as well as unknown samples.
CLO #5 Identify, properly use, and care for equipment and supplies used in analytical laboratory
CLO #6 Identify the requirements for adequate protection of personnel form solvents and materials used in the analysis.

Required Texts/Readings
Lab Manual: Chem 55 Quantitative Analysis Laboratory: J.J. Pesek – required – available via SAACS, DH 20 in the basement, during business hours the first two weeks of the semester.

Other equipment / material requirements
Lab Notebook: A laboratory electronic notebook, is required for all students. Notebook pages will be due at the conclusion of each day of lab (due at midnight on the day of the lab). I will check all entries and then each page has to be electronically dated and signed (NOT BEFORE I WILL CHECK YOUR PAGES). All primary data must be taken in the notebook and after each experiment summary and resume pages must be prepared in the labnotebook. In many industry or research laboratories, the lab notebook can be used as a legal document, so good notebook habits are essential for success in science! Notebooks can be purchased ($10) via link which I will send to you.

Classroom Protocol
Penalties are imposed if an analysis must be repeated because of poor reported results (10 points out of 100) or if results are reported after announced deadline dates (10 points out of 100). Adequate time is allotted to complete the assignments and to repeat some determinations. If because of illness or other reason a student falls behind, she or he may work during the second lab section if permission is obtained from the instructor and if there is a space available. HOWEVER, A STUDENT SHOULD NEVER WORK ALONE, AND AN INSTRUCTOR SHOULD BE WITHIN CALLING DISTANCE.

Dropping and Adding

Students are responsible for understanding the policies and procedures about add/drops, academic renewal, etc. Information on add/drops are available at [http://info.sjsu.edu/web-dbgen/narr/soc-fall/rec-324.html](http://info.sjsu.edu/web-dbgen/narr/soc-fall/rec-324.html). Information about late drop is available at [http://www.sjsu.edu/sac/advising/latedrops/policy/](http://www.sjsu.edu/sac/advising/latedrops/policy/). Students should be aware of the current deadlines and penalties for adding and dropping classes.

Assignments and Grading Policy

See separate sheet for points to be awarded for analyses, quizzes, notebook, calibration of equipment, and technique. Attendance per se will not be used as a criterion for grading according to Academic Policy F-69-24.

University Policies

Academic integrity

Students should know that the University’s Academic Integrity Policy is available at [http://www.sa.sjsu.edu/download/judicial_affairs/Academic_Integrity_Policy_S07-2.pdf](http://www.sa.sjsu.edu/download/judicial_affairs/Academic_Integrity_Policy_S07-2.pdf). Your own commitment to learning, as evidenced by your enrollment at San Jose State University and the University’s integrity policy, require 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 website for Student Conduct and Ethical Development is available at [http://www.sa.sjsu.edu/judicial_affairs/index.html](http://www.sa.sjsu.edu/judicial_affairs/index.html).

Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person’s ideas without giving proper credit) will result in a failing grade and sanctions by the University. For this class, all assignments are to be completed by the individual student unless otherwise specified. If you would like to include in your assignment any material you have submitted, or plan to
submit for another class, please note that SJSU’s Academic Policy F06-1 requires approval of instructors.

University Policies

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 requires that students with disabilities requesting accommodations must register with the DRC (Disability Resource Center) to establish a record of their disability.

Any student with a disability requiring special testing conditions must show the necessary documentation from the university to the instructor within the first two weeks of class.

Student Technology Resources

Computer labs for student use are available in the Academic Success Center located on the 1st floor of Clark Hall and 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 digital and VHS camcorders, VHS and Beta video players, 16 mm, slide, overhead, DVD, CD, and audiotape players, sound systems, wireless microphones, projection screens and monitors.

Learning Assistance Resource Center

The Learning Assistance Resource Center (LARC) is located in Room 600 in the Student Services Center. It is designed to assist students in the development of their full academic potential and to motivate them to become self-directed learners. The center provides support services, such as skills assessment, individual or group tutorials, subject advising, learning assistance, summer academic preparation and basic skills development. The LARC website is located at http://www.sjsu.edu/larc/.

SJSU Writing Center

The SJSU Writing Center is located in Room 126 in Clark Hall. It is staffed by professional instructors and upper-division or graduate-level writing specialists from each of the seven SJSU colleges. Our writing specialists have met a rigorous GPA requirement, and they are well trained to assist all students at all levels within all disciplines to become better writers. The Writing Center website is located at http://www.sjsu.edu/writingcenter/about/staff/.
Peer Mentor Center

The Peer Mentor Center is located on the 1st floor of Clark Hall in the Academic Success Center. The Peer Mentor Center is staffed with Peer Mentors who excel in helping students manage university life, tackling problems that range from academic challenges to interpersonal struggles. On the road to graduation, Peer Mentors are navigators, offering "roadside assistance" to peers who feel a bit lost or simply need help mapping out the locations of campus resources. Peer Mentor services are free and available on a drop –in basis, no reservation required. The Peer Mentor Center website is located at http://www.sjsu.edu/muse/peermentor/.

Exercises: In this course we will:

a. Discuss quantitative chemical analysis, statistics and error analysis, chemical equilibria, acid-base and buffer chemistry, basic spectrophotometry, chromatography and electrophoresis.

b. Conduct lab experiments in acid – base and EDTA titrametry, flame and solution photometry, electrochemistry, high performance liquid chromatography and capillary electrophoresis.

SAFETY: Strict adherence to laboratory safety rules is required. You must pass a quiz on safety rules. Wearing eye protection is mandatory. See, ADDENDUM TO ALL CHEMISTRY DEPARTMENT GREENSHEETS.

EMERGENCIES/EVACUATIONS

If you hear a continuously sounding alarm, or are told to evacuate by Emergency Coordinators (colored badge identities), walk quickly to the nearest stairway (end of each hall). Take your personal belongings with you as you may not be immediately allowed to return. Follow instructions of Coordinators. Be quiet so you can hear. Once outside, move away from the building. Do not return to the building unless the Police or Coordinators announce that it is permissible. If an alarm should occur during an exam or quiz, please attempt to give your instructor the paper or if taking test on line please attempt to save the test.

Course Schedule

See separate sheet for Chem_55 Schedule. The schedule is subject to change with notice announced during the lab and on Canvas – website.
1. Check-in and preliminary operations
   a. Safety orientation and safety quiz, has to be taken on Canvas website before second lab
   b. Review of analytical balance

2. Gravimetric determination of calcium in a solid sample. Report results by **September 18th 2014**.

3. **Gravimetric Analysis - Quiz – September 23rd 2014.**

4. Preparation of standard EDTA solution.

5. EDTA determination of total hardness, calcium, and magnesium in brine sample. Report by **October 2nd 2014**.

7. Preparation and standardization of 0.1 M NaOH.

8. Calibration of pH electrode. No due date, but please remember to turn in the report (20 points).

9. Manganese determination by atomic absorption spectroscopy using both calibration curve and standard addition procedures. Report by **November 4th 2014**.

10. **Complexing titrations, HPLC - Quiz November 6th 2014.**

11. Potentiometric titration of a mixture of phosphoric acid and sodium dihydrogen phosphate.

12. Submit explicit directions for the preparation of 500 mL of 0.050 M pH 7.0 phosphate buffer solution. Use activity coefficients. Report by **November 20th 2014**.


15. **Phosphates, HPCE - Quiz – November 25th 2014.**
High Performance Liquid Chromatography (HPLC) and Capillary Electrophoresis (HPCE) experiments are done in groups of 4 students (due to instrumentation restrictions).
There will be a sign up sheet for both experiments. After the lab will be completed next lab period will be used to work on the reports. The reports will be due after the second lab. Grades for the HPLC, HPCE experiments will depend on each individual student (sample preparation-HPLC, report- HPCE).

There are TWO additional experiments (listed below) which you are required to complete before the end of the semester. You are allowed to determine the order in which you will do these experiments. PLEASE PLAN TO COMPLETE THESE EXPERIMENTS EARLY IN THE SEMESTER.

17. **Determination of Ascorbic Acid in a mixture by Analytical Voltametry.** Report **before December 10th 2014**
18. **Check out of locker on or before last day of laboratory (December 10th 2014) NO LAB Work on December 10th 2014.** Students failing to check out officially will be charged a fee for the Service Center to check out the locker.
CHEMISTRY 55 LABORATORY

A single letter grade will be assigned for Chem 55 class. A passing grade in Chem 55 course requires a passing grade in both the lecture and the laboratory portion of the course.

Chemistry 55 Laboratory experiments                      Maximum points
Calcium w/w % gravimetry                                  100
Total Hardness (ppm) titration                            100
Ca and Mg w/v %                                            100
Calibration of pH electrode                                20
Phosphates w/v % by titration                             200
Preparation of 500 mL pH 7.0 buffer solution               20
Mn in steel w/w %                                          150
HPLC – PAH in the mixture (mg/mL)                          100
HPCE – analysis of drug formulations (ppm)                100
Vitamin C (mg/250 mL) by voltametry                        100
Calibration of one instrument                              30
TOTAL POSSIBLE POINTS                                      1020
Multiply above by 0.4412 (1020 x 0.4412 = 450)            450
NOTEBOOK                                                   50
3 Quizzes (100 points each x 0.42 = 125)                  125
Technique                                                 25

TOTAL LAB POINTS                                           650
Adjusted lab points                                        480

GRAND TOTAL FOR THE LAB                                     480

Chem 055, Quantitative Analysis, Section: 02 and 03, Semester: Fall, Year: 2014 The schedule is subject to change with fair notice and any change will be announced during the lecture and on Canvas web site. All Quizzes (dates marked in red) will be conducted in the "computer room" on the 5th floor. After the quiz (about 1 hour), please go back to the laboratory to continue your experiments. Please turn in your report during the lab before due date. After due date points will be taken off (10 points out of 100) for late turn in. Course Schedule in the table below.
<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topics, Readings, Assignments, Deadlines</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>08-26</td>
<td>Check-in and preliminary operations, Safety orientation and safety quiz, has to be taken on Canvas website before second lab. Gravimetric determination of calcium in a solid sample. EDTA preparation.</td>
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<td>08-28</td>
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<td>2</td>
<td>09-02</td>
<td>Gravimetric determination of calcium in a solid sample and EDTA determination of total hardness, calcium, and magnesium in brine sample.</td>
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<td>09-04</td>
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<tr>
<td>3</td>
<td>09-09</td>
<td>Gravimetric determination of calcium in a solid sample and EDTA determination of total hardness, calcium, and magnesium in brine sample.</td>
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<td>09-11</td>
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<td>4</td>
<td>09-16</td>
<td>EDTA determination of total hardness, calcium, and magnesium in brine sample. REPORT DUE DATE: 09-18: Gravimetric determination of calcium. (100 points)</td>
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<td>09-18</td>
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<tr>
<td>5</td>
<td>09-23</td>
<td>Gravimetric Analysis – Quiz, September 9th. EDTA determination of total hardness, calcium, and magnesium in brine sample. Manganese determination.</td>
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<td>09-25</td>
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<td>6</td>
<td>09-30</td>
<td>Group experiment: HPLC, report due: next lab after experiment is done. Manganese determination. REPORT DUE DATE: 10-02: Total Hardness &amp; Calcium (200 points).</td>
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<td>10-02</td>
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<td>7</td>
<td>10-07</td>
<td>Group experiment: HPLC, report due: next lab after experiment is done. Manganese determination.</td>
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<td>10-09</td>
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<td>8</td>
<td>10-14</td>
<td>Group experiment: HPLC, report due: next lab after experiment is done. Manganese determination. Preparation and standardization of 0.1M NaOH.</td>
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<td>10-16</td>
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<td>9</td>
<td>10-21</td>
<td>Group experiment: HPCE, report due: next lab after experiment is done. Phosphates titration, Vit C, instrument calibration.</td>
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<td>10-23</td>
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<td>10</td>
<td>10-28</td>
<td>Group experiment: HPCE, report due: next lab after experiment is done. Phosphates titration, Vit C, instrument calibration.</td>
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<tr>
<td>14</td>
<td>11-25</td>
<td>Phosphates, HPCE quiz, November 25th</td>
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<tr>
<td>15</td>
<td>12-02</td>
<td>Group experiment: HPCE Vit C, instrument calibration</td>
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<td>12-04</td>
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<td>16</td>
<td>12-10-2014</td>
<td>Last laboratory: check out day, NO LAB WORK. You can check out before this date if you finished all the experiments and turned in all reports. Please save your lab notebook as pdf file</td>
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<td>Week</td>
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<td>Topics, Readings, Assignments, Deadlines</td>
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<tr>
<td>Final Exam</td>
<td>To be determined</td>
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