Course description in terms of learning outcomes: Chemical quantitative analysis is a 4 credit, 200 level course, consisting of four units that focus on training students to (1) prepare histograms and estimate and interpret confidence intervals for a given set of experimental results, (2) to use optical spectroscopy, titrations and least squares regression to measure how much of a given chemical is present in a solution, (3) draw up a recipe for preparing a buffered solution at any specified pH, predict chemical concentrations in and pH of acid/base buffering systems, and (4) isolate individual components from complex samples via chromatography. This course is accompanied by a four-hour laboratory that focuses on implementing the concepts being covered in lecture, developing good analytical technique, developing basic data analysis & reporting skills.

Instructor: David Thompson, 936 294 3270, david.thompson@shsu.edu
Tentative Office Hours W Th: 11:00am-noon
(May be modified after conversation with the class)
Alternate meeting times may be scheduled as needed.

Teaching Assistants: Will assist with the labs.

Lecture Location: Chemistry and Forensic Science (CFS) 103
Lab Location: CFS 309
Required Calculator: TI 84 or similar scientific graphing calculator
Website: www.whfreeman.com/qca7e

Required Lab Notebook: Hayden McNeil Student Lab Notebook with permanent binding & 50 carbonless duplicate sets

Blackboard Login Page: https://blackboard.shsu.edu/webapps/login/

Grading: Your grade will be based upon your performance on:

<table>
<thead>
<tr>
<th>Assignment Type</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignments (8 @ 12 pts)</td>
<td>96 pts</td>
</tr>
<tr>
<td>Laboratory (10 @ 20 pts)</td>
<td>200 pts</td>
</tr>
<tr>
<td>Reaction paper or Documentary</td>
<td>20 pts</td>
</tr>
<tr>
<td>Midterm exams (3 @ 150 pts)</td>
<td>450 pts</td>
</tr>
<tr>
<td>Final exam</td>
<td>234 pts</td>
</tr>
<tr>
<td>Total</td>
<td>1000 pts</td>
</tr>
</tbody>
</table>

Assignments (9.6 % of total grade): Unless an announcement is made to the contrary, assignments will be submitted via the class Blackboard page and will be due weekly on Monday at 11:55pm. If there are more than 8 online assignments your grade will be based only on your 8 highest scores.

Laboratory (20 % of total grade): 5% of the laboratory grade will be based on the prelab, and 15 % on the laboratory report. Laboratory grades for an entire lab will be reduced by multiplying by 0.8 if common areas of the lab are left unclean (checked at the end of lab for the whole lab). Specific students/groups will be penalized by a factor of 0.9 for each of the following: if the student or group are observed leaving the balance or bench unclean, if goggles are not worn (will be randomly checked once during the lab).

Reaction Paper or Documentary: (2 % of total grade)
Either: (A) Attend one science related seminar or convocation given by a professor or a visiting speaker. Talks given by Sam Houston undergraduate or graduate students do not count for this exercise. The talk cannot be a lecture in a regularly scheduled course that you are enrolled in at SHSU. Ask a question during the talk, or in the public question and answer period at the end of the talk on some aspect that intrigued or puzzled you. Write a quick 1-2 page paper that includes (1) a summary of what it was that intrigued or puzzled you, (2) the question you asked and (3) the response you were given. Comment on whether or not you felt the answer was satisfactory. Include the title of the talk and the presenter’s name and the date and place where the talk was given. The point of the exercise is to encourage you to be a part of the community by actively engaging a seminar speaker with a question, not to spend lots of time composing the perfect essay. Reaction papers should be uploaded in Blackboard by Saturday April 30.

OR (B) View the full documentary on the life of Chemist Percy Julian and participate in the discussion following the viewing. The documentary will be shown in the last week of classes and will begin after lab checkouts have been completed.
Midterm Exams: (45 % of total grade)

Midterm exams are closed book exams that will be held in class on
Friday Feb 11 - Midterm exam 1 covering unit 1 material.
Wednesday Mar 9 - Midterm exam 2 covering unit 2 material.
Friday April 15 - Midterm exam 3 covering unit 3 material.
Exam questions may take any format (essay, multiple choice, calculation etc.)

Final Exam: (23.4 % of total grade)

The final exam for this course is scheduled to be held on Monday May 9 from 11 am to 1 pm.
The final exam is worth 234 points, 171 of which will be focused on material from Unit 4, and 63 of which will be focused on the previous three units.

Accommodation: Any student with a disability that affects his/her academic functioning should contact the Services for Students with Disabilities (SSD) at the SHSU Counseling Center (Lee Drain North Annex, telephone 936-294-1720, TDD 936-294-3786) to apply for accommodations. In the event that accommodations are approved by SSD, the student is advised to schedule an appointment with the course instructor in order to present his/her accommodation forms and discuss the arrangements for the accommodations.

Collaboration: In general I encourage you to work with others. Collaboration will enable you to get much more out of the class than if you work alone. Specifically I would encourage you to work with others to prepare for exams and to discuss laboratories and lectures. Your lab reports must be in your own words (No direct copying of text) and give appropriate credit to all relevant sources, including fellow students with whom you worked. No collaboration is allowed during exams, and submitting answers that you have not derived yourself is prohibited in all submitted work.

Attendance and Make-up policy: Attendance will be taken in lecture, but attendance at lectures is not required and does not affect your grade. That being said: (1) you are responsible for all of the material covered in class, and (2) I will work to make the lectures as useful and relevant as I can and to provide some supplementary notes that will be available whether you make it to lecture or not. If you miss a lecture, check Blackboard for materials and/or arrange to obtain notes from a fellow student. Unexcused laboratory, assignment and exam absences will result in a grade of 0 for all grades based on the exams and experiments that were missed. Late assignments and late lab write ups because of unexcused reasons or absences receive a grade of zero and cannot be made up.

Policy on cell phones and electronic devices:
Lectures: With the exception of approved graphing calculators and wrist watches, no other electronics (for example cell phones and computers) are allowed during lecture, unless the user has requested and received permission from the instructor to use a specific device. The first violation of this policy will be met with a warning. If there are subsequent violations, the student will be asked to move the back rows of the classroom or to leave, and the lecture will pause until this has been accomplished.

Exams: On exams the visible presence of a cell phone, earbuds or other electronic device (excepting approved calculators and watches) during the exam will result in a grade of zero for that exam. Exceptions will be granted to individuals who have requested and received permission to use a specific device from the instructor.

---

1 An excused absence is one that you get BEFORE you miss class, unless you are really ill or in an extreme emergency situation, in which case you should notify the class professor as soon as you can, or get a friend or family member to do so. You should be able to provide official written documentation in support of excused absences, and may be requested to do so. For absences due to athletic, religious or other reasons, notify me in advance via email, and be ready to provide written verification from your professor, coach, etc…. Any other absence is an unexcused absence.
The following Sam Houston State University Policies are designed to strengthen community and learning and are fully applicable in Chemical Quantitative Analysis (Chemistry 241)

ACADEMIC DISHONESTY:
All students are expected to engage in all academic pursuits in a manner that is above reproach. Students are expected to maintain honesty and integrity in the academic experiences both in and out of the classroom. Any student found guilty of dishonesty in any phase of academic work will be subject to disciplinary action. The University and its official representatives may initiate disciplinary proceedings against a student accused of any form of academic dishonesty including but not limited to, cheating on an examination or other academic work which is to be submitted, plagiarism, collusion and the abuse of resource materials. For a complete listing of the university policy, see:

http://www.shsu.edu/administrative/faculty/sectionb.html#dishonesty

Specific policy for chem. 241: First violations will automatically result in a grade of 0 for the work in question. Second violations will result in failure of the course.

STUDENT ABSENCES ON RELIGIOUS HOLY DAYS POLICY:
Section 51.911(b) of the Texas Education Code requires that an institution of higher education excuse a student from attending classes or other required activities, including examinations, for the observance of a religious holy day, including travel for that purpose. Section 51.911 (a) (2) defines a religious holy day as: “a holy day observed by a religion whose places of worship are exempt from property taxation under Section 11.20…” A student whose absence is excused under this subsection may not be penalized for that absence and shall be allowed to take an examination or complete an assignment from which the student is excused within a reasonable time after the absence.

University policy 861001 provides the procedures to be followed by the student and instructor. A student desiring to absent himself/herself from a scheduled class in order to observe (a) religious holy day(s) shall present to each instructor involved a written statement concerning the religious holy day(s). The instructor will complete a form notifying the student of a reasonable timeframe in which the missed assignments and/or examinations are to be completed. For a complete listing of the university policy, see:


STUDENTS WITH DISABILITIES POLICY:
It is the policy of Sam Houston State University that individuals otherwise qualified shall not be excluded, solely by reason of their disability, from participation in any academic program of the university. Further, they shall not be denied the benefits of these programs nor shall they be subjected to discrimination. Students with disabilities that might affect their academic performance are expected to visit with the Office of Services for Students with Disabilities located in the Counseling Center. They should then make arrangements with their individual instructors so that appropriate strategies can be considered and helpful procedures can be developed to ensure that participation and achievement opportunities are not impaired.

SHSU adheres to all applicable federal, state, and local laws, regulations, and guidelines with respect to providing reasonable accommodations for students with disabilities. If you have a disability that may affect adversely your work in this class, then I encourage you to register with the SHSU Counseling Center and to talk with me about how I can best help you. All disclosures of disabilities will be kept strictly confidential. NOTE: No accommodation can be made until you register with the Counseling Center. For a complete listing of the university policy, see:


VISITORS IN THE CLASSROOM:
Only registered students may attend class. Exceptions can be made on a case-by-case basis by the professor. In all cases, visitors must not present a disruption to the class by their attendance. Students wishing to audit a class must apply to do so through the Registrar's Office.
Tentative Schedule (page 1) – CHEMISTRY 241 – W 2011
(may be adjusted by the instructor as the semester progresses)

Unit 1: How much confidence should we place in predictions based on experiments?
W Jan 19  Ch. 1 Welcome to Analytical Chemistry – SI units and Scale
F Jan 21  Ch. 1 Unit Conversions – Chemical Concentrations
M Jan 24  Ch. 1 Solution recipes, dilutions and stoichiometric calculations
W Jan 26  Sample Preparation equations
F Jan 28  Ch. 4 Histograms – the basic probability distribution
Lab 1 – Formulas, Plots & Basic Statistics in Microsoft Excel

M Jan 31  Ch. 4 Gaussian probability distribution functions
W Feb 2  Ch. 4 Student-t Confidence intervals
F Feb 4  Ch. 4 F & t-tests
Lab 2 – Error Bars in Microsoft Excel and statistical tests on the TI-84 calculator
M Feb 7  Ch. 4 F & t-tests
W Feb 9  Review
F Feb 11  Midterm exam 1 covering unit 1 material.

Unit 2: Answering “What?” and “How Much?” titrations and spectrophotometry
M Feb 14  Ch. 4 Introduction to calibration
W Feb 16  Ch. 4 Linear Least Squares Regression I & External Standards
F Feb 18  Ch. 18 Spectrophotometric Determination of Iron – a Pre lab Exercise (I will be travelling this day)
Lab 3 – Linear Least Squares Regression
M Feb 21  Ch. 18 Isolating colors and measuring intensities
W Feb 23  Ch. 18 Molecular phenomena that can be measured once we are able to isolate colors and measure intensities I: Absorbance, Scattering
F Feb 25  Ch. 18 Molecular phenomena that can be measured once we are able to isolate colors and measure intensities II: Fluorescence, Phosphorescence
Lab 4 – Spectrophotometric Determination of Iron
M Feb 28  Ch. 21 Atomic Absorption Determination of Calcium or of Iron
W Mar 2  Ch. 21 Atomic Spectroscopy
F Mar 4  Ch. 21 Atomic Spectroscopy
Lab 5 – TBD – Either, AA Determination of Calcium or of Fe
M Mar 7  Review Exercise -  (Instructor away at research conf)
W Mar 9  Midterm exam 2 covering unit 2 material -  (Instructor away at research conf)
F Mar 11  Ch. 7 Preparing and Standardizing a Sodium Hydroxide Solution

Mar 14-18  Spring Break
Tentative Schedule (page 2) – CHEMISTRY 241 – W 2011
(may be adjusted by the instructor as the semester progresses)

Unit 3: Understanding the equilibria that fix the concentrations we measure.

M Mar 21 Ch. 6 Equilibria of Dissolving & Complexation Reactions (Solubility Products)
W Mar 23 Ch. 6 Acid Base Vocabulary
F Mar 25 Ch. 6 Weight percent of an unknown acid
   Lab 6 – Preparing and Standardizing a Sodium Hydroxide Solution

M Mar 28 Ch. 7 Titrations
W Mar 30 Ch. 7 Titrations
F Apr 1 Ch. 7 Titrations - Iodometric Determination of Vitamin C
   Lab 7- Weight percent of an unknown acid

M Apr 4 Ch. 9 Monoprotic Acid Base Equilibria
W Apr 6 Ch. 9 Monoprotic Acid Base Equilibria
F Apr 8 Ch. 9 Preparing and Testing a Buffer
   Lab 8- Iodometric determination of Vitamin C

M Apr 11 Buffers & acid base equilibria cont’d
W Apr 13 Review
F Apr 15 Midterm Exam 3 Chemical Equilibrium
   Lab 9- Preparing and Testing a Buffer

Unit 4: Analyzing trace components in complex samples – Separate first; then Quantitate

M Apr 18 Ch. 24 Gas Chromatography
W Apr 20 Ch. 24 Gas Chromatography
F Apr 22 Good Friday Holiday – No Class

M Apr 25 Ch. 24 Gas Chromatography
W Apr 27 Quadrupole Mass Spectrometry
F Apr 29 Ch. 23 Partitioning in Liquid systems
   Lab 10 – Introduction to Gas Chromatography I&II

M May 2 Ch. 23 Separations cont’d
W May 4 Ch. 23 Separations cont’d
F May 6 Review

M May 9 FINAL EXAM: 11AM-1PM

Final Exam is Monday May 9, 11am – 1pm