Queens College, CUNY  
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Department of Chemistry and Biochemistry  
Fall 2015  
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**CHEM 790.1- Analytical Chemistry Laboratory Techniques**  
**341.1- Instrumental Methods Laboratory**

**341.1-02, 790.1-02**  
Lecture Hour: F, 9:15 - 10:05 AM, 354 RE  
Experimental: F, 10:15 - 1:05 PM, 354 RE

**341.1-01, 790.1-01**  
Lecture Hour: Tu, 12:50 - 1:40 PM, 354 RE  
Experimental: Tu, 1:50 - 4:40 PM, 354 RE

**Syllabus**

**I. Text:**  

**II. Other Required Materials:**  
Scientific calculator, bound laboratory notebook

**III. Schedule:**  
*Schedule is subject to change as semester progresses.*

<table>
<thead>
<tr>
<th>Week</th>
<th>Dates</th>
<th>Experiment</th>
<th>Assignment Due Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8/28, 9/1</td>
<td>Introduction-Check-in; Safety Lecture; group assignment; SOPs and Lab Reports, group assignments- all groups</td>
<td>n/a</td>
</tr>
<tr>
<td>2-4</td>
<td>9/4, 8 – 18, 29</td>
<td>Lab 1</td>
<td>Lab 2</td>
</tr>
<tr>
<td>5</td>
<td>10/2, 10/6</td>
<td>Lab 2</td>
<td>Lab 3</td>
</tr>
<tr>
<td>6</td>
<td>10/9, 13</td>
<td>Lab 3</td>
<td>Lab 4</td>
</tr>
<tr>
<td><strong>7</strong></td>
<td><strong>10/16, 20</strong></td>
<td><strong>QUIZ 1</strong></td>
<td>Lab 4</td>
</tr>
<tr>
<td>8-10</td>
<td>10/23, 27 – 11/6, 10</td>
<td>Lab 5</td>
<td>Lab 7</td>
</tr>
<tr>
<td>11</td>
<td>11/13, 17</td>
<td>Lab 7</td>
<td>Lab 9</td>
</tr>
<tr>
<td><strong>12</strong></td>
<td><strong>11/20, 24</strong></td>
<td><strong>QUIZ 2</strong></td>
<td>Lab 9</td>
</tr>
<tr>
<td>13</td>
<td>12/1, 12/4</td>
<td>presentation</td>
<td>presentation</td>
</tr>
<tr>
<td>14</td>
<td>12/8, 11</td>
<td><strong>REQUIRED ATTENDANCE</strong>- checkout; cleanup- all groups</td>
<td>n/a</td>
</tr>
</tbody>
</table>

**Experiment List**

<table>
<thead>
<tr>
<th>Lab #</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Programming a NXT LEGO Mindstorms Robot with LabVIEW</td>
</tr>
<tr>
<td>2</td>
<td>Building a Digital Thermometer Using a DAQ in LabVIEW</td>
</tr>
<tr>
<td>3</td>
<td>UV-Vis Determination of Vanillin in Natural and Synthetic Vanilla Extracts</td>
</tr>
<tr>
<td>4</td>
<td>IR Spectroscopy: Determination of Xylenes Using an Internal Standard</td>
</tr>
<tr>
<td>5</td>
<td>Fluorescence Determination of Quinine in Tonic Water</td>
</tr>
<tr>
<td>7</td>
<td>Identification of Some Constituents Using HPLC</td>
</tr>
<tr>
<td>9</td>
<td>Separation and Identification of Some Constituents Using ESI-MS</td>
</tr>
</tbody>
</table>
IV. Attendance: Both laboratory and lecture (recitation) sessions are required. Excessive absences in either will adversely affect your grade. Class participation will positively affect your grade. The last meeting is mandatory.

V. Some Suggested Reference Sources:
  Harris *Quantitative Chemical Analysis, seventh* (or any) ed. W. H. Freeman and Company New York 2001 (On reserve in Rosenthal Library)
  Atkins, de Paula *Physical Chemistry, ninth ed.* (or any) W. H. Freeman and Company New York 2002 (On reserve in Rosenthal Library)
  Bishop *Learning with LabVIEW 8* Prentice-Hall New York 2006 (On reserve in Rosenthal Library)

VI. Safety: Goggles, long pants or skirts, closed toe shoes, and long hair tied back are required. Eating, drinking, gum chewing, horseplay, stunt experiments, and contact lenses are not allowed; wear glasses to lab if needed. Safety shower, eyewash, and fire extinguisher locations must be noted. Chemical waste handling protocols must be observed; if in doubt *ask!* Points will be deducted for unsafe practices or violations of waste protocols, and you may be ejected from lab and receive a zero (0) for that experiment.

VII. Work to Be Done: Reports and Standard Operating Procedures (SOPs)

A. Grading of Submitted Work
  1. All Reports and SOPs- are due on the dates listed in the lab schedule. Each is graded for completeness and succinctness of content, clarity and effectiveness of presentation, and proper formatting on the basis of 100 points.
  2. SOPs- There are two, and together are weighted to be 24% of grade total.
  3. Reports- There are five, and together are weighted to be 35% of grade total.
  4. Literature Presentation- There is one and weighted to be 12% of grade total.
  5. Notebooks- will be sporadically checked in lab; points deducted at my discretion, if not properly used and maintained, and weighted to be 5% of grade total.
  6. Laboratory Performance- will be subjectively evaluated by me and weighted to be 12% of grade total.
  7. Quizzes- There will be two, on the material presented in our lecture (recitation) hour, and together will be 12% of your grade total.
  8. Safety- Violations of safety rules will result in points deducted from course total at my discretion.
VII. B. Reports

1. Format- Reports must be written in the style of a scientific journal article. Refer to ACS or APS style guides, or to examples in papers published in chemistry or physics journals.

   a. **Heading**- title, author(s: your name, name of people in your group), department and college

   b. **Introduction**- Explain what the various approaches that can be taken to perform the experiment and any theoretical and background information. The last paragraph should describe the procedure and objective.

   c. **Experimental section**- describe what you did— you may insert figures, graphs, references, tables, if this will better elucidate your text.

   d. **Results**- include data here. While the original data is to be recorded in your lab notebook, they must be reproduced in this section of the paper.

      i. **Calculations** - do include figures (graphs, charts, diagrams) and tables.

      ii. **Error Analysis**- Discuss your calculations, accuracy, including error analysis. Error analysis should be included for all calculations.

   e. **Discussion**- What do your results mean? (This is where you make your scientific conclusions.)

   f. **Conclusions or Summary**- This is more than just a simple synopsis. What is noteworthy or can be learned from the work?

   g. **References**- Reference citations are to be listed in this section, with the annotation superscripts in appropriate places throughout the paper. Do **NOT use Internet sources** for your citations. Use actual scientific literature, as peer-reviewed journals, textbooks, etc. (Of course, you may use the Internet to locate, for example, a journal article or book.)

2. Submission of Reports- Hard copies of assignments must be submitted for credit and are due the next lab meeting, unless otherwise scheduled or notified. Do **not** submit your papers late; late papers are not acceptable and will receive a zero (0) score. Electronic copies are not acceptable for credit.

C. SOPs-

1. **Heading**- Name, model and manufacturer (or vendor) of the instrument, author(s), date, location (dept. & college).
VII. C. 2. **Theory**- Give just enough of the theoretical principles of the instrument necessary for proper operation of the instrument. Include figures, etc., if necessary.

3. **Procedure**- List the correct procedure(s) involved in the proper operation of the instrument, and any variations for different cases, if necessary, and experimental steps. Again, also include figures, etc., if necessary.

4. **References**- *When relevant* and appropriate, list your citations or notes here, using the proper citation format.

D. **Presentation**-

1. **Source**- The presentation to the class will be based on a paper in a topic from analytical chemistry, chosen from a peer-reviewed scientific journal. It is recommended to begin searching for a paper for presentation *no later than* the 3rd week of class and begin preparing around the 4th week. Papers must be subject to my approval before you begin.

2. **Structure**- It will be for up to twelve (12) total minutes: up to nine (9) for the talk, and up to three (3) for a question and answer period.

VIII. **Work in the Laboratory**

A. **Computers** - Each person is responsible for any computers assigned for laboratory use; this includes damage and theft; **do not leave Department laptops unattended**. When you are finished with any desktop computer, *please log out only*; **do not shut down**.

B. **Safety**- Observe all safety requirments and exercise caution; see § VI and VII.A above.

C. **Equipment Usage**- You will likely be assigned to work with other students in small groups or teams on the same experiment or equipment. However, your submissions to me are to be solely your own. (See Section VIII. D, below.) You must leave the equipment and work areas at the end of the lab period clean and neat; again observe safety protocols. Put away all glassware, other equipment and chemicals after use.

D. **Code of Conduct**

1. **Plagiarism**- Plagiarism or any other form of cheating is not tolerated. The student perpetrating such an act will receive a zero (0) for the assignment in question and a warning, along with other possible penalties, for a first offense. A second offense by the student will result in automatic failure of the course (F) and referral to the Chairman and/or the Dean. A failure to properly cite any sources, including figures, charts, tables, and artwork, in a submission or work is also considered plagiarism.
VIII. D. 2. Laboratory Conduct: No horseplay. No offensive language. No other activities in the laboratory or classroom that are not relevant to the coursework. Return all items used to proper places, keep equipment and work areas clean and neat. Strictly observe all safety protocols.

IX. Course Grade: For Chem 341.1, the course grade will be based on the total points of all assignments and quizzes, as stated above, which will then be 85% of the grade. The remaining 15% will be from performance in the laboratory and class participation. The grand total, minus any deductions for safety infractions, will be used to determine the letter grade for the course. For Chem 790.1, the grading process is the same except that the final course numerical grade will be given to the 790.1 lecturer and then will be made a part the final course letter grade.

X. Communication: I can be reached preferably via the discussion group for our course on BlackBoard, and secondarily via e-mail, but only for messages that don’t belong on BlackBoard. I encourage everyone to ask questions, discuss course topics, and answer others’ questions on Blackboard, too! (Of course, I will check the answers.) Course materials, such as manual of experiments, this syllabus, and other, ancillary materials will be posted on Blackboard.