1. COURSE: CHEMISTRY 515 – Advanced Instrumental Analysis

<table>
<thead>
<tr>
<th>LEC</th>
<th>DAYS</th>
<th>TIME</th>
<th>ROOM</th>
<th>INSTRUCTOR</th>
<th>OFFICE</th>
<th>PHONE</th>
<th>EMAIL</th>
<th>OFFICE HOURS</th>
</tr>
</thead>
<tbody>
<tr>
<td>L01</td>
<td>MWF</td>
<td>09:00-09:50</td>
<td>ST 129</td>
<td>Dr. Osthoff</td>
<td>SB 205</td>
<td>220-8689</td>
<td><a href="mailto:hosthoff@ucalgary.ca">hosthoff@ucalgary.ca</a></td>
<td>TR 12-1</td>
</tr>
</tbody>
</table>

Course website or Desire 2 Learn (D2L) course name: https://d2l.ucalgary.ca/d2l/home/278273
Departmental Office: SA 229, 220-5341, chem.undergrad@ucalgary.ca

2. TEXTBOOK:


RECOMMENDED TEXTBOOKS:


3. LIST OF LABORATORY EXPERIMENTS:

Expt. 1: Determination of alcohols in a bourbon sample by gas chromatography with flame ionization detection
Expt. 2: Spectrophotometric analysis of caffeine in a soft drink
Expt. 3: Analysis of food additives in a caffeinated soft drink by reversed-phase high-performance liquid chromatography and diode array detection
Expt. 4: Analysis of drugs of abuse by gas chromatography with mass spectrometric detection
Expt. 5: Quantification of major anions in a water sample by ion chromatography with indirect UV detection
Expt. 6: Analysis of trace metals in a wine sample by graphite furnace atomic absorption spectroscopy
Expt. 7: Analysis of trace metals in drinking water and wine by Inductively Coupled Plasma-Mass Spectrometry
Expt. 8: Data acquisition with National Instruments LABVIEW™ and Analog Discovery 2
4. **TOPICS COVERED AND SUGGESTED READING:**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Generalized Instrumentation, Figures of Merit</td>
<td>Ch. 1.2</td>
<td>Ch. 1</td>
<td>Ch. 1</td>
<td>-</td>
<td>Ch. 1-5</td>
<td>-</td>
</tr>
<tr>
<td>Evaluation of Analytical Data (Review) and Statistics of Linear Regression and Calibration Curves</td>
<td>Ch. 22</td>
<td>Ch. 1 Appendix 1</td>
<td>Ch. 1 Appendix 1</td>
<td>-</td>
<td>Ch. 1-5</td>
<td>-</td>
</tr>
<tr>
<td>Electrical Circuit Components and Circuits</td>
<td>Ch. 4.1-4.4, 4.6</td>
<td>Ch. 2</td>
<td>Ch. 2</td>
<td>Ch. 6.1-6.3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Operational Amplifiers in Chemical Instrumentation</td>
<td>Ch. 4.5</td>
<td>Ch. 3ABCE</td>
<td>Ch. 3</td>
<td>Ch. 6.4</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Digital electronics, Concepts in digital Measurements</td>
<td>Ch. 4.7</td>
<td>Ch. 4ABC</td>
<td>Ch. 4</td>
<td>Ch. 6.6</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Introduction to data acquisition and instrument control</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Ch. 6.7</td>
<td>-</td>
<td>Ch. 5, 12-13</td>
</tr>
<tr>
<td>Introduction to Labview™</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Ch. 1-3, 6-8</td>
</tr>
<tr>
<td>Introduction to Microsoft Excel®</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>pp. xii-xiii</td>
<td>-</td>
</tr>
<tr>
<td>Signals and noise</td>
<td>Ch. 5</td>
<td>Ch. 5</td>
<td>Ch. 5</td>
<td>Ch. 6.8</td>
<td>Ch. 3; 20-6</td>
<td>-</td>
</tr>
<tr>
<td>Spectroscopy - components of optical instruments (sources, wavelength selection)</td>
<td>Ch. 3</td>
<td>Ch. 6 (review) Ch. 7ABC</td>
<td>Ch. 6-7</td>
<td>Ch. 4.1-4.3, 4.5-4.8</td>
<td>Ch. 18</td>
<td>-</td>
</tr>
<tr>
<td>UV, visible, and near infrared spectroscopy</td>
<td>Ch. 1.2, 6</td>
<td>Ch. 13</td>
<td>Ch. 13-14</td>
<td>Ch. 4.7</td>
<td>Ch. 19-20</td>
<td>-</td>
</tr>
<tr>
<td>Atomic Absorption and Emission Spectroscopy</td>
<td>Ch. 7, 9</td>
<td>Ch. 9, 10A</td>
<td>Ch. 9-10</td>
<td>-</td>
<td>Ch. 21</td>
<td>-</td>
</tr>
<tr>
<td>Fourier Transform (FT) Instruments and FTIR spectrometers</td>
<td>Ch. 11</td>
<td>Ch. 71, 16 BI</td>
<td>Ch. 7, 17</td>
<td>Ch. 4.7.6</td>
<td>Ch. 20-5</td>
<td>Ch. 11</td>
</tr>
<tr>
<td>Mass spectrometry</td>
<td>Ch. 13</td>
<td>Ch. 11ABC; 20</td>
<td>Ch. 11ABC; 20</td>
<td>Ch. 5.4, 5.5</td>
<td>Ch. 22</td>
<td>-</td>
</tr>
<tr>
<td>Separations</td>
<td>Ch. 15.1, 15.2</td>
<td>Ch. 26</td>
<td>Ch. 26</td>
<td>-</td>
<td>Ch. 23</td>
<td>-</td>
</tr>
<tr>
<td>GC</td>
<td>Ch. 16</td>
<td>Ch. 27</td>
<td>Ch. 27</td>
<td>-</td>
<td>Ch. 24</td>
<td>-</td>
</tr>
<tr>
<td>HPLC</td>
<td>Ch. 15.3-15.5</td>
<td>Ch. 28A-G</td>
<td>Ch. 28</td>
<td>-</td>
<td>Ch. 25</td>
<td>-</td>
</tr>
</tbody>
</table>