

# CHMC16H3 - Analytical Instrumentation

**The course will be split into 4 main sections :**

Section 1. Three weeks split between, RAMAN, TRXRF, CE

Section 2. Three weeks will be spent learning and applying NMR

Section 3. Three weeks will be spent on GC and GC-MS

Section 4. Three weeks will be spent learning HPLC and HPLC-MS

**Unless stated otherwise we will always meet in S141.**

## **Assessment**

There will be *no* final exam for this course. Students will be assessed on the following criteria.

- 1) 4 x Lab reports. Lab reports are worth 15% each
- 2) 1 x term paper (20%)
- 3) Ability and Performance in the Lab sessions (20%). Remember this is a lab course you will be evaluated on your involvement, safety (lab glasses, coat), your ability to work with your team members, your ideas especially in “the research project section”, your ability to keep a lab manual that can both be used to verify your results, and repeat your work, your timeliness, and your ability to organize your time and leave the lab in good shape.

***Lab reports are to be written individually and each student will be expected to attach their own copies of the relevant chromatograms, spectra etc with their reports.***

***Plagiarized reports will not be accepted.***

***Late Reports will not be accepted unless you have a Dr's note***

*Acknowledgement : Some sections of these practicals have modified from “Chemistry Experiments from Instrumental Methods” by Sawyer, Heineman and Beebe.*

## *Week Number by Group*

Week Number

<i>Lab</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>	<i>11</i>	<i>12</i>
<i>RAMAN/TRXRF/CE</i>	<i>A</i>	<i>A</i>	<i>A</i>	<i>B</i>	<i>B</i>	<i>B</i>	<i>C</i>	<i>C</i>	<i>C</i>	<i>D</i>	<i>D</i>	<i>D</i>
<i>GC/GC-MS</i>	<i>B</i>	<i>B</i>	<i>B</i>	<i>C</i>	<i>C</i>	<i>C</i>	<i>D</i>	<i>D</i>	<i>D</i>	<i>A</i>	<i>A</i>	<i>A</i>
<i>HPLC/HPLC-MS</i>	<i>C</i>	<i>C</i>	<i>C</i>	<i>D</i>	<i>D</i>	<i>D</i>	<i>A</i>	<i>A</i>	<i>A</i>	<i>B</i>	<i>B</i>	<i>B</i>
<i>NMR</i>	<i>D</i>	<i>D</i>	<i>D</i>	<i>A</i>	<i>A</i>	<i>A</i>	<i>B</i>	<i>B</i>	<i>B</i>	<i>C</i>	<i>C</i>	<i>C</i>

**Do not enter research labs, unless your TA is present. If you are early wait outside.**

## Contacts and Office Hrs

Office Hrs : Wed 3.30-4.30pm. In Environmental NMR Center (take elevator to basement of the **science research building** and bang on the large double door that are located around the corner) E-mail : [andre.simpson@utoronto.ca](mailto:andre.simpson@utoronto.ca)

## Lab Books, Cleaning Up, and Leaving

### *Before Leaving*

Make sure all chemicals have been returned and that all apparatus, has been cleaned an returned to its correct location. **YOU WILL LOOSE MARKS IF YOU LEAVE A MESS. LOTS OF THE EQUIPMENT YOU WILL BE USING IS VERY EXPENSIVE RESEARCH EQUIPMENT, TREAT IT WITH RESPECT !!**

### *Lab Manuals :*

Lab Manuals are to be kept throughout the course. *You must get these initialed by the instructor or demonstrator at the end of each session* after you have cleaned up and shut down all the instrumentation properly. Lab manuals **must be handed in along** with the last lab report. **It is your responsibility to get you lab book signed each week. IF SIGNATURES OR LAB BOOKS ARE MISSING AT THE END OF THE COURSE THEN YOU WILL LOOSE MARKS.**

**All students are required to make their own notes and observations in the lab books as they feel appropriate**

# *Example Lab Report + Schedule*

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## **Overall Title (i.e. Gas Chromatography)**

**Name : Student Number**

Names of Other Student in the same practical group

**Date :**

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## **Subtitle (i.e. Week 1 : Determination of Optimal Flow Rate in Gas Chromatography)**

Make a note here of any special circumstances. For example : *“As is was the first week of class only 4 of the 6 compounds were available”*

## **Treatment of Data and Results**

Here you will be expected to work chronologically through the practical write up. You are expected to carry out all the instructions in the “Treatment of Data Sections” throughout the text. You will be expected to clearly label and hand in all spectra or data collected during the practical. Each individual will be responsible to obtaining his own individual copy of any relevant data. Any appropriate experimental conditions should be clearly marked. In this section discuss any relevant finding or observations that you made during the practical.

## **Questions**

Answer all questions throughout the text as fully as possible.

## **Conclusions**

**In this section summarize your major findings, and what you think you learnt from the practical session. Address any problems encountered. Suggest improvements that could be made to improve the results.**

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*Repeat Format for week 2 and hand in complete report.*

**The practical report should be submitted in full the week following the last practical session on a particular type of instrumentation. Exact dates for handing in each assignment are given on the next page.**

## Dates Reports are Due !!!!

Note if we have to switch things around – **REPORTS ARE ALWAYS DUE ONE WEEK AFTER THE LAST CLASS ON THAT SPECIFIC INSTRUMENT. NOTE FOR SECTION A there is NO lab report. However, A is included in the table to make it easier to follow.**

**PLEASE NOTE AS THIS COURSE HAS NO EXAM THE GRADES ARE DUE ONE WEEK AFTER THE END OF CLASS. THAT IS THE SAME DAY THE FINAL LAB REPORT IS DUE ! YOU MUST HAND IN YOUR REPORT BY 12PM SO WE CAN MARK THEM. WE HAVE NO CHOICE BUT TO GIVE LATE REPORTS ZERO. PLEASE GET YOUR REPORTS IN ON TIME !**

Date	RAMAN/TRXRF/CE	GC/GC-MS	HPLC/HPLC-MS	NMR	Comment
Wed 8 <sup>th</sup> Jan	*	*	*	*	<b>Term Paper Set</b>
Wed 15 <sup>th</sup> Jan	*	*	*	*	
Wed 22 <sup>nd</sup> Jan	*	*	*	*	
Wed 29 <sup>th</sup> Feb	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	B/C/D lab reports DUE
Wed 5 <sup>th</sup> Feb	*	*	*	*	
Wed 12 <sup>th</sup> Feb	*	*	*	*	
Wed 19 <sup>th</sup> Feb	----- <b>Spring Break</b> -----				
Wed 26 <sup>th</sup> Feb	<b>B</b>	<b>C</b>	<b>D</b>	<b>A</b>	B/C/D lab reports DUE
Wed 5 <sup>th</sup> Mar	*	*	*	*	
Wed 12 <sup>th</sup> Mar	*	*	*	*	
Wed 19 <sup>th</sup> Mar	<b>C</b>	<b>D</b>	<b>A</b>	<b>B</b>	B/C/D lab reports DUE
Wed 26 <sup>th</sup> Mar	*	*	*	*	<b>Term Paper Due</b>
Wed 2 <sup>nd</sup> Apr	*	*	*	*	<i>Last Week of Class</i>
Wed 9 <sup>th</sup> Apr	<b>D</b>	<b>A</b>	<b>B</b>	<b>C</b>	B/C/D lab reports DUE