

## Chemistry 451/551 Analytical Spectroscopy Syllabus Spring 2021

**Professor:** Dr. Gene S. Hall, 282/288 Wright-Rieman Chemistry Lab,

848-445-2590. e-mail: [gene@genehall.com](mailto:gene@genehall.com) **subject: chem551**

01:160:451/551 Analytical Spectroscopy

**Text: Principles of Instrumental Analysis 7th Edition**

by Douglas A. Skoog, Stanley R. Crouch, and F. James Holler

Virtual class meets Tuesday and Thursday evenings 5:00 – 6:20 PM Chem. 260.

Lect	Date	Topic	Readings
1.	01/19/2021	Introduction course logistics	
2.	01/21/2021	Introduction to spectroscopy, units, etc.	C6: Pg. 120
3.	01/26/2021	UV-VIS Part 1	C13: Pg. 304
4.	01/28/2021	UV-VIS Part II	C13: Pg. 304
5.	02/02/2021	UV-VIS Part III	C13: Pg. 304
6.	02/04/2021	Fluorescence Part I	C15: Pg. 361
7.	02/09/2021	Fluorescence Part II	C15: Pg. 361
8.	02/11/2021	Fluorescence Part III, Lab visit? (Virtual)	C15: Pg. 361
9.	02/16/2021	IR Part I	C16: Pg. 389
10.	02/18/2021	IR Part II	C16: Pg. 389
11.	02/23/2021	IR Part III, Apps,	C16: Pg. 389
12.	02/25/2021	IR Part IV, Apps, Virtual Lab visit	
13.	03/02/2021	Raman Part I	C18: Pg 437
14.	03/04/2021	Raman Part II	C18: Pg 437
15.	03/09/2021	Raman Part III	C18: Pg 437
16.	03/11/2021	Raman Part IV Virtual Lab visit	C18: Pg 437
	03/23/2021	Take home exam due March 30, 2021	
17.	03/30/2021	Atomic Absorption	C6,8,9: Pg 120-228

18.	04/01/2021	Atomic Emission (ICP-OES)	C10: Pg 231
19.	04/06/2021	Atomic Emission (ICP-OES) II virtual lab visit	C10: Pg 231
20.	04/08/2021	X-ray methods	C12: Pg 274
21.	04/13/2021	X-ray methods II	C12: Pg 274
22.	04/15/2021	X-ray methods III Virtual lab visit	C12: Pg 274
23.	04/20/2021	ICP-MS	C11: Pg 253
24.	04/22/2021	Sample Preparations Data Analysis	App. 1: Pg 887
25.	04/27/2021	Chemometrics	Internet refs.
26.	04/29/2021	Surface methods, ESCA, AUGER, etc.	Internet refs.

Last class Thursday April 29, 2021

Take Home Exam: Date to be determined

Final Exam May 12, 2021 8-11 AM. Will be take home exam.

**Course Grading: 100% 2 Exams.**

Course objectives:

1. Provide detailed theory of various spectrometric methods that includes, XRF, FT-IR, Raman, UV-Vis, Fluorescence, ICP-OES, LIBS, ESCA, Auger, and PIXE.
2. Explain the correlation between molecular structure and various spectra including IR, UV-Vis, Raman, and Fluorescence.
3. Sample preparation methods.
4. Using various data interpretation software such as KnowItAll, Gaussin, ChemDraw, OriginPro, and ACD Curve Manager.
5. Detailed operation of various spectrometers including UV-Vis, XRF, FT-IR, Raman, Fluorescence, and ICP-OES. (Virtually of course.)
6. How to purchase an instrument.

Computer resources links.

Your student computer fees paid for you to access a large selection of computer programs and journal publications using Chemical Abstract Services.

Link to KnowItAll software to read Raman and IR spectra. You have to sign up using your official Rutgers email i.e. .edu as it is free for academia. You do not need to pay for this software. However, it only runs on a PC.

[KnowItAll Academic Edition - Free Chemistry Software - Wiley Science Solutions](https://sciencesolutions.wiley.com/academic-edition/) <https://sciencesolutions.wiley.com/academic-edition/>

Here is the link for Rutgers Software Portal  
<https://it.rutgers.edu/software-portal/>

Here is the Software Catalog  
<https://software.rutgers.edu/catalog/?mode=vue>

Be sure to learn how to vpn from off campus to access Chem Abstracts and read online journals.

Cisco AnyConnect VPN  
<https://software.rutgers.edu/product/3605>

ChemOfficePro 19.1 with Mnova (NMR)  
<https://software.rutgers.edu/product/3629>

Great molecular drawing program and it is available both for **Macs** and Windows computers.

Great graphing program is OriginPro 2021 for Windows only.  
<https://software.rutgers.edu/product/3670>

This program can read spectra from various vendor's instruments including FT-IR, Raman, UV-Vis, Fluorescence, and many other instrument generated data files. Publication quality graphs.

You can also sign up for your Box, WebEx, and Zoom accounts all free with your Rutgers NetInd account.

WebEx: <https://tlc.rutgers.edu/resources-and-services/webex?id=586>  
Zoom: <https://it.rutgers.edu/zoom/knowledgebase/how-to-create-your-rutgers-zoom-account/>

Box Account: <https://ods.rutgers.edu/box-activation>

To get Rutgers Connect (Office 365) suite of programs including OneDrive  
<https://its.rutgers.edu/services/rutgers-connect>

To get SciFinder

[https://www.libraries.rutgers.edu/indexes/scifinder\\_scholar](https://www.libraries.rutgers.edu/indexes/scifinder_scholar)

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