

**INSTRUMENTAL METHODS III: SPECTROSCOPY**  
**Chemistry 4190/6190 (CRN 20551, 20552, 20721)**  
**Spring Semester 2021**

**Instructors**

Dr. Markus W. Germann   Lecture  
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**Course modality**

**This course is composed of lectures and a laboratory component, both which are on-line**

**Lectures:** TR 11:30 am-12:20 pm (50 min) via Webex in iCollege  
**Note the lectures are synchronous**

**Laboratory:** Refer to guidance from Drs. Barrow and Chen

**Office Hours**

Lecture: Individual consultation as requested. Email instructor to schedule

**Text**

Principles of Instrumental Analysis, 7<sup>th</sup> edition, 2018  
Authors: Skoog, Holler and Crouch  
Cengage Learning, Independence, KY  
ISBN-13: 978-1-305-57721-3

**Prerequisites:**

Grade C or above in CHEM 4000/6000 and CHEM4120/6120 or equivalent

**Course Description**

Spectroscopy in all its forms is among the most powerful analytical techniques in experimental research. This course provides a theoretical foundation and hands-on opportunities for generate and analyze data from UV/visible absorption, fluorescence, FT-NMR, and FT-IR spectroscopy in probing physical properties of chemicals and their interactions. This course complements the Physical Chemistry sequence (CHEM 4110/4111/4120/4121), Introduction to Biophysical Chemistry (CHEM 4150) and Photon Science (CHEM 4470) by focusing on the instrumental, analytical, and experimental aspects of spectroscopic investigations into chemical systems.

**Course Outcomes**

Upon completion of this course, students will be able to:

1. Describe the physical principles of spectroscopic detection by UV, visible, and IR absorption, fluorescence, NMR;
2. Demonstrate competency in operating contemporary spectroscopic instrumentation and analyzing their output;
3. Solve quantitative problems using spectroscopic data drawn from different techniques;
4. Write ACS-style laboratory reports.

**Additional course materials**

Lecture slides, assignments, and additional handouts will be posted on the iCollege course page prior to the required dates. Drs. Barrow and Chen will provide materials needed for the laboratory component.

### Attendance and participation policy

**Attendance at the live WebEx sessions is required.** Participants benefit significantly through real-time discussions and clarifications with the instructor as the material is presented. Policy on the laboratory component will be elaborated by Drs. Barrow and Chen.

### Grading and assessments

Lecture: Take home tests (3)	52.5%
Lecture: Final Exam	17.5%
Lab Reports, (and Notebook)	30%

The tests and final examination for the lecture will be almost exclusively on material covered in the lectures, including, especially, the recommended problems.

Please refer to the laboratory syllabus (a separate document from the laboratory Instructor) for specific guidance on the laboratory assessments. Graduate students enrolled in CHEM 6190 have additional laboratory requirements over undergraduates enrolled in CHEM 4190.

Students earn the following grades by attaining the following scores:

94%	<b>A+</b>	82%	<b>B+</b>	70%	<b>C+</b>	58%	<b>D</b>
90%	<b>A</b>	78%	<b>B</b>	66%	<b>C</b>	Below 50%	<b>F</b>
86%	<b>A-</b>	74%	<b>B-</b>	62%	<b>C-</b>		

### Make-up policy

Each assignment/exam will explicitly show its due date. Since there will be ample time to complete the work, you are expected to submit the work on time. iCollege will not allow late submissions. If emergent circumstances arise that will cause excessive hardship in a timely submission, notify the instructor at least 48 h prior to the due date. Any accommodation is strictly as agreed upon by the instructor and will be documented. Student requiring accommodation for disability should consult the statement of student support below.

### Academic honesty

The Department of Chemistry follows the University policy on academic honesty published in the “Student Code of Conduct” (<https://codeofconduct.gsu.edu/>). All assignments and tests taken must represent the student’s individual, unaided effort. Receiving or offering information on a test or assignment is cheating, including digital social media (including Facebook groups), as is the use of unauthorized supplementary materials or devices (see next section). **To receive credit, each assignment/exam must be accompanied by its coversheet, which the submitting student must sign to acknowledge that she/he understands the GSU policy on academic integrity and intends to follow it. Any suspected offense may be referred to the Dean of Students for further action.** The consequences of cheating are severe and potentially long-lasting: don’t do it!

### GSU policy prohibiting students from posting instructor-generated materials on external sites

The selling, sharing, publishing, presenting, or distributing of instructor-prepared course lecture notes, videos, audio recordings, or any other instructor-produced materials from any course for any commercial purpose is strictly prohibited unless explicit written permission is granted in advance by the course instructor. This includes posting any materials on websites such as Chegg, Course Hero, OneClass, Stuvia, StuDocu and other similar sites. Unauthorized sale or commercial distribution of such material is a violation of the instructor’s intellectual property and the privacy rights of students attending the class, and is prohibited.

### Statement of student support

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. Students who wish to request accommodation for a disability may do so via the Access and Accommodations Center (AACE) at <https://access.gsu.edu/>. Students may only be accommodated upon issuance of a signed Accommodation Plan by the AACE Center (see: <https://access.gsu.edu/testing-services/>) and are responsible for providing a copy of that plan to instructors of all classes in which accommodations are sought.

**FERPA**

In keeping with USG and university policy, this course will make every effort to maintain the privacy and accuracy of your personal information. Specifically, unless otherwise noted, it will not actively share personal information gathered from the site with anyone except university employees whose responsibilities require access to said records. However, some information collected from the site may be subject to the Georgia Open Records Act. This means that while we do not actively share information, in some cases we may be compelled by law to release information gathered from the site. Also, the site will be managed in compliance with the Family Educational Rights and Privacy Act (FERPA), which prohibits the release of education records without student permission.

**Sexual harassment**

In instances of sexual misconduct, the present instructor(s) and teaching assistants, are designated as Responsible Employees who are required to share with administrative officials all reports of sexual misconduct for university review. If you wish to disclose an incident of sexual misconduct confidentially, there are options on campus for you to do so. For more information on this policy, please refer to the Sexual Misconduct Policy which is included in the Georgia State University Student Code of Conduct.

**Basic needs statement**

Any student who faces challenges securing their food or housing and believes this may affect their performance in the course is urged to contact the Dean of Students for support. Furthermore, please notify the professor if you are comfortable in doing so. This will enable us to provide resources that we may possess. The Embark program at GSU provides resources for students facing homelessness.

**Course evaluation**

Your constructive assessment of this course plays an indispensable role in shaping education at Georgia State. Upon completing the course, please take time to fill out the online course evaluation. Please note that the lecture and laboratory components are not evaluated together. The lecture component is evaluated on GoSolar. The laboratory component is evaluated separately by Qualtrics with links provided outside GoSolar.

## Course Schedule

The course syllabus provides a general plan for the course; deviations may be necessary.

DATE	Week	SUBJECT	READING*
1/12, 1/14	1	Introduction	Chapters 5
1/19, 1/21	2	UV-Visible	Chapter 6
1/26, 1/28	3	UV-Visible	Chapter 7
2/2, 2,4	4	UV-Visible,	Chapter 13
2/9, 2,11	5	UV-Visible, Fluorescence, <b>Test 1 due</b>	Chapter 14
2/16, 2/18	6	Fluorescence	Chapter 14/15
2/23, 2/25	7	Fluorescence,	Chapter 15
3/2, 3/4	8	Fluorescence, <b>Test 2 due</b>	Chapter 15
3/9, 3/11	9	Misc. topics i.e. CD	Handout (pdf)
3/15, 3/17	10	Spring Break	
3/23, 3/25	11	IR, <b>Test 3 due</b>	Chapter 16/17
3/29, 3/31	12	IR, NMR	Chapter 17/18/19
4/6, 4/8	13	NMR	Chapter 19
4/13, 4/15	14	NMR	Chapter 17/18/19
4/20, 4/22	15	Review, catch up Classes end 4/26	All
4/30	16	<b>FINAL due</b>	All

The University requires that faculty members must, on a date after the midpoint of the course to be set by the Provost (or her designee) give a W to all students who are on their rolls but are no longer taking the class and report the last day the student attended or turned in an assignment. Students who withdrawn may petition the Departmental Chair for reinstatement into their classes. **For the Spring 2021 semester, the semester midpoint is 3/2/2021.**

\* From Skoog et al.