

# Syllabus, CHEM/BCMB 4190/6190/8189

## Introductory NMR / Fundamentals of NMR

Nuclear Magnetic Resonance (NMR) is a type of spectroscopy that uses the magnetic properties of nuclei to probe molecular structure and dynamics. It has applications in analysis of organic and inorganic compounds, in structure determination of biological macromolecules, and even in medical imaging. These introductory courses are intended to serve a broad audience seeking background in principles behind NMR methodology and practical knowledge of data acquisition and analysis. Material is presented in both lecture and laboratory formats. It is an ideal stepping-stone to more advanced courses offered in biomolecular NMR (CHEM/BCMB 8190) as well as other application-oriented courses. The three courses share lecture and laboratory presentations. Grading is based on exams, written laboratory reports, and an evaluation of classroom and laboratory participation (see page 3 of this syllabus). For graduate students, completion of an additional independent study project is required.

*The course syllabus is a general plan for the course; deviations announced to the class by the instructor may be necessary.*

**Instructor:**

- Professor Jeffrey Urbauer
- Office: room 2254 (lab, rooms 2247) iSTEM-2 building
- Phone: 542-7922
- Email: [urbauer@uga.edu](mailto:urbauer@uga.edu)

**Office Hours:** - any time / by appointment

**Course Website:** - <https://urbauerlab.uga.edu/4190>

**Class time:** - Tu,Th, 3:55-5:10

**Class Room:** - Davison Life Sciences room C120

**Recommended text:** - Friebolin "Basic One and 2D NMR Spectroscopy" – VCH paperback  
- 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup> or 5<sup>th</sup> edition

### COURSE OUTLINE AND DATES:

(dates are target dates and subject to change)

Month	Day	Date	Lecture / Exam / Lab	Readings
<b>August</b>				
	R	18	Introduction	
	Tu	23	Basic principles I	1.1 - 1.5
	R	25	Basic principles I, II	1.1 - 1.5
	Tu	30	Basic principles II	1.1 - 1.5
<b>September</b>				
	R	1	Data Acquisition	1.5
	Tu	6	Special Lecture / Discussion	
<b>EXAM</b>	<b>R</b>	<b>8</b>	<b>EXAM 1</b>	
	Tu	13	Chemical Shifts	1.6, 2.1 - 2.5, 6.1 – 6.4
	R	15	Coupling	1.6, 1.7, 2.4 3.1 – 3.7, 4.1 – 4.2

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	Tu 20	Coupling and Structure	1.6, 1.7, 2.4 3.1 – 3.7, 4.1 – 4.2
	R 22	Double Resonance / Decoupling	5.1 – 5.3
	Tu 27	Special Lecture / Discussion	
<b>EXAM</b>	<b>R 29</b>	<b>EXAM 2</b>	
<b>October</b>			
	Tu 4	Spin Relaxation	7.1 – 7.3
	R 6	Complex Pulse Sequences/Spin Echo	8.1 – 8.2
	Tu 11	Spin Echo	8.3 – 8.4
	R 13	INEPT and DEPT	8.5 – 8.6
	Tu 18	Laboratory Discussion	
	R 20	Special Lecture / Discussion	
*****	<b>M 24</b>	<b>MIDPOINT WITHDRAWL DEADLINE</b>	*****
<b>EXAM</b>	Tu 25	<b>EXAM 3</b>	
	R 27	Introduction to 2D NMR	9.1 – 9.3
<b>November</b>			
	Tu 1	2D COSY / HETCOR	9.4
	R 3	2D TOCSY / HSQC	9.4
	Tu 8	Nuclear Overhauser Effect / NOESY	10.1 - 10.4
	R 10	Laboratory Discussion	
	Tu 15	Laboratory Discussion	
	R 17	Special Lecture / Discussion	
<b>EXAM</b>	Tu 22	<b>EXAM 4</b>	
	R 24	No Class: Thanksgiving Holiday	
	Tu 29	Laboratory Discussion	
<b>December</b>			
	R 1	Laboratory Discussion	
	Tu 6	No Class: UGA Operates a Friday class schedule	
	Tu 6	Last Day of Classes at UGA	
	W 7	Reading Day	
	<b>F 9</b>	<b>ALL REMAINING LAB REPORTS DUE BY 5:00 PM</b>	

### ATTENDANCE:

The University of Georgia guidelines for attendance can be found at the following link: (<http://bulletin.uga.edu/bulletin/ind/attendance.html>).

Attendance policies are at the discretion of the instructor. Attendance in this course will be monitored. For this course, five (5) absences from lectures will result in automatic withdrawal from the course. If the withdrawal is before the midpoint deadline, the grade will be “WP”. After the deadline, the grade will be “WP” if the student is passing, or “WF” if the student is failing. The five (5) absences include absences that may prove to be excused.

No absences from laboratory periods are permitted. A missed laboratory period will result in a score of zero (0) for that laboratory (see below).

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No absences from exam periods are permitted. A missed exam will result in a score of zero (0) for that exam (see below).

Examinations missed in the case of emergencies, including personal/family crises, require a signed excuse from the Office of the Vice President of Instruction. No score for a makeup exam will be acknowledged/recorded without this signed excuse.

Examinations missed in the case of personal illness require certification signed by the attending physician describing the illness and validating the absence. This will be presented to the instructor. Contact information for the attending physician will also be provided to the instructor.

In the event that a critical activity has been scheduled well in advance of a scheduled exam, the student can arrange with the instructor for a makeup exam. **This must be done at least two weeks before the examination.** In the event it is not, a signed excuse from the Office of the Vice President of Instruction must be provided.

Makeup exams will be given only within four (4) days of the normally scheduled exam. These will be scheduled at the earliest possible time.

For students arriving late for an exam, no additional time beyond the normal exam end time will be given to complete an exam. The same guidelines apply to missed laboratory sessions (see below).

Lectures begin at 3:55 pm. Students who arrive between 3:55 pm and 4:05 pm will be considered late. Two (2) such instances of arriving late will constitute one (1) absence. Students who arrive after 4:05 pm will be considered absent. Likewise, leaving class ten (10) or less minutes before the end of the class period will be equivalent to a late arrival. Leaving class more than ten (10) minutes before the end of the class period will count as an absence.

### **EMAIL COMMUNICATION:**

The instructor will **ONLY** email students at their official UGA email addresses. The instructor will **NOT** email students at any other addresses (i.e. Gmail, Yahoo mail, etc.), and will not reply to emails sent from such addresses.

### **ELECTRONIC DEVICES:**

No cell phones, laptops, tablet computers, iPhones/iPods/iPads/iWatches or equivalent, PDAs or other electronic devices are allowed to be in operation in the classroom. All such, or related, devices must be turned off before entering the classroom, and must be off of the desktop during class (in a bookbag or on the floor). **The exception is, for exams, each student should bring a hand-held calculator to each exam.**

### **GRADING:**

Grades will be based on exams and written laboratory reports. There are four (4) in-class exams. There are five (5) laboratory sessions and a total of five (5) written laboratory reports. The grade in the course will be assigned based on the highest three (3) exam scores and the highest four (4) written laboratory report scores. The three (3) highest exam scores will count 75% toward the final grade, and the four (4) highest laboratory scores will count 25% toward the final grade.

Consideration for re-grading of an exam requires that the student request the re-grading no more than one (1) week after the graded exam is returned. A written statement detailing the justification for consideration of re-grading must also be provided.

### **EXAMS:**

There are three (4) in class exams. All exams are comprehensive. An absence from any exam will result in a score of zero (0) for that exam.

Exams will cover all material discussed in class, all material found in the lecture notes, and all material in the reading assignments.

**Under no circumstance will any exam be rescheduled to accommodate holiday or end of semester travel plans.**

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### **LABORATORY / WRITTEN LABORATORY REPORTS:**

There are five (5) laboratory sessions and a total of five (5) written laboratory reports. A written report is required for each lab. **The laboratory reports are typed.** Due dates for the reports will be announced in class. **The written laboratory reports will be original works of a single individual, will not be written by teams, and will not be the result of joint efforts between two or more students.**

### **ACADEMIC HONESTY POLICY:**

As a University of Georgia student, you have agreed to abide by the University's academic honesty policy, "A Culture of Honesty," and the Student Honor Code. All academic work must meet the standards described in "A Culture of Honesty" found at:

[https://honesty.uga.edu/resources/documents/academic\\_honesty\\_policy\\_2017.pdf](https://honesty.uga.edu/resources/documents/academic_honesty_policy_2017.pdf)

Lack of knowledge of the academic honesty policy is not a reasonable explanation for a violation. Questions related to course assignments and the academic honesty policy should be directed to the instructor.

*UGA Student Honor Code: "I will be academically honest in all of my academic work and will not tolerate academic dishonesty of others." A Culture of Honesty, the University's policy and procedures for handling cases of suspected dishonesty, can be found at [www.uga.edu/ovpi](http://www.uga.edu/ovpi). Every course syllabus should include the instructor's expectations related to academic honesty.*

### **ACCESSIBILITY STATEMENT:**

*If you anticipate issues related to the format or requirements of this course, please meet with Professor Urbauer, who will discuss with you ways to ensure your full participation in the course. If formal, disability-related accommodations are necessary, it is very important that you be registered with the Disability Resource Center (Voice: 706-542-8719 or TTY: 706-542-8778) and notify Professor Urbauer of your eligibility for reasonable accommodations. A plan to best coordinate your accommodations can then be developed. The website for the disability resource center can be found at: <https://drc.uga.edu>*

### **FERPA NOTICE:**

The Federal Family Educational Rights and Privacy Act (FERPA) grants students certain information privacy rights. See the registrar's explanation at: <https://apps.reg.uga.edu/FERPA/>

### **UGA NON-DISCRIMINATION AND ANTI-HARASSMENT POLICY:**

The University of Georgia ("the University") is committed to maintaining a fair and respectful environment for living, work and study. To that end, and in accordance with federal and state law, University System of Georgia policy, and University policy, the University prohibits harassment of or discrimination against any person because of race, color, sex (including sexual harassment and pregnancy), sexual orientation, gender identity, ethnicity or national origin, religion, age, genetic information, disability, or veteran status by any member of the University Community (as defined below) on campus, in connection with a University program or activity, or in a manner that creates a hostile environment for any member of the University Community. Incidents of harassment and discrimination will be met with appropriate disciplinary action, up to and including dismissal or expulsion from the University. The full policy can be found at: <https://eoo.uga.edu/policies/non-discrimination-anti-harassment-policy>

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### **CAMPUS CARRY (HOUSE BILL 280, “HB280”):**

For information about House Bill 280, commonly known as the “campus carry” legislation, which became effective July 1, 2017, please refer to information and guidance provided by the University System of Georgia at: <http://www.usg.edu/hb280>  
Students are free to contact the UGA Police Department concerning the enforcement of HB280.

### **MENTAL HEALTH AND WELLNESS RESOURCES:**

- *If you or someone you know needs assistance, you are encouraged to contact Student Care and Outreach in the Division of Student Affairs at 706-542-7774 or visit <https://sco.uga.edu>. They will help you navigate any difficult circumstances you may be facing by connecting you with the appropriate resources or services.*
- *UGA has several resources for a student seeking mental health services (<https://www.uhs.uga.edu/bewelluga/bewelluga>) or crisis support (<https://www.uhs.uga.edu/info/emergencies>).*
- *If you need help managing stress anxiety, relationships, etc., please visit BeWellUGA (<https://www.uhs.uga.edu/bewelluga/bewelluga>) for a list of FREE workshops, classes, mentoring, and health coaching led by licensed clinicians and health educators in the University Health Center.*
- *Additional resources can be accessed through the UGA App.*

### **COURSE MATERIALS:**

All course materials are the sole property of Dr. Urbauer. The course materials (lecture notes, handouts, videos, exams, any recordings, anything else) can be used by the students enrolled in the course, but not distributed in any way. They may not be given to any individuals not enrolled in the course, they may not be posted to any web sites or distributed to anyone not enrolled in this course or any other entity. Doing so will constitute a violation of the Academic Honesty policies. This includes any special materials and/or recordings made during class.

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## **CORONAVIRUS INFORMATION FOR STUDENTS FOR FALL 2021 CLASSES**

### **Face coverings:**

Following guidance from the University System of Georgia, face coverings are recommended for all individuals while inside campus facilities.

### **How can I obtain the COVID-19 vaccine?**

University Health Center is scheduling appointments for students through the UHC Patient Portal ([https://patientportal.uhs.uga.edu/login\\_dualauthentication.aspx](https://patientportal.uhs.uga.edu/login_dualauthentication.aspx)). Learn more here – <https://www.uhs.uga.edu/healthtopics/covid-vaccine>.

The Georgia Department of Health, pharmacy chains and local providers also offer the COVID-19 vaccine at no cost to you. To find a COVID-19 vaccination location near you, please go to: <https://georgia.gov/covid-vaccine>.

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In addition, the University System of Georgia has made COVID-19 vaccines available at 15 campuses statewide and you can locate one here: <https://www.usg.edu/vaccination>

### What do I do if I have COVID-19 symptoms?

Students showing COVID-19 symptoms should self-isolate and schedule an appointment with the University Health Center by calling 706-542-1162 (Monday-Friday, 8 a.m.-5 p.m.). Please DO NOT walk-in. For emergencies and after-hours care, see, <https://www.uhs.uga.edu/info/emergencies>.

### What do I do if I test positive for COVID-19?

If you test positive for COVID-19 at any time, you are **required to report it** through the DawgCheck Test Reporting Survey (<https://dawgcheck.uga.edu/>). We encourage you to stay at home if you become ill or until you have excluded COVID-19 as the cause of your symptoms. UGA adheres to current Georgia Department of Public Health (DPH) quarantine and isolation guidance (<https://dph.georgia.gov/covid-quarantine-calculator>) and requires that it be followed. Follow the instructions provided to you when you report your positive test result in DawgCheck.

### Guidelines for COVID-19 Quarantine Period (As of 8/1/21; follow DawgCheck or see DPH website for most up-to-date recommendations)

Students who are fully vaccinated **do not** need to quarantine upon exposure unless they have symptoms of COVID-19 themselves. All others should follow the Georgia Department of Public Health (DPH) recommendations:

Students who are not fully vaccinated and have been directly exposed to COVID-19 but are not showing symptoms **should self-quarantine for 10 days**. Those quarantining for 10 days must have been symptom-free throughout the monitoring period and continue self-monitoring for COVID-19 symptoms for a total of 14 days. You should report the need to quarantine on DawgCheck (<https://dawgcheck.uga.edu/>) AND communicate directly with your course instructors to coordinate your coursework while in quarantine. If you need additional help, reach out to Student Care and Outreach ([sco@uga.edu](mailto:sco@uga.edu)) for assistance.

Students, faculty and staff who have been in close contact with someone who has COVID-19 are no longer required to quarantine if they have been fully vaccinated against the disease and show no symptoms.

### Well-being, Mental Health, and Student Support

If you or someone you know needs assistance, you are encouraged to contact Student Care & Outreach in the Division of Student Affairs at 706-542-7774 or visit <https://sco.uga.edu/>. They will help you navigate any difficult circumstances you may be facing by connecting you with the appropriate resources or services.

UGA has several resources to support your well-being and mental health: <https://well-being.uga.edu/>

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Counseling and Psychiatric Services (CAPS) is your go-to, on-campus resource for emotional, social and behavioral-health support: <https://caps.uga.edu/>, TAO Online Support (<https://caps.uga.edu/tao/>), 24/7 support at 706-542-2273. For crisis support: <https://healthcenter.uga.edu/emergencies/>.

The University Health Center offers FREE workshops, classes, mentoring and health coaching led by licensed clinicians or health educators: <https://healthcenter.uga.edu/bewelluga/>

### **Monitoring conditions:**

Note that the guidance referenced in this syllabus is subject to change based on recommendations from the Georgia Department of Public Health, the University System of Georgia, or the Governor's Office or. For the latest on UGA policy, you can visit <https://coronavirus.uga.edu>.