NMR Spectroscopy

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Lecture:  Tu, Th 12:00-15:50; HPA1 0246; 5/17 – 6/23

Office Hours:  Richardson: MWF 10:00-11:00; 5/16 – 6/3
Harper: MW 15:30-17:00; 6/6 – 6/22


Other materials:  Scientific calculator. Cell phones and other electronic devices are prohibited during exams. Such devices should be turned off and inside your bag.

Course Objective:  We will cover the principles and applications of modern NMR spectroscopy. Starting with the classical description of a single nuclear spin and going through the quantum mechanical description of the macroscopic nuclear magnetization and its interaction with the magnetic and radio frequency fields. Relaxation theory and its effect on the spectrum and implications on experimental parameters will also be covered. We will go over the instrument hardware and how the signal is generated and detected. Finally, the practical applications of NMR will be covered, including two-dimensional and other advanced experiments, and how they are used to solve structure and other chemical problems.

Problem Sets:  Homework is assigned, but will not be collected or graded. The tests will closely reflect homework and it is therefore to your advantage to complete all assigned homework. You are encouraged to work together to solve homework problems. The later portion of each lecture session will be devoted to going over the previous session’s assigned problems.

Exams:  There will be a midterm and a final worth 100 points each. Exams will be given in class on the following dates:

<table>
<thead>
<tr>
<th>Exam</th>
<th>Date</th>
<th>Time</th>
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</thead>
<tbody>
<tr>
<td>Midterm</td>
<td>Th 6/2</td>
<td>13:30-15:30</td>
</tr>
<tr>
<td>Final</td>
<td>Th 6/23</td>
<td>13:30-15:30</td>
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</tbody>
</table>

Grading:  The average from the tests will be used to determine your grade:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>93 - 100%</td>
</tr>
<tr>
<td>A-</td>
<td>89 – 92.99%</td>
</tr>
<tr>
<td>A+</td>
<td>85 – 88.99%</td>
</tr>
<tr>
<td>B</td>
<td>81 – 84.99%</td>
</tr>
<tr>
<td>B-</td>
<td>77 – 80.99%</td>
</tr>
<tr>
<td>C</td>
<td>67 – 71.99%</td>
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<tr>
<td>C-</td>
<td>62 – 66.99%</td>
</tr>
<tr>
<td>D+</td>
<td>58 – 61.99%</td>
</tr>
<tr>
<td>D</td>
<td>54 – 57.99%</td>
</tr>
<tr>
<td>D-</td>
<td>50 – 53.99%</td>
</tr>
<tr>
<td>C+</td>
<td>72 – 76.99%</td>
</tr>
<tr>
<td>Fail</td>
<td>&lt;50%</td>
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</table>
**NMR Spectroscopy**

**Academic Honesty:** Dishonesty or cheating will not be tolerated in this course. Your exams must represent your own work and not be copied from other sources. Violations of these principles and rules are subject to severe sanctions, according to the University’s Rules of Conduct (see [http://www.osc.sdes.ucf.edu/](http://www.osc.sdes.ucf.edu/)).

**Important Dates:**
Monday May 30th   Memorial Day Holiday

**Financial aid:** All faculty are now required to document students’ academic activity at the beginning of each course. In order to document that you have begun this course, please log onto webcourses and complete Quiz #1 by the end of the first week of class (May 20th). Failure to do so may result in a delay in the disbursement of your financial aid.

The University of Central Florida is committed to providing reasonable accommodations for all persons with disabilities. Students who need accommodations must be registered with Student Disability Services, Ferrell Commons Room 132, phone (407) 823-2371, TTY/TDD-only-phone (407) 823-2116, before requesting accommodations from the professor. Students with disabilities who need accommodations in this course must also contact the professor at the beginning of the semester to discuss needed accommodations. No accommodations will be provided until the student has met with the professor to request accommodations.
\begin{table}
\centering
\begin{tabular}{|c|c|c|l|}
\hline
Date & Chapter & Instructor & Topic \\
\hline
5/17 & 2,3 & Richardson & Introduction to NMR, energy levels \\
\hline
5/19 & 4 & Richardson & The vector model \\
\hline
5/24 & 5 & Richardson & FT and data processing \\
\hline
5/26 & 12 & Richardson & Non-first order and equivalence, applications and analysis \\
\hline
5/31 & 13 & Richardson & Applications and analysis, instrument \\
\hline
6/2 & - & Richardson & Review for Midterm (12:00-13:00); Midterm (13:30-15:30) \\
\hline
6/7 & 7 & Harper & Operators and quantum mechanics \\
\hline
6/9 & 7 & Harper & Operators and quantum mechanics \\
\hline
6/14 & 8 & Harper & Operators and quantum mechanics \\
\hline
6/16 & 8, 9 & Harper & Operators and quantum mechanics, Relaxation \\
\hline
6/21 & 9, 11 & Harper & Relaxation and coherence pathways \\
\hline
6/23 & - & Harper & Review for Final (12:00-13:00), Final (13:30-15:30) \\
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\end{tabular}
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Chapters listed refer to James Keller, Understanding NMR Spectroscopy, 2nd Edition.

*This syllabus may be modified at the discretion of the instructor. The instructor reserves the right to modify the schedule, testing procedure and grading policy. Any such changes will be discussed in class or via e-mail.