NMR Spectroscopy (CH410/510) Syllabus

Instructors

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Class time and room
The class will be held in on the Portland State Campus in Cramer Hall, room 382 on Tuesday and Thursdays from 14:00 to 15:50.

Office Hours
There is no system of formal office hours. If you require administrative assistance contact Mark Woods (above). If you require academic assistance you should drop an e-mail to either Mark Woods or the relevant instructor to arrange an appointment. For many students it is recognized that it will be more convenient to arrange an appointment with someone located on the same campus, you may therefore consider Mark Woods to the primary point of contact for questions or concerns.

Textbook
Spin Dynamics: Basics of Nuclear Magnetic Resonance (2nd Edition; Malcolm H. Levitt; John Wiley & Sons, Ltd; Chichester; 2008) will be used as the text for this course.
Student Assessment

- There will be 2 exams: 1 mid-term and 1 final exam.
- There will be no ‘quizzes’ and no ‘tests’
- The final exam is not cumulative.
- Each exam will have equal weighting
- The mid-term will cover modules 1 and 2
- The final will cover modules 3-5
- The final exam will be on Monday Dec 3rd at 10:15 AM

There will be no excuses for missing an exam. There will be no make-up exams. Once the exam has started you cannot leave. If you need to leave, then hand-in the exam and your time has expired. (Go to the rest room before class and any exam). Ensure your phone and other mobile electronic devices are turned off, if they make a noise during the exam your time in the exam room will have expired.

Grading: If you believe there is an error in the grading or scoring of your exam then follow these steps:

1. **Do not panic** if there is a grading or addition error. It will be fixed if you follow step 2.
2. **Staple** a professionally worded, very brief and to-the-point note to the front of your exam stating (a) the specific problem number and (b) your question about the problem. If, on the other hand, there is simply an error in addition, be specific about the number of points miscalculated.
3. If you ask for a re-grade of a question that has been graded correctly, then you will forfeit from your original score the same number of points believed were graded incorrectly. So, be absolutely sure that there is an error in grading before asking for a re-grade.
4. If you find an addition error in calculating your score there is no penalty for bringing this to our attention.

Homework and Assigned reading

Homework is not assessed towards your final grade. However, you should expect that you diligence in completing homework assignments will be reflected in your overall grade. Your primary homework assignment is to read the text in advance of the class.

Overview

The aim of this course is to provide a foundation of the basic underlying principles behind all magnetic resonance experiments. Rather than a providing a brief survey of magnetic resonance this course will rigorously explore these principles in more depth. A student completing this course will understand the theoretical physics, the experimental considerations and the important experimental phenomena of magnetic resonance. The course is designed to provide a strong foundation for students interested in a very diverse range of fields form organic spectral interpretation through protein NMR to electron spin relaxation and magnetic resonance imaging.
Course Structure
Each instructor will take on a different aspect of magnetic resonance, referred to as a module

Module 1 (Rooney): Magnetism, precession and the NMR signal
Module 2 (Springer): Relaxation in magnetic resonance
Module 3 (Woods): Exchanging spins
Module 4 (Kroenke): Coupled spins
Module 5 (Barbara): Practical aspects of magnetic resonance

Teaching Schedule

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<thead>
<tr>
<th>Day /Date</th>
<th>Instructor</th>
<th>Topic</th>
<th>Assigned Reading</th>
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<td></td>
<td>(Sections)</td>
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<tr>
<td>1 Tu Sept. 25</td>
<td>Rooney</td>
<td>Magnetism, Precession, NMR Signal</td>
<td>1.1-1.6</td>
</tr>
<tr>
<td>2 Th Sept. 27</td>
<td>Rooney</td>
<td>Magnetism, Precession, NMR Signal</td>
<td>2.1-2.8</td>
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<tr>
<td>3 Tu Oct. 2</td>
<td>Rooney</td>
<td>Magnetism, Precession, NMR Signal</td>
<td>3.1-3.7</td>
</tr>
<tr>
<td>4 Th Oct. 4</td>
<td>Rooney</td>
<td>Magnetism, Precession, NMR Signal</td>
<td>5.1-5.8</td>
</tr>
<tr>
<td>5 Tu Oct . 9</td>
<td>Springer</td>
<td>Magnetic Resonance Relaxation</td>
<td>2.6, 2.7; 11.9, 11.10</td>
</tr>
<tr>
<td>6 Th Oct. 11</td>
<td>Springer</td>
<td>Magnetic Resonance Relaxation</td>
<td>12.1, 12.2; 20.1, 20.2</td>
</tr>
<tr>
<td>7 Tu Oct. 16</td>
<td>Springer</td>
<td>Magnetic Resonance Relaxation</td>
<td>20.3, 20.4</td>
</tr>
<tr>
<td>8 Th Oct. 18</td>
<td>Springer</td>
<td>Magnetic Resonance Relaxation</td>
<td>20.8</td>
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<td>9 Tu Oct. 23</td>
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<td>Mid Term Examination</td>
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<td>10 Th Oct. 25</td>
<td>Woods</td>
<td>Exchanging Spins</td>
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<tr>
<td>11 Tu Oct. 30</td>
<td>Woods</td>
<td>Exchanging Spins</td>
<td>TBA</td>
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<tr>
<td>12 Th Nov. 1</td>
<td>Woods</td>
<td>Exchanging Spins</td>
<td>TBA</td>
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<tr>
<td>13 Tu Nov. 6</td>
<td>Kroenke</td>
<td>Coupled Spins</td>
<td>TBA</td>
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<tr>
<td>14 Th Nov. 8</td>
<td>Kroenke</td>
<td>Coupled Spins</td>
<td>TBA</td>
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<tr>
<td>15 Tu Nov. 13</td>
<td>Kroenke</td>
<td>Coupled Spins</td>
<td>TBA</td>
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<tr>
<td>16 Th Nov. 15</td>
<td>Kroenke</td>
<td>Coupled Spins</td>
<td>TBA</td>
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<tr>
<td>17 Tu Nov. 20</td>
<td>Barbara</td>
<td>Practical MR Aspects</td>
<td>TBA</td>
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The Small Print

• Your attendance at class is not compulsory; however, you should expect that your absences will be reflected by your performance in the exams.

• If you miss class you should seek help from your fellow students before asking for a resume of the class from an instructor. It should not be necessary for a class to be re-taught on a regular basis.

• You should make plans to attend ALL exams. Attendance at exams is compulsory.

• If you cannot make an exam then it must be for an acceptable reason. Acceptable excuses would include: bereavement, illness and religious holidays.

• If you miss an exam for an acceptable reason or for illness then your term grade will be made up from your score on the other exam.

• If you miss an exam for an unacceptable reason, then you will be awarded a zero.

• It is expected that students will conduct themselves in a courteous and considerate manner (both to the instructor and to their fellow students) in class: cell phones off, no discussing last night’s game, no getting up to leave to take a call, and so on. If you are not interested in the class, then please do not attend in the first place.

• The instructors retain the right to change any part of this syllabus at any time.

Students with Disabilities

If you have a disability and require an accommodation to fully participate in this class, contact the Office for Students with Disabilities (OSWD). If you have an OSWD Accommodation Plan, you should make an appointment to meet with me to discuss your accommodations. Also, you should meet with me if you wish to discuss emergency medical information or special arrangements in case the building must be evacuated.