课程名（Coursename）
The Physical Basis of NMR Spectroscopy

课程代码（Coursenumber）
C8

课程对象（Audience）
Undergraduate

开课教师（Teacher）
Dr J. H. Keeler

学期（Semester）
L 7–8 & E 1–2

课程描述（Description））
By now you will be familiar with the use of NMR as a qualitative tool for structure determination, but little has been said so far about what NMR spectroscopy actually is and how it works. One of the beauties of NMR is that you can use it every day to help in identifying chemical structures without ever having to worry about what is actually going on in the experiment. However, there comes a time when either our curiosity, or our need to understand more deeply what we are doing, brings us to the point where we really want to know what NMR is. This is where this course fits in.
The course starts out by considering the basic NMR experiment which, it turns out, is performed in rather a different way to virtually all other kinds of spectroscopy. Rather than looking for the absorption of radiation by the spins, we excite the spins with a short burst of radiation and then detect the ringing signal which is induced. The Fourier transform of this ringing signal is the familiar spectrum. In order to understand this most basic experiment we will have to develop the vector model, which is a precise semi-classical way of understanding the behaviour of the spins. Once we have the vector model we can begin to explore other experiments which involving pulses, including the famous spin echo experiment, which is the basis for many further developments.
Useful though the vector model is, it is not able to describe the behaviour of coupled spins, and in particular the important phenomena of coherence transfer and multiple quantum coherence. To deal with these effects we need the quantum mechanical approach offered by the product operator method. We will not concern ourselves too much with where this theory comes from, but will find that it can be used in a simple and intuitive way to explain all of the important phenomena in modern NMR. In particular, we will be able to understand how two-dimensional experiments, with such delightful names as COSY, DQF-COSY and HMQC work. It is these experiment which have so revolutionized the application of NMR over the past twenty years.

课时信息（Totalhours）

教参信息（Textbookinfo）
1 NMR in Biomedicine: The Physical Basis (Key Papers in Physics, No 2) by Eiichi Fukushima (Paperback - Jan. 1, 1989)
ISBN-13: 978-0883186091
2 NMR Spectroscopy: Basic Principles, Concepts, and Applications in Chemistry, 2nd Edition by Harald Günther (Paperback - July 25, 1995)
ISBN-13: 978-0471952015
3 Structural Bioinformatics (Methods of Biochemical Analysis) by Jenny Gu and Philip E. Bourne (Hardcover - Mar. 16, 2009)
ISBN-13: 978-0470181058
世界各地拥有馆藏的图书馆（OCLC）:186
4 Physical Biochemistry: Principles and Applications by David Sheehan (Hardcover - May 18, 2009)
ISBN-13: 978-0470856024
世界各地拥有馆藏的图书馆（OCLC）:156
5 Organic Chemistry by G. Marc Loudon (Hardcover - Dec. 27, 2001)
ISBN-13: 978-0195119992
世界各地拥有馆藏的图书馆（OCLC）:185
6 Analytical Chemistry (German Edition) by Robert Kellner, Matthias Otto, H. Michael Widmer, and Jean-Michel Mermet (Paperback - Apr. 22, 1999)
ISBN-13: 978-3527288816