Chemistry 625 **Spring 2019**
Chemical Applications of Magnetic Resonance Spectroscopy

Instructor: Prof. Ralf Haiges **Office:** ACB 201, **Tel.:** x03197**, email:** haiges@usc.edu
Days and Time: Tue. & Th., 9.30 a.m. to 10.50 a.m.
Class Location: SGM226

This course will not have any formal prescribed texts. Material from the following suggested books will be used from time to time.
"Basic One- and Two-Dimensional NMR Spectroscopy", H. Friebolin, 5th Edition, Wiley-VCH, A Paperback, 2016.

"Organic Structure Analysis", P. Crews. J. Rodriguez and M. Jaspars, Oxford University Press, Oxford, 2010, Second Edition.

"NMR Spectroscopy, Basic Principles, Concepts and Applications in Chemistry", H. Günther, Wiley-VCH, 3rd Edition, A Paperback, 2013.

"Understanding NMR Spectrocopy". J. Keeler, 2nd Edition, Wiley, A Paperback, 2010.

"Modern NMR Techniques for Chemistry Research", A. E. Derome, Pergamon Press Inc., (flexi cover), 1991.

Exams: 2 Midterm Tests (40%), Final Term Paper on selected topics (40%), Occasional problem sets (20 %).

Syllabus: Outline of the material that will be covered.

Introduction to Nuclear Magnetic Resonance (NMR) Spectroscopy
Physical Aspects of NMR and Basic Theory- Single Pulse Experiment
FT NMR
Experimental Aspects
^{1}H NMR spectra of Organic Molecules
^{1}H NMR Chemical Shifts and Spin-Spin Coupling Constants
Origin of Chemical Shifts and Coupling Constants
^{13}C and ^{19}F NMR Spectroscopy
Spin Decoupling
NMR of Other Nuclei
Dynamic NMR
CIDNP
Multiple Pulse Experiments
Polarization Transfer
Spectral Editing
Connectivity through Bonds, Space and Chemical Exchange
Two Dimensional NMR
NMR of Solids
Imaging
Theoretical Methods (IGLO, GIAO)

NMR Bibliography

"Carbon-13 Nuclear Magnetic Resonance Spectroscopy", G.C. Levy, R.L. Lichter and G. Nelson, John Wiley and Sons, New York, 1980.

"Nuclear Magnetic Resonance Spectroscopy", R.K. Harris, Longman Scientific.

"Proton and Carbon-13 NMR Spectroscopy- An Integrated Approach", R.J. Abraham and P. Loftus, Heyden, London, 1978.

"Practical NMR Spectroscopy", M.L. Martin, J.-J. Delpuech and G.J. Martin, Heyden, London, 1980.

"Experimental Pulse NMR- A Nuts and Bolts Approach", E. Fukushima and S.B. Roader, Addison-Wesley, New York, 1981.

"Hand Book of High Resolution Multinuclear NMR", C. Brevard and P. Granger, John Wiley and Sons, New York.

"Dynamic NMR Spectroscopy", J. Sandstrom, Academic Press, 1982.

"Solid State NMR for Chemists", C. Fyfe, C.F.C. Press, Guelph, Ontario, Canada 1983.

"Nuclear Magnetic Resonance Imaging in Medicine and Biology", P.G. Morris, Calrendon Press, Oxford 1985.

"NMR Basic Principles and Progress", Springer Verlag, Volumes 1-33. Each volume is dedicated to a particular nucelus or technique.

"NMR Spectroscopy Techniques", C. Dyboski and R. L. Lichter, eds., Marcel Dekker, Inc., New York, 1987.

"A Complete Introduction to Modern NMR Spectroscopy", Roger S. Macomber, Wiley, New York, 1998.

"200 and More NMR Experiments, A Practical Course", S. Berger and S. Braun, Wiley-VCH, Weinheim, 2004.

"Applied NMR Spectroscopy for Chemists and Life Scientists", O. Zerbe, S. Jurt, Wiley-VCH, Weinheim, 2014.

"High-Resolution NMR Techniques in Organic Chemistry", 3rd ed., T. Claridge, Elsevier, 2016.

"Organic Structures from 2D NMR Spectra", L. Field, H. Li, A. Magill, Wiley, 2015.