

## Biochemistry 8990: Advanced Topic in Biochemistry

### Bio-Macromolecular NMR Spectroscopy: Structure and Dynamics

1.5 ch, Call # 35825

Autumn 2018, Tuesdays 12:45-2:05 pm, Biological Sciences 668

Instructor: Mark P Foster (foster.281)

**Description:** This course will introduce students to the application of NMR spectroscopy to problems in biochemistry and structural biology. The focus of this special topics class will be on structure determination of proteins from NMR spectra, computational docking of molecular complexes, and on methods for characterizing macromolecular dynamics. Students will be introduced to popular NMR software tools provided through NMRBox (<http://nmrbox.org>); novices will be offered a hands-on introduction to data collection on high-field instruments in the CCIC. Grades will be assigned based on written reports summarizing results of hands-on exercises, and on a presentation from the literature on an application of NMR to a biomolecular problem.

OSU has world-class facilities for biomolecular NMR (see <http://ccic.ohio-state.edu/nmr>); students will learn how these great resources can advance their research.

#### **Topics** (subject to change):

1. Introduction to NMR: spin  $\frac{1}{2}$  nuclei, sensitivity, magnetic field strength, vector model, FT NMR, coupling, chemical shift, proteins, nucleic acids, isotope labeling
2. Multi-dimensional NMR (2D, 3D)
3. NMR data processing (NMRPipe, NMRFX) and analysis (NMRView, SPARKY)
4. Resonance assignments
5. Structure calculation from NMR data (CYANA, CNS/XPLOR, HADDOCK)
6. Protein dynamics from NMR relaxation
7. Special topics

**Text:** Rule & Hitchens, Fundamentals of Protein NMR Spectroscopy, 2006, Springer

#### **Other texts:**

Cavanagh *et al.*, Protein NMR Spectroscopy 2<sup>nd</sup> Ed. 2007, Elsevier/Academic Press

Keeler, Understanding NMR, 2005, Wiley

Hore *et al.*, NMR: The Toolkit (2000) [Oxford University Press]

Levitt, Spin Dynamics (2008) [Wiley]

***Misconduct***

All work submitted for this class is expected to be your sole effort. No form of academic misconduct will be tolerated. Suspected cases will be referred to the Committee on Academic Misconduct per OSU procedures. Any falsification or improper alteration of grades, marks, answers or University forms will be dealt with severely. You will also be held to a high standard of treating your instructor and peers with the utmost respect.

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct <http://studentlife.osu.edu/csc/>.

***Accessibility***

Students with disabilities (including mental health, chronic or temporary medical conditions) that have been certified by the Office of Student Life Disability Services will be appropriately accommodated and should inform the instructor as soon as possible of their needs. The Office of Student Life Disability Services is located in 098 Baker Hall, 113 W. 12th Avenue; telephone 614- 292-3307, [slds@osu.edu](mailto:slds@osu.edu).