



MECHANISMS IN ORGANIC CHEMISTRY

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PRE-REQUISITES : Basic Organic Chemistry

INTENDED AUDIENCE : Students studying Chemistry

COURSE OUTLINE :

The course can be broadly classified as a Physical Organic Chemistry course. Understanding organic reaction mechanisms are extremely useful in predicting the products and improving the reaction efficiency. A student needs to know basic concepts in order to be able to write reasonable reaction mechanisms. A mechanism cannot be considered valid unless there is experimental evidence to support it. The student needs to know basic experiments that can be used to validate reaction mechanisms. Learning outcomes for the course: At the end of the course, the student should be able to • Propose/write a mechanism for a given organic reaction. • Design experiments to determine reaction intermediates/mechanisms.

ABOUT INSTRUCTOR:

Prof. Nandita Madhavan is an Associate Professor in the Department of Chemistry at Indian Institute of Technology Bombay(IITB). Post-doc, Georgia Institute of Technology, USA Assistant Professor, IIT Madras (2009), Associate Professor, IIT Madras (2015), Associate Professor, IIT Bombay (2016), Ph. D., Univ. of Illinois at Urbana-Champaign, USA, M. Sc., IIT Bombay, B. Sc., S. I. E. S. College, Mumbai

COURSE PLAN:

Week 1 :Broad classification of reactions and basics of arrow pushing

Week 2 :Reaction co-ordinate diagrams

Week 3 :Reaction Kinetics: rate laws and methods of determining concentration. Introduction to linear free energy relationships

Week 4 :Linear Free Energy Relationships

Week 5 :Kinetic and equilibrium isotope Effects

Week 6 :Miscellaneous methods to determine mechanisms: isotope labelling, trapping of intermediates, checking for common intermediate, competition and cross-over experiments.

Week 7 :Catalysis: classification and introduction to Bronstead acid catalysis

Week 8 :Types of Catalysis: Acid, Binding, Electrophilic, Nucleophilic, Covalent, Proximity and Phase-transfer