

# Organic Chemistry and Pericyclic Reactions - Web course

## COURSE OUTLINE

The course will involve a discussion of molecular organic photochemistry and pericyclic reactions.

Initially, we will study in brief the fundamental principles of photochemistry. In the following lectures we will discuss the primary photochemical reactions of  $n,\pi^*$  states. In the second half of our course we will be focusing on the primary photochemical reactions of  $\pi,\pi^*$  states where we will discuss in detail about the pericyclic reactions. We will end our course by studying some important applications of photochemistry.

## COURSE DETAIL

| Lecture No. | Topics  |
|-------------|---|
| 1           | Introduction to organic photochemistry  |
| 2           | Primary photochemical reactions of $n,\pi^*$ states                             |
| 3           | Photophysical process of $n,\pi^*$ states: Electronic energy transfer           |
| 4-5         | Detail analysis of primary photochemical process of $\alpha$ -cleavage          |
| 6-7         | Detail analysis of primary photochemical process of hydrogen abstraction        |
| 8-9         | Detail analysis of primary photochemical process of addition to $\pi$ system    |
| 10          | Detail analysis of primary photochemical process of electron transfer reactions |
| 11          | Primary photochemical reactions of $\pi,\pi^*$ states                           |
| 12          | Detail analysis of cis-trans isomerisations                                     |
| 13          | Study on di- $\pi$ -methane rearrangements                                      |
| 14          | Introduction to pericyclic reaction   |
| 15-16       | In depth analysis of Cycloaddition and Diels –Alder reactions                   |
| 17-18       | In depth analysis of Electrocyclic reactions                                    |
| 19-20       | Detail study of Sigmatropic reactions   |
| 21          | Chelotropic reactions   |
|             |   |



# NPTEL

<http://nptel.iitm.ac.in>

## Chemistry and Biochemistry

### Additional Reading:

1. M. Klessinger and J. Michl, *Excited States and photochemistry of Organic Molecules*, VCH, New York, 1995.
2. J. C. Calvert and J. N. Pitts, Jr., *Photochemistry*, Wiley, New York, 1966.

### Hyperlinks:

1. [www.unibas.ch/epa/glossary/glossary.htm](http://www.unibas.ch/epa/glossary/glossary.htm)
2. <http://www.chemres.hu/pchem>
3. <http://allen.rad.nd.edu/icabr/PhotoDocs/hpc.html>

### Coordinators:

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| 22    | Group transfer reactions                                 |
| 23    | Ene and retro ene reactions                              |
| 24    | Coarctate reactions                                      |
| 25-26 | Photochemical production and reactions of carbenes       |
| 27-28 | Photochemical production and reactions of nitrenes       |
| 29    | Photochemical reaction of azo compounds                  |
| 30-31 | Photochemical oxygenations-Singlet Oxygen                |
| 32    | Photochemistry of halogen containing compounds           |
| 33-34 | Photoinduced electron transfer reactions                 |
| 35    | Factors influencing the course of photochemical reaction |
| 36-40 | Applications of photochemistry                           |

**References:**

1. N. J. Turro, "*Modern Molecular Photochemistry*" (**MMP**), University Press, Menlo Park, CA, 1978
2. A. Gilbert and J. Baggott, "*Essentials of Molecular Photochemistry*," CRC Press, London, UK, 1991
3. J. Mattay and A. Griesbeck, eds., "*Photochemical Key Steps in Organic Synthesis*", VCH, New York, 1994
4. J. D. Coyle, ed., "*Photochemistry in Organic Synthesis*", Royal society of Chemistry, London, 1986