

**DEPARTMENT OF CHEMISTRY**

**NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI**

COURSE PLAN – PART I			
Name of the programme and specialization	M.Sc		
Course Title	Stereochemistry, Photochemistry, Pericyclic and Rearrangement reactions		
Course Code	CH 602	No. of Credits	3
Course Code of Pre-requisite subject(s)	NIL		
Session	January 2020	Section (if, applicable)	
Name of Faculty	Dr.S.Velmathi	Department	Chemistry
Email	velmathis@nitt.edu	Telephone No.	91-431-2503640
Name of Course Coordinator(s) (if, applicable)	Dr.S.Velmathi		
E-mail	velmathis@nitt.edu	Telephone No.	91-431-2503640
Course Type	<input checked="" type="checkbox"/> Core course	<input type="checkbox"/> Elective course	

**Syllabus (approved in BoS)**

Optical activity and chirality: absolute and relative configuration-R-S Notation system, Molecules with more than one asymmetric center. Enantiotopic and diastereotopic atoms, groups and faces. Stereo specific and stereo selective synthesis Optical isomerism of biphenyls, allenes and spiranes. Compounds containing chiral nitrogen and sulfur. Geometrical isomerism, E, Z-nomenclature of olefins, cumulenes and oximes.

Conformational analysis: Inter-conversion of Sawhorse, Newman and Fischer projections Conformational analysis of ethane and disubstituted ethane derivatives, cycloalkanes and substituted cyclohexane. Conformation and stereochemistry of cis and trans decalin and 9methyldecalin. Anomeric effect in cyclic compounds.

Fundamentals of Photochemistry: Qualitative introduction about different transitions, CisTrans isomerization, Paterno-Buchi reaction, Norrish type I and II reactions, photo reduction of ketones, photochemistry of arenes di-pi-methane and Hoffmann-Loeffler-Freytag rearrangements.

Pericyclic reactions: Classification, electrocyclic, sigmatropic, cycloaddition and ene reactions, Woodward-Hoffmann rules, and FMO theory, Claisen, Cope, Sommelet-Hauser, and Diels-Alder reactions in synthesis, stereochemical aspects.

Rearrangements: reactions involving electron deficient, carbon, nitrogen, oxygen centers, emphasis on synthetic utility of these rearrangements. Baker–Venkataraman, Benzilic acid, [1,2]-Meisenheimer, [2,3]-Meisenheimer, Wagner-Meerwein, Pinacol, Demyanov, DienonePhenol, Favorskii, Wolff, Hofmann, Curtius, Lossen, Schmidt, Beckmann, Benzidine rearrangements.

REFERENCE BOOKS 1. Photochemistry and Pericyclic Reactions by Jagdamba Singh, 3rd Edition, ISBN-13: 9781906574161 ISBN-10: 1906574162 , New Age Science publisher 2. Stereochemistry of Organic Compounds: Principles and Applications 4th Revised Edition By D. Nasipuri, Publisher: New Academic Science Ltd. 3. House, Modern Synthetic Reactions, 1973. 4. R.O.C. Norman and J. M. Coxon, Principles of organic synthesis, ELBS, 1994. 5. J. J. Li, Name Reactions, Springer, 3rd Edn, 2006. 6. B. P. Mundy, M. G. Ellerd, F. G., Jr. Favaloro Name Reactions and Reagents in Organic 7. Synthesis, Wiley-Interscience, 2005

### COURSE OBJECTIVES

To introduce the basic principles involved in Optical activity and chirality, Conformational analysis, Fundamentals of Photochemistry, Pericyclic reaction and Rearrangement reactions.

### COURSE OUTCOMES (CO)

Course Outcomes	Aligned Programme Outcomes (PO)
Students would become familiar with the:	
Students would become familiar with the: 1. Absolute and relative configuration Optical and Geometrical isomerism - to assign R-S and E-Z Notation 2. Conformational analysis, stereochemistry, Inter-conversion of Sawhorse, Newman and Fischer projections 3. Fundamentals of Photochemistry and Pericyclic reactions. Photophysical processes and Selection rules governing pericyclic reactions 4. Synthetic utility of various Rearrangement reactions involving electron deficient, carbon, nitrogen, oxygen centers	

Week/Contact Hours	Topic	Mode of Delivery
I week of Jan	<b>Unit-III</b> Fundamentals of Photochemistry Qualitative introduction about different transitions	Chalk and Talk
II week of Jan	Norrish type I and II reactions, photo reduction of ketones,	Chalk and Talk
III week of Jan	Paterno-Buchi reaction, Cis-Trans isomerization di-pi-methane rearrangement	Chalk and Talk
IV week of January	photochemistry of arenes and Hoffmann-Loeffler-Freytag rearrangement.	Chalk and Talk
I week of Feb	<b>Unit-IV</b> Pericyclic reactions: Classification, electrocyclic, Woodward-Hoffmann rules, and FMO theory,	Chalk and Talk

II week of Feb	Cycloaddition, sigmatropic, ene reactions	Chalk and Talk	
III week of Feb	Claisen, Cope, and Sommelet-Hauser, reactions and Diels-Alder reactions in synthesis, stereochemical aspects.	Chalk and Talk	
IV week of February	<b>Unit-V</b> Rearrangement reactions involving electron deficient, carbon, nitrogen, oxygen centers, emphasis on synthetic utility of these rearrangements. Hofmann, Curtius, Lossen, Schmidt,	Chalk and Talk	
I week of March	Baker-Venkataraman, [1,2]-Meisenheimer, [2,3]-Meisenheimer, Favorskii,	Chalk and Talk	
II week of March	Wagner-Meerwein, Wolff, Pinacol, Demjanov, Beckmann, Benzidine, Benzilic acid and DienonePhenol rearrangements.	Chalk and Talk	
III week of March	<b>Unit-II</b> Inter-conversion of Sawhorse, Newman and Fischer projections	Chalk and Talk & ppt	
IV week of March	Conformational analysis of ethane and disubstituted ethane derivatives Cycloalkanes and substituted cyclohexane	Chalk and Talk & ppt	
I week of April	Conformation and stereochemistry of cis and trans decalin and 9-methyldecalin. Anomeric effect in cyclic compounds	Chalk and Talk & ppt	
II week of April	<b>Unit-I</b> Absolute and relative configuration-R-S Notation system, Molecules with more than one symmetric center, Geometrical isomerism, E, Z- nomenclature of olefins,	Chalk and Talk & ppt	
III week of April	cumulenes and oximes, Enantiotopic and diastereotopic atoms, groups and faces Stereo specific and stereo selective synthesis	Chalk and Talk & ppt	
IV week of April	Optical isomerism of biphenyls, allenes and spiranes. Compounds containing chiral nitrogen and sulfur	Chalk and Talk & ppt	
<b>Mode of Assessment</b>	<b>Week/Date</b>	<b>Duration</b>	<b>% Weightage</b>
Test -I	4 <sup>th</sup> week of February	60 minutes	20
Assignment	1 <sup>st</sup> week of March	One week	5
Test -II	1 <sup>st</sup> week of April	60 minutes	20
Seminar	2 <sup>nd</sup> week of April	One week	5
Compensation Assessment*	3 <sup>rd</sup> week of April	60 minutes	20
Final Assessment	1 <sup>st</sup> week of May	3 hrs	50

**COURSE EXIT SURVEY (mention the ways in which the feedback about the course shall be assessed)**

1. Feedback from students during class committee meetings.
2. Anonymous feedback through questionnaire at the end of the semester.

**COURSE POLICY (preferred mode of correspondence with students, compensation assessment policy to be specified)**

**MODE OF CORRESPONDENCE (email/ phone etc)**

By email: velmathis@nitt.edu

**COMPENSATION ASSESSMENT POLICY**

1. This is for those students who were absent in Test I or Test II for some valid reasons.
2. Compensation assessment will be conducted during the III week of April 2020.

**ATTENDANCE POLICY (A uniform attendance policy as specified below shall be followed)**

- At least 75% attendance in each course is mandatory.
- A maximum of 10% shall be allowed under On Duty (OD) category.
- Students with less than 65% of attendance shall be prevented from writing the final assessment and shall be awarded 'V' grade.

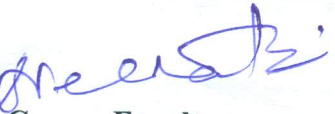
**ACADEMIC DISHONESTY & PLAGIARISM**


- Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.
- Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.
- The departmental disciplinary committee including the course faculty member, PAC chairperson and the HoD, as members shall verify the facts of the malpractice and award the punishment if the student is found guilty. The report shall be submitted to the Academic office.


The above policy against academic dishonesty shall be applicable for all the programmes.

**ADDITIONAL INFORMATION**

**FOR APPROVAL**

  
Course Faculty \_\_\_\_\_

  
CC-Chairperson \_\_\_\_\_

  
HOD \_\_\_\_\_ 28/1/2020