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<tr><td>Course Code</td><td colspan="3">CHE304M3</td></tr>
<tr><td>Course Title</td><td colspan="3">Advanced Organic Chemistry II</td></tr>
<tr><td>Credit Value</td><td colspan="3">3</td></tr>
<tr><td rowspan="2">Hourly Breakdown</td><td>Theory</td><td>Practical</td><td>Independent Learning</td></tr>
<tr><td>45</td><td>-</td><td>105</td></tr>
<tr><td>Objective/s</td><td colspan="3">• Explain the quantitative structure-reactivity relationships in organic chemistry
• Identify the methods that are used to prepare enantiomerically pure products from achiral starting materials.
• Provide detailed account in conformational analysis and its applications to advanced phenomena and problems in organic synthesis.
• Develop effective strategies for using chiral auxiliaries, reagents and catalysts to control stereo chemical relationships.</td></tr>
<tr><td>Intended Learning Outcomes</td><td colspan="3">• Elucidate intramolecular interactions quantitatively
• Determine the influence of substituents and positions of substitution on rates of equilibrium of organic reactions
• Diagnose reaction mechanisms using Hammett and related equations
• Recognize the importance of conformational analysis in organic synthesis
• Apply stereo chemical concepts in relation to chemical transformations.</td></tr>
<tr><td>Course Content</td><td colspan="3">Hammett Equation
• Hammett equation: σ-ρ relationship, limitations and deviations
• Modified substituent constants: σ^o, σ^- and σ^+ scales
• Diagnosis of reaction mechanisms
• Yukawa-Tsuno equation and its application
• Taft equation and its application
• Effect of solvents: Y and E_T parameters
Stereo chemistry & Conformational analysis
• Effect of conformation on reactivity and stability of compounds, Curtin-Hammett principle
• Conformations of chiral aldehydes (Crams model, Felkin-Anh model, chelation-control and non-chelation control, Cieplak model), Baldwin’s rule.</td></tr>
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<tr><td></td><td colspan="2">Conformations of monocyclic, bicyclic (decalin) and polycyclic (perhydrophenanthrene and perhydroanthracene) compounds
Effect of conformation on rearrangement reactions (Neighbouring Group Participation, classical and non-classical ions, etc.), stereoisomerism, stereo specific and stereo selective reactions,
Asymmetric syntheses: Using chiral auxiliaries, chiral reagents and chiral catalysts (Sharpless asymmetric epoxidation, asymmetric hydroxylation, asymmetric hydrogenation etc.)
Geometrical isomerism, optical isomerism in achiral compounds (spiro compounds, biphenyls, etc.), correlation of configuration and specification of configuration.
Optical rotatory dispersion, circular dichroism, Cotton effect, axial haloketone rule, octant rule.</td></tr>
<tr><td>Teaching and Learning Methods / Activities</td><td colspan="2">Lectures, tutorial discussions, small group assignment and home-work assignments</td></tr>
<tr><td rowspan="2">Evaluation/Assessment Strategy</td><td>In-course Assessment</td><td>End-of-course Examination</td></tr>
<tr><td>30 %</td><td>70 %</td></tr>
<tr><td>Recommended References</td><td colspan="2">Eric V. Anslyn and Dennis A. Dougherty; Modern Physical Organic Chemistry. Illustrated Edition. University Science, 2005
Michael B. Sponsler; Student Solutions Manual to accompany Modern Physical Organic Chemistry. Solution Manual Edition. University Science Books, 2005
Johnson, C. D.,; The Hammett Equation. 1st Edition. Cambridge University Press, 1973
March. J., Advanced Organic Chemistry, 4th Edition, John Wiley, 2004
Eliel, L. E., Stereochemistry of organic compounds, John Wiley, 2004
P.S. Kalsi, P. S., Stereochemisry, conformation and mechanism, 6th edition, New Age International, 2007
Clayden. J., Organic chemistry, 2nd edition, Oxford University Press, 2001</td></tr>
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