The Hebrew University of Jerusalem

Syllabus

Organic Chemistry Bio-Medical Sciences. - 69118

Last update 28-10-2024

HU Credits: 5

Degree/Cycle: 1st degree (Bachelor)

Responsible Department: Chemistry

Academic year: 0

Semester: 1st Semester

Teaching Languages: Hebrew

Campus: E. Safra

Course/Module Coordinator: Prof. Ahmad Masarwa

Coordinator Email: Ahmad.Masarwa1@mail.huji.ac.il

Coordinator Office Hours: Upon demand

Teaching Staff:

Prof. Ahmad Masarwa,
Mr. Sagi Ezov,
Mr. Yuval Rahav

Course/Module description:
Introduction to organic chemistry, compounds, reactions and mechanisms.

Course/Module aims:
To learn the fundamentals of organic chemistry

Learning outcomes - On successful completion of this module, students should be able to:
• Analyze and apply stereochemistry, isomerism and conformational considerations.
• Describe and evaluate the structure and reactivity of alkanes, alkenes, alkyl halides, alcohols, aromatic compounds, carbonyl compounds and carboxylic acid derivatives
• Assess reaction mechanisms
• Apply the concept of electrophile-nucleophile relationship in organic reactions
• Apply addition, elimination and substitution (electrophilic and nucleophilic) reactions to various organic molecules
• Demonstrate the practical skills required for organic synthesis.

Attendance requirements(%):
0%

Teaching arrangement and method of instruction: Lecture and Exercise

Course/Module Content:
• Electronic structure and bonding acids and bases (mandatory reading from the course book, overview).
• An introduction to organic compounds; nomenclature, properties, structures: Alkanes, isomers, nomenclature of alkyl substituents, cycloalkanes, alkyl halids, ethers, alcohols, amines, conformations.
• Alkenes; structure, nomenclature, reactivity: Electrophilic addition to alkenes, carbocation stability, delocalization of electrons, Markovnikov's Rule, carbocation rearrangements, anti Markovnikov addition, radical addition.
• Stereochemistry: Isomers, cis-trans, enantiomers, diastereomers, meso compounds, stereochemistry of electrophilic addition reactions to alkenes.

• *Alkynes: Nomenclature, structure, properties, addition reactions of alkynes, acidity of a hydrogen bonded to an sp hybridized carbon.*
• *Delocalization and resonance, Dienes: Benzene, stability contributed by resonance, nomenclature, structure, isomers and reactions of dienes.*
• *Reactions of alkanes.*
• *Substitutions and eliminations; alkyl halides, alcohols, ethers, epoxides, Griniard reactions.*
• *Aromaticity: Definition, stability of aromatic compounds, reactions of aromatic compounds.*
• *Carbonyl compounds: Definition, structure, properties, reaction of carbonyl compounds.*
• *Oxidation-reduction- minor.*
• *Bioorganic compounds; carbohydrates, proteins, lipids, nucleic acids- introduction.*

Required Reading:

Electronic structure and bonding acids and bases; according to chapters of 4th edition:
1: Mandatory self reading (Background of Basic Chemistry; not part of this course)
2: An introduction to organic compounds; nomenclature, properties, structures (60-94)
3-4: Alkenes; structure, nomenclature, reactivity (3: 111-126, 135-138; recommended: 126-135; 4: 141-145, 147-181)
5: Stereochemistry (182-237)
6: Alkynes (238-246, 249, 250-254, 254-262)
7: Delocalization and resonance (263-275, 278-286)
8: Dienes (298-308, 313-314, 315-317)
9: Reactions of alkanes (338-340, 346-349)
10-12: Substitutions and eliminations; alkyl halides, alcohols, ethers, epoxides, Griniard reactions (10: 360-390; 11: 400-417, 422-436; 12: 437-457, 466-470)
15: Aromaticity (594-610, 612-616)
16: Reactions of aromatic compounds (622-646, 653-656)
17-19: Carbonyl compounds (17: 670-675, 676-677, 681-682, 683-695, 695-697, 702-706, 710-713; 18: 731-740, 743-750, 753, 755-757, 761-766, 769; 19: 788-796, 799-800, 804-816, 818-825)
20: Oxidation-reduction (841-843, 845, 846, 848, 850, 853, 855, 858, 859, 861)
22,23,26,27
Bioorganic compounds; carbohydrates, proteins, lipids, nucleic acids (22: 921-926, 934-937, 943-949; 23: 959-964, 973-976, 989-993; 26: 1075-1079, 1082-1083, 1097-1098; 27: 1106-1110, 1118-1122, 1128)

Additional Reading Material:

Grading Scheme:
Written / Oral / Practical Exam 100 %

Additional information: