DIPARTIMENTO DI SCIENZE

COURSE: ORGANIC CHEMISTRY – Mod. B			
ACADEMIC YEAR: **2019-2020**			
TYPE OF EDUCATIONAL ACTIVITY: **Basic**			
TEACHER: **Prof. Brigida Bochicchio**			
e-mail: **brigida.bochicchio@unibas.it**		website: *http://docenti.unibas.it/site/home/docente.html?m=003216*	
phone: **: 0971 205481**		mobile (optional):	
Language: **ITALIAN**			
ECTS: **6** (lessons and tutorials/practice)	n. of hours: **48** (lessons and tutorials/practice)	Campus: **Potenza** Dept./School: **Department of Sciences** Program: **Pharmacy (LM-13)**	Semester: **I** (02 october 2019 to 20 december 2019-20 january 2020)

EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES

- The aim of the course is to complete the knowledge of Organic Chemistry/ A Part through the study of main reaction mechanisms. Main classes of natural macromolecules are topics of the course as well. The final goal is to give to the student the basic knowledge of organic chemistry necessary for subsequent study of biochemistry and pharmaceutical chemistry.

After having completed the course, the student should:

1) Demonstrate knowledge of fundamental contents in the basic areas of organic chemistry;

2) Understand the relationship between structure and function of molecules, the major classes of reactions, reaction energetics and mechanisms;

3) Integrate knowledge with critical thinking to solve synthetic problems;

4) Articulate scientific information through oral communication.

PRE-REQUIREMENTS

In order to understand Organic Chemistry, the student should have good knowledge of the basic principles of General Chemistry and Physics.

SYLLABUS

1. Phenols: Acidity; physical properties; preparation from Cumene hydroperoxide, alkaline fusion; reactions of pharmaceutical interest: Kolbe reaction and Reimer-Tiemann; Quinones (**3h**).

2. Carbonyl Functional group: structure and reactivity; naming, physical properties, preparation: oxidation of alcohol and methyl-benzene, formylation, reduction of acyl chloride. Oxidation and reduction reactions; Cannizzaro reaction; nucleophilic addition reactions to aldehydes and ketones, nucleophilic addition of: water; alcohol (hemiacetal and acetal, acetal as protecting group); ammonia and derivatives: amines I, II (formation of imines, enamine, oxime, hydrazon, semicarbazone,), hydrogen cyanide, bisulfite, organometallic compounds (reactivity and selectivity). Oxime geometry. Wolff-Kishner reaction, the Wittig Reaction. Keto, enol tautomerism, acidity of alpha hydrogens, alpha-halogenation of aldehydes and ketones. The Aldol reaction; aldol condensation, haloform reaction (**14h**).

3. Carboxylic Acids. Naming, structure and properties, acidity, preparation, reactions. Carboxylic Acid Derivatives. Nucleophilic acyl substitution reactions; chemistry of acyl halides, anhydrides, esters, amides. Hydrolysis of ester compounds: acidic and basic hydrolysis; trans-esterification, lactones. Alpha hydroxyl acids***.*** Carbonyl Alpha-Substitution Reactions: mechanism of alpha-substitution reactions; alpha-halogenation, alpha bromination of carboxylic acids, dicarboxilic acids (**7h**).

4. Acidity of alpha-hydrogens in carbonilic compounds; Carbonyl condensation reactions: acetoacetic synthesis and Claisen condensation. Malonic Synthesis: synthesis of alpha-substituted acetic acids; alpha-beta unsaturated carbonyl compounds: structure and reactivity; nucleophilic and electrophilic addition. (**5h**).

5. Amines. Physical and chemical properties. Preparation: reduction of nitro compounds; ammonolysis of alkyl halide ; reductive amination; Gabriel synthesis, Hofmann degradation of amines. Reactions with nitrous acid. Diazonium salts: structure, stability. Coupling reaction and azocompounds (dyes) (**7h**).

6. Aminoacids, Peptides, Proteins. Structure. Acidity and basicity of aminoacids. Isoelectric point; Stereoisomery;

Preparation. Peptidic bond: structure. Peptide synthesis. (**7h**)

7. Carbohydrates, Lipids, Nucleic Acids. Carbohydrates. Classification. Monosaccharides. Structure. Stereochemistry. Relative Configuration (D, L). Hemiacetal structure of D-glucose; anomers; mutarotation. Epimers. Monosaccharides Chemistry. Disaccharides. Polysaccharides: starch, glycogen, cellulose. Nucleic Acids. (**7h**).

TEACHING METHODS

Frontal lessons

EVALUATION METHODS

The aim of the final examination is to evaluate the level of achievement of the educational goals.

The final exam consists of a written and oral test concerning the contents of Mod A and B.

Both tests must be successful for the exam to be recorded.

The written exam consists of five questions to be completed in 1 hour generally on acidity/basicity/nucleophilicity/relative reactivities; functional groups reactivity; carbonil condensation reactions; reaction mechanisms; structure and properties of aminoacids, peptides, carbohydrates, nucleic acids.

Oral exam: it can only be taken if the written test has been successful (minimum mark: 18/30)

TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL

- Solomons – Fryhle. Organic Chemistry IX Edition, Wiley
- Solomons – Fryhle – Johnson. La chimica organica attraverso gli esercizi II edizione italiana, Zanichelli
- McMurry-Organic Chemistry: A Biological Approach.

Copyright 2007 Brooks/Cole, a Thomson Learning Company

- Course slides will be available from a shared Dropbox folder, whose link will be furnished to the students attending the classroom

INTERACTION WITH STUDENTS

At the beginning of the course, the teacher will describe to the students the educational goals, the syllabus and the examination methods. Students are expected to provide their own institutional e-mail address. All course information will be sent exclusively to the institutional email addresses previously provided.

The Teacher meets the students on Wednesday and Thursday from 15:00 to 16:00 pm. After booking an appointment by e-mail, students will receive an answer fixing the date and hour.

EXAMINATION SESSIONS (FORECAST)[1]

10/02/2020; 2/03/2020; 8/06/2020; 6/07/2020; 7/09/2020; 5/10/2020; 7/12/2020

SEMINARS BY EXTERNAL EXPERTS YES □ NOx

FURTHER INFORMATION

[1]Subject to possible changes: check the web site of the Teacher or the Department/School for updates.