

**DEREE COLLEGE SYLLABUS FOR: CH 3325 ORGANIC AND BIOLOGICAL CHEMISTRY**

**UK LEVEL: 5**  
**UK CREDITS: 15**  
**US CREDITS:3/0/3**

(Fall 2019)

**PREREQUISITES:**

CH 1002 Principles of Chemistry  
 CH 2115 General Chemistry  
 CH 3220 Organic Chemistry

**CATALOG DESCRIPTION:**

Organic chemistry with focus on the chemistry of life, examining proteins, carbohydrates lipids, nucleic acids, the relationship between structure and function, as well as metabolism and gene expression.

**RATIONALE:**

Organic and Biological Chemistry is a course designed to provide a biochemistry background to biomedical sciences majors and to other interested students. Having a good knowledge and understanding of the structure and function of all biomolecules (proteins, carbohydrates, lipids, nucleic acids) and of the of chemistry of life processes such as metabolism and gene expression sets the foundations for further studies and careers in any branch of the life sciences and medicine. The course emphasizes biomedical and clinical applications of organic chemistry.

**LEARNING OUTCOMES:**

- As a result of taking this course, the student should be able to:
1. Demonstrate knowledge and understanding of the structure and function of biomolecules.
  2. Apply fundamental principles of chemistry towards the understanding of chemical phenomena in biological systems.
  3. Relate organic and biological chemistry principles to health, disease and modern medicine issues.
  4. Develop chemical reasoning skills that enable scientific problem-solving and prepare students for research.
  5. Analyze and critically evaluate data and information from scientific research articles and communicate them in writing and orally.

**METHOD OFTEACHING AND LEARNING:**

- In congruence with the learning and teaching strategy of the college, the following tools are used:
- Class lectures, interactive learning (class discussions, group work), video presentations, and practical problems solved in class.
  - Coursework portfolio, including take-home essays and problem solving.
  - Exercises and primary source documents are assigned as homework and are discussed and reviewed in class
  - Use of textbook companion site, CD-ROMs, Blackboard online interactive tools and online resources.
  - Office hours: students are encouraged to make full use of the office hours of their instructor, where they can ask questions, see their exam paper, and/or go over lecture/lab material.
  - Use of a blackboard site, where instructors post lecture notes, assignment instructions, timely announcements, as well as additional resources.

**ASSESSMENT:**

<b>Summative:</b>	
<b>First assessment:</b>	<b>40%</b>
a) short in-class midterm exam (20%)	
b) in-class student presentation of a specific topic, followed by a written	

	<table border="1"> <tr> <td>summary <b>or</b> structured reflection on a scientific article or report (20%)</td> <td></td> </tr> <tr> <td><b>Second Assessment:</b> Final examination (2 hours) (essay questions)</td> <td><b>50%</b></td> </tr> <tr> <td><b>Third Assessment</b> Portfolio: Essays and exercises aiming to prepare students for their first and second assessments in terms of content, context and time management</td> <td><b>10%</b></td> </tr> </table> <p><b>Formative:</b></p> <table border="1"> <tr> <td>In-class or online quizzes</td> <td><b>0</b></td> </tr> </table> <p>The formative tests aim to prepare students for the examinations. The coursework portfolio examines Learning Outcomes 1, 2, 3, 4 and 5. The final examination tests Learning Outcomes 1, 2 and 3.</p>	summary <b>or</b> structured reflection on a scientific article or report (20%)		<b>Second Assessment:</b> Final examination (2 hours) (essay questions)	<b>50%</b>	<b>Third Assessment</b> Portfolio: Essays and exercises aiming to prepare students for their first and second assessments in terms of content, context and time management	<b>10%</b>	In-class or online quizzes	<b>0</b>
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In-class or online quizzes	<b>0</b>								
<b>INDICATIVE READING:</b>	<p><b>Required Reading:</b></p> <ul style="list-style-type: none"> <li>McKee, T., and J. R. McKee. 2017. <i>Biochemistry: The Molecular Basis of Life</i>. Oxford: Oxford University Press. Print.</li> </ul> <p><b>Recommended Readings:</b></p> <ul style="list-style-type: none"> <li>Ahem, K., Rajagopal, I. and K. Kan. 2015. <i>Biochemistry Free for All</i>, Version 1.3. Ebook. Oregon State University</li> <li>Nessar A. (Editor). 2016. <i>Clinical Biochemistry: Fundamentals of Biomedical Science</i>. Oxford University Press.</li> </ul>								
<b>INDICATIVE MATERIAL:</b> (e.g. audiovisual, digital material, etc.)	<p><b>REQUIRED MATERIAL:</b> N/A</p> <p><b>RECOMMENDED MATERIAL:</b> N/A</p>								
<b>COMMUNICATION REQUIREMENTS:</b>	Verbal skills using academic/professional English								
<b>SOFTWARE REQUIREMENTS:</b>	Word, PowerPoint, Excel								
<b>WWW RESOURCES:</b>	<ul style="list-style-type: none"> <li>Scientific American: <a href="http://www.sciam.com">www.sciam.com</a></li> <li>American Chemical Society: <a href="http://www.acs.org/content/acs/en.html">http://www.acs.org/content/acs/en.html</a></li> <li>ChemWeb: <a href="http://www.chemweb.com/">http://www.chemweb.com/</a></li> <li>International Union of Pure and Applied Chemistry: <a href="http://www.iupac.org/">http://www.iupac.org/</a></li> </ul>								

**INDICATIVE CONTENT:**

- Energy
  - Bioenergetics and thermodynamics
  - Energy transfer processes
  - Redox reactions and electron transfer
- Amino Acids and Peptides
  - Amino Acids: Structure and Properties
  - Peptide bond, Peptides
- Proteins
  - Structure
  - Non-Enzymatic Protein Function
  - Enzyme Function
  - Enzyme Kinetics
- Carbohydrates
  - Monosaccharides
  - Disaccharides
  - Polysaccharides
- Lipids
  - Fatty Acids and Triglycerides
  - Membrane Lipids: Structure and Processes
- Metabolic Pathways
  - Carbohydrate Metabolism
  - Citric Acid Cycle and Electron Transport Chain
  - Fatty Acid and Protein Metabolism
  - Regulation of Metabolic Pathways
  - Metabolic Disorders
- Nucleic Acids
  - Structure
  - Replication of DNA
  - Protein Biosynthesis
  - Regulation of Gene Expression
  - DNA Technology
- Clinical Biochemistry
  - Principles and Applications of Clinical Biochemistry
  - Clinical Enzymology and Biomarkers
  - Metabolism: Abnormalities and Detection
  - Endocrine System: Disorders and Detection
  - Specific Protein Markers
  - Tumor Markers