

<b>DEREE COLLEGE SYLLABUS FOR: BI 3235 CELL AND MOLECULAR BIOLOGY</b>													
(Fall 2019 )	<b>UK LEVEL: 5</b> <b>UK CREDITS: 20</b> <b>US CREDITS: 3/2/4</b>												
<b>PREREQUISITES:</b>	BI 1000 Introduction to Biology I BI 1101 Introduction to Biology II												
<b>CATALOG DESCRIPTION:</b>	An integrated exploration of the fundamentals of cell and molecular biology as a science, the nature of life, biological chemistry, cell biology, metabolism and genetics												
<b>RATIONALE:</b>	This course will expose students to key themes and experimental techniques in molecular biology, genetics and eukaryotic cell biology illustrated by examples from a wide range of microbial and mammalian systems. It will cover basic cell structure, and organisation of cells into specialized cell types and complex multi-cellular organisms. The principles of cell cycle and cell division will be outlined. The control of all living processes by genetic mechanisms will be introduced and an opportunity to handle and manipulate genetic material provided in the laboratory. Monitoring of students' knowledge and progress will be provided by a multi-choice test and the laboratory report, with feedback.												
<b>LEARNING OUTCOMES:</b>	As a result of taking this course, the student should be able to:  1. Demonstrate understanding of cell structure, cell membrane functions, organisation and division and cellular control by genetic material. 2. Demonstrate understanding of the molecular organization of the genetic material, its expression and control of expression and in connection to health and disease. 3. Demonstrate practical competence, in research methods and in problem solving in cell and molecular biology 4. Develop and demonstrate skills for interpreting and retrieving information 5. Develop and demonstrate laboratory practical skills and laboratory teamwork in several methods of cell and molecular biology such as cell culture, bacterial manipulation and polymerase chain reaction.												
<b>METHOD OF TEACHING AND LEARNING:</b>	In congruence with the teaching and learning strategy of the college, the following tools are used: <ul style="list-style-type: none"> <li>➤ Class lectures, interactive learning (class discussions, group work) video presentations, and practical problems solved in class.</li> <li>➤ Exercises and primary source documents are assigned as homework, the solutions of which are reviewed in class</li> <li>➤ Laboratory work (laboratory reports).</li> <li>➤ 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.</li> <li>➤ Use of a blackboard site, where instructors post lecture notes, assignment instructions, timely announcements, as well as additional resources.</li> </ul>												
<b>ASSESSMENT:</b>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2"><b>Summative:</b></th> </tr> </thead> <tbody> <tr> <td style="width: 70%;"><b>First assessment</b> In-class midterm examination (1-hour) (Multiple choice, short answers, matching, essay questions, combination, problem solving)</td> <td style="text-align: center;"><b>30%</b></td> </tr> <tr> <td><b>Second assessment</b> In-class final examination (2-hour, comprehensive), (Essay questions, short answers, problem solving)</td> <td style="text-align: center;"><b>45%</b></td> </tr> <tr> <td><b>Third assessment</b> Lab report, 1500-2000 words</td> <td style="text-align: center;"><b>25%</b></td> </tr> <tr> <th colspan="2"><b>Formative:</b></th> </tr> <tr> <td>Multiple "diagnostic on-line" tests</td> <td style="text-align: center;">0</td> </tr> </tbody> </table>	<b>Summative:</b>		<b>First assessment</b> In-class midterm examination (1-hour) (Multiple choice, short answers, matching, essay questions, combination, problem solving)	<b>30%</b>	<b>Second assessment</b> In-class final examination (2-hour, comprehensive), (Essay questions, short answers, problem solving)	<b>45%</b>	<b>Third assessment</b> Lab report, 1500-2000 words	<b>25%</b>	<b>Formative:</b>		Multiple "diagnostic on-line" tests	0
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<b>INDICATIVE READING:</b>	<p><b>REQUIRED READING:</b> Alberts B, Essential cell biology, 4th Edition, Garland Science Pub., 2014 Templeman Library Classmark QH 581.2</p> <p>Alberts, Molecular Biology of the cell, 6<sup>th</sup> Edition, Garland Science Pub., 2015, Taylor and Francis Group, LLC</p>				
<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>	N/A				
<b>SOFTWARE REQUIREMENTS:</b>	Microsoft Word, Microsoft PowerPoint, Blackboard CMS				
<b>WWW RESOURCES:</b>	<p>Cell Biology: <a href="https://geneed.nlm.nih.gov/specialty.php?spageID=2#topic2">https://geneed.nlm.nih.gov/specialty.php?spageID=2#topic2</a> DNA, Genes, Chromosomes: <a href="https://geneed.nlm.nih.gov/specialty.php?spageID=2#topic16">https://geneed.nlm.nih.gov/specialty.php?spageID=2#topic16</a> <a href="http://www.dnalc.org/">http://www.dnalc.org/</a> <a href="http://www.sciam.com">www.sciam.com</a> <a href="http://www.cellsalive.com/">http://www.cellsalive.com/</a> <a href="http://www.dnafb.org/dnafb/">http://www.dnafb.org/dnafb/</a> <a href="http://www.usd.edu/biol/labs/151/devel51.htm">http://www.usd.edu/biol/labs/151/devel51.htm</a> <a href="http://www.learner.org/courses/biology/archive/animations.html">http://www.learner.org/courses/biology/archive/animations.html</a> <a href="https://genographic.nationalgeographic.com/genographic/lan/en/atlas.html">https://genographic.nationalgeographic.com/genographic/lan/en/atlas.html</a> <a href="http://www.mcb.harvard.edu/BioLinks.html">http://www.mcb.harvard.edu/BioLinks.html</a> <a href="http://www.ornl.gov/sci/techresources/Human_Genome/project/about.shtml">http://www.ornl.gov/sci/techresources/Human_Genome/project/about.shtml</a> <a href="http://www.nature.com/index.html">http://www.nature.com/index.html</a></p>				
<b>INDICATIVE CONTENT (LEC):</b>	<p>Cell biology:</p> <ol style="list-style-type: none"> <li>1. Introduction to cell organisation, variety and cell membranes.</li> <li>2. Molecular traffic in cells.</li> <li>3. Organelles involved in energy and metabolism.</li> <li>4. Eukaryotic cell cycle and its control.</li> <li>5. Chromosome structure &amp; cell division.</li> <li>6. Techniques in cell biology</li> </ol> <p>Molecular biology:</p> <ol style="list-style-type: none"> <li>1. The structure and function of genetic material.</li> <li>2. Chromosomes, chromatin structure, mutations.</li> <li>3. DNA replication, DNA repair and recombination.</li> <li>4. Basic mechanisms of transcription, mRNA processing and translation.</li> <li>5. Control of gene expression</li> <li>6. Techniques in molecular biology</li> </ol>				
<b>INDICATIVE CONTENT (LAB):</b>	<ol style="list-style-type: none"> <li>1. Laboratory Safety Guidelines &amp; Regulations</li> <li>2. Genomic DNA extraction and purification</li> <li>3. DNA amplification design in silico and PCR</li> </ol>				

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	<ol style="list-style-type: none"><li>4. PCR analysis on agarose gel electrophoresis</li><li>5. Bacterial culture techniques, plasmid transformation and plasmid digestion</li><li>6. Plasmid DNA isolation, agarose gel electrophoresis and restriction enzyme digestion</li><li>7. Restriction enzyme digestion analysis and introduction in aseptic techniques in cell culture</li><li>8. Microscope use, cell line thawing and expansion</li><li>9. Cell line freezing and cryopreservation techniques</li><li>10. Genome editing technologies and transgenics in silico.</li></ol>
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