Alexander College
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CURRICULUM GUIDE: OFFICIAL COURSE OUTLINE

<table>
<tr><td>Course Code</td><td>BIOL 222</td><td>Course Title</td><td colspan="4">Introduction to Biochemistry</td></tr>
<tr><td>Credit Value</td><td>3</td><td>Department</td><td colspan="4">Mathematics and Science</td></tr>
<tr><td rowspan="2">No. of weeks</td><td rowspan="2">14</td><td rowspan="2">Hrs. per week</td><td>Lecture</td><td>Tutorial</td><td>Laboratory</td><td>Total</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td></tr>
<tr><td>Course Description</td><td colspan="6">Students will learn the patterns and reactions of cellular metabolism with particular attention to the structure and function of proteins, the mechanisms of reactions, and the interrelationships and control of catabolism and anabolism.</td></tr>
<tr><td>Prerequisite(s)</td><td colspan="6">ENGL 100, BIOL 101 & BIOL 102 or BIOL 101 (B or higher), CHEM 102</td></tr>
<tr><td rowspan="3">Initial Articulation Targets</td><td>UBC</td><td>SFU</td><td>UVic</td><td>UNBC</td><td colspan="2">TRU</td></tr>
<tr><td>BIOL 201 (3)</td><td>MBB 222 (4)</td><td>BIOC 299 (1.5)</td><td>CHEM 204 (3)</td><td colspan="2">BIOL 3131 (3)</td></tr>
<tr><td colspan="6">For updated information on the transferability of this course, please consult the BC Transfer Guide, www.bctransferguide.ca</td></tr>
<tr><td>Learning Outcomes</td><td colspan="6">Upon successful completion of this course, the student will be able to:
Demonstrate an understanding of the chemistry underlying the following biological processes:
pH-dependent behavior of molecules and their functional relevance under biological conditions
Protein folding, function and kinetics
The biochemistry behind Energy Transformations
Metabolism
Demonstrate an understanding of protein structure and its importance in protein function.
Solve problems related to biochemistry by Integrating and applying knowledge of chemistry and biology.
Describe and interpret experimental data based on conceptual knowledge of chemistry and biology.
Articulate the interdisciplinary nature of biochemistry within the context of the ‘bigger picture’ of everyday life.</td></tr>
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Alexander College
Main Campus 4805 Kingsway, Burnaby, BC V5H 4T6
www.alexandercollege.ca

Content	**Core** topics – all of the following will be covered:
	• Review of water chemistry acid-base chemistry, chemical bonding Biomolecules:
	  ○ Amino acid classification, structure, chemical characteristics, acid base behaviour
	  ○ Protein structure, to include primary, secondary, tertiary, quaternary, role of chaperones in protein folding, post translational modification, methods of protein separation, purification and sequencing, examples of proteins: collagen, myoglobin, haemoglobin
	  ○ Enzyme classification
	  ○ Enzyme regulation
	  ○ Enzyme kinetics: Michaelis-Menten and Lineweaver-Burk
	  ○ Enzyme inhibitors
	  ○ Catalytic properties of enzymes, role of coenzymes, mechanism of serine proteases
	  ○ Structural nomenclature, chemical properties and biochemical functions of lipids and carbohydrates
	• Metabolism: (prokaryotic and eukaryotic examples)
	  ○ Thermodynamics, bioenergetics, role of adenosine triphosphate (ATP) and phosphoryl transfer in metabolism
	  ○ Glycolysis and gluconeogenesis: role in energy production, biochemical pathways, compartmentalization and regulation
	  ○ Citric acid cycle, oxidative phosphorylation and the electron transport chain: role in energy
	  ○ Production, biochemical pathways, compartmentalization and regulation
	  ○ Oxidative phosphorylation and the electron transport chain glycogen synthesis, degradation and
	  ○ Regulation gluconeogenesis reactions and regulation
	  ○ Comparing glycolysis and gluconeogenesis reactions, thermodynamics and stoichiometry
	  ○ Human disease associated with glucose regulation
	
	Additional topics may also be covered, at the discretion of the instructor.

Methods of Instruction	Lectures, demonstrations, small group discussions and activities, case study analysis, concept mapping, internet research, and laboratory sessions.
Required Textbook(s)	The following textbook(s) is/are required, or approved equivalent(s). Nelson, D., & Cox. M. (2021). Lehninger Principles of Biochemistry (8th ed.). W.H. Freeman & Company.

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<tr><td>Required Equipment and Technology</td><td colspan="3">Students are required to have a computer with internet access.
The following resources are provided by the College:
• Office 365
• Student email</td></tr>
<tr><td>Homework Hours</td><td colspan="3">At minimum, students can expect one hour of homework for every hour of instructional time.</td></tr>
<tr><td rowspan="6">Evaluation</td><td>Component</td><td colspan="2">% Value</td></tr>
<tr><td>Quizzes and assignments</td><td colspan="2">10-20%</td></tr>
<tr><td>Group work</td><td colspan="2">10-20%</td></tr>
<tr><td>Peer-reviewed journal presentation</td><td colspan="2">10-20%</td></tr>
<tr><td>Midterm examination</td><td colspan="2">20-30%</td></tr>
<tr><td>Comprehensive final examination</td><td colspan="2">25-35%</td></tr>
<tr><td>Completion Requirements</td><td colspan="3">The minimum grade to pass this course is D (50%). Unless otherwise stated, a minimum grade of C- (55%) is required for this course to fulfil a prerequisite.</td></tr>
<tr><td>Course Designer(s)</td><td>Mitra Panahi, Ph.D.
Biology Instructor, Alexander College</td><td>Consultant(s), if applicable</td><td>Carol Pollock, Ph.D., Professor Emerita, University of British Columbia</td></tr>
<tr><td>Dean’s Approval</td><td>Steven Roe, Ph.D., Dean of Arts and Sciences, Alexander College</td><td>Dean’s Approval Date</td><td>January 17, 2023</td></tr>
<tr><td>Curriculum Committee Approval Date</td><td>January 17, 2023</td><td>First Term Offered</td><td></td></tr>
<tr><td>Last Review Date</td><td>January 17, 2023</td><td>Next Review Date</td><td>January 17, 2028</td></tr>
<tr><td>Revision History</td><td colspan="3">January 2, 2025 – English prerequisite increased to ENGL 100, effective Winter 2025</td></tr>
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