B.Sc. in Biochemical Engineering

This program was officially accredited by the Council for Higher Education ("MALAG") in the summer of 2001, after two years of detailed planning. The course curriculum, presented in Tables 3 and 4, reflects a cooperative effort between the departments of Chemical Engineering and Biology. Students in this special program acquire almost all core courses program in chemical engineering, as well as strong background in biochemistry, molecular- and cell-biology. The program prepares chemical engineers to play leading roles in Israel's emerging biochemical industries, as well as preparing them for graduate studies in chemical engineering and biology. It is a demanding but popular program, with students required to take 165 credits as compared to 156 credits in the regular Chemical Engineering degree. Furthermore, as shown in Table 4, its electives are more demanding than the average elective course in the regular program. Hence, only the best students are accepted into this program. We typically limited entry to freshmen with scholastics scores of 4-5 points higher than those enrolled to the regular program.

Table 3. Required Course Schedule for B.Sc. in Biochemical Engineering

Cat. No.	Course	Credit	Cat. No.	Course	Credit
Semester 1			Semester 5		
104003	Calculus 1	5.0	054306	Principles of Chemical Eng. 2M	4.0
104006	Linear Algebra	4.0	054307	Separation Operations 1M	3.5
124114	Principles of Chemistry	4.0	054315	Thermodynamics B	3.0
134058	Biology 1	3.0	054408	Intro to Chemical Reactor Eng.	3.5
324012	Technical English	3.0	124601	Physical Chemistry Lab.	2.5
394800	Physical Education Courses	1.0	125102	Analytical Chemistry Lab. 1BC	1.0
	Total	**20.0**		**Total**	**15.5**
Semester 2			Semester 6		
054131	Introduction to Chemical and Biochemical Eng.	4.0	054308	Separation Operations 2 For Biochemical Eng.	3.5
104004	Differential And Integral Calculus 2	5.0	054314	Introduction to Process Dynamics and Control	3.0
125801	Organic Chemistry	5.0	054374	Process Analysis using Numerical Methods	3.0
134019	Protein Biochemistry		054409	Chemical Reactor Eng.	2.5
134020	General Genetics	3.5	054330	Chemical Process Simulation Lab.	1.0
			134128	Cell Biology	3.5
			134114	Biochemistry and Metabolism Lab.	2.0
	Total	**20.0**		**Total**	**18.5**
Semester 3			Semester 7		
104131	Ordinary Differential Equations/H	2.5	054401	Economics Analysis in Chemical Eng.	2.5
114051	Physics 1	2.5	054402	Design and Analysis in Chemical Eng. M	2.5
134113	Metabolic Pathways	3.5	054420	Chemical Engineering Laboratory 2 Bc	1.5
134120	Molecular Genetics Lab.	2.0	054412	Biochemical Engineering	3.5
134082	Molecular Biology	2.5			
234127	Programming (Matlab)	4.0			
394800	Physical Education Courses	1.0			
	Total	**18.0**		**Total**	**10.0**

Semester 4			Semester 8		
054203	Principles of Chemical Eng. 1M	4.0	-	-	-
054215	Thermodynamics A	3.0			
104218	Partial Differential Equations/H	2.5			
114052	Physics 2	3.5			
134119	Regulation of Gene Expression	2.5			
134121	Microbiology and Virology	3.0			
125101	Analytical Chemistry 1 for Engineers	1.5			

Table 4. Elective Courses for Biochemical Engineering

Chemical Engineering courses (17.0 credit points)

Cat. No.	Course	Credit	Cat. No.	Course	Credit
Required course: one of the following		3.5	336405	Eng. Principles Biotechnol.	2.0
094480	Into. to Probability and Statistics		336531	Principles of Biochem. Sensors	2.5
			336528	Controlled Drug Release	2.5
014003	Statistics	3.0	336529	Biological Substitutes and Tissue Engineering	2.5
054350	Polymers 1	2.5	336512	Biochem. Eng. Process Lab	2.0
054350	Polymers 1	2.5	056142	Membrane Processes	2.5
054369	Polymer Engineering Lab	2.5	056391	Nano-based Sensors	2.0
			056390	Molecular Materials	2.0
056379	Membrane Process Lab	2.0	126304	Structural Biology Bioinformatics	2.0
054413	Polymers in Biotechnology	2.5	336401	Biomaterials	2.0
056120	Electron Microscopy	2.0	336526	Artificial Metabolic Organs	2.0
056383	Complex Fluids	2.0	No more than one of the following:		
064322	Food Chemistry	3.0	014917	Principles of Quality Eng.	2.5
127718	Bio-organic chemistry of enzymes	2.0	054354	Selected Process Chem. Eng.	2.5
124301	Structure Determination By Physical Methods	2.5	054371	Environmental Risk and Safety in Industry	2.5
315018	Biomaterials	2.0	054410	Plant Design M	3.5
064611	Environmental Toxicology	2.0	054452	Environmental Problems – Air Pollution	2.5
056166	Interfacial and Colloidal Phenomena	2.0	114053	Physics 3	3.0
054132	Mini Project	1.0	124509	Principles of Spectroscopy	2.0
054406	Final Project 1	3.0	124911	Organic Chemistry Lab 1	3.0
054407	Final Project 2	3.0	127707	Stereochemistry	2.0
054451	Math. Models in Chem. Eng.	2.5	314533	Intro. Material Eng. 1M	3.5
316240	Principles of Crystallography	2.0			

Biology Courses: 14 credit points

Cat. No.	Course	Credit	Cat. No.	Course	Credit
5 credits from the following:					
134039	Molecular virology	2.0	134130	Hormones and animal Behavior	2.0
134055	Endocrinology	2.0	134132	Genetic Engineering	2.5
134040	Molecular Physiology of the Plant	3.0	134135	Aspects of Environment Protection	2.0
1340401	Physiology	3.5	136014	Advanced Molecular Biotechnology	2.0
134131	Plant Physiology Lab	1.0	136021	Cell Cycle	2.0
134133	Evolution	3.0	136022	Sensing in Microorganisms	2.0
134136	Molecular Biophysics	2.5	136030	Epigenetics	2.0
136016	Chapters in Neurobiology	2.0	136031	Genome Evolution	2.5
136105	Evolution Biology	2.5	136032	Systems Biology	2.0
276413	Basic Immunology	4.0	136033	Mechanisms of Plant Growth and Development	2.0
276424	Selected Chapters in Pharmacology	2.0	136034	Photobiology	2.0
014968	Ecology for Engineers	2.5	137067	Molecular Biology and Biotechnology of Plants	2.0
016327	Biological Treatment of Harmful Organic Materials	2.0	136088	Human Molecular Genetics	3.0
066327	Physical Methods for Biomol. Characterization	2.0	136090	Principles of Molecular Recognition Between Proteins and Nucleic acids	2.0
066411	Biotechnol. Microbiology	2.0	136093	Macromolecules for Bioinformatics	2.0
066518	Applied Biocatalysts	2.0	336537	Biophysics and Neurophysiology for Engineers	3.0
066524	Peptide Biotechnology	2.0	134111	Zoology	3.0
134049	Project in Biology (1)	4.0	134129	Cancer Biology	2.0
134065	Genetic Engineering Lab	2.5			
134088	Advanced Biology Lab (1)	2.0	236523	Introduction to Bioinformatics	2.5