البرنامج الدراسي للتكنولوجيا الحيوية وتطبيقاتها (مقرر جديد) – مقررات المستوى الأول

الفصل	كود المادة	إسم المادة	إسم المقرر	متطلبات المقرر	حالة المقرر		توزيع عدد الساعات أسبوعيا				الدرجة					المجموع	ملاحظات
					إجبارى	إختيارى	نظرى	عملى تطبيقى	تمرينات تطبيقية	المعتمدة	عملى	شفوى	تطبيقى	نظرى	المجموع		
الأول	ن101	نبات	علم النبات العام	-	1	-	2	2	1	3	20	10	10	60	100		
	ن102	نبات	التنوع البيولوجي النباتي	-	1	-	2	2	1	3	20	10	10	60	100		
	ك101	كيمياء	أساسيات الكيمياء الغير العضويه	-	1	-	2	2	1	3	20	10	10	60	100		
	ف101	فيزياء	مقدمة في الفيزياء	-	1	-	2	2	-	3	20	10	10	60	100		
	ر101	أساسيات رياضية (1)	رياضه عامه: 1	-	1	-	2	-	2	3	-	10	10	80	100		
	ع101	لغة أوروبية (1)	لغة انجليزية	-	1	-	1	-	2	2	-	10	10	80	100		متطلبات جامعة
	ع102	مواد ثقافية (1)	مادة ثقافيه:1	-	1	-	1	-	2	2	-	10	10	80	100		
المجموع					7		12	8	9	19					700		
الثاني	ح101	حيوان	التنوع البيولوجي الحيواني	-	1	-	2	2	1	3	20	10	10	60	100		
	ن103	نبات	أساسيات علم وظائف اعضاء النبات	-	1	-	2	2	-	3	20	10	10	60	100		
	ك102	كيمياء عضوية	أساسيات الكيمياء العضوية	-	1	-	2	2	1	3	20	10	10	60	100		
	ن104	نبات	مبادئ علم الخلية والوراثة	-	1	-	2	2	1	3	20	10	10	60	100		
	ن105	نبات	مقدمة فى البيئة النباتية والتصنيف الزهري	-	1	-	2	2	1	3	20	10	10	60	100		
	ك141	كيمياء فيزياءيه	أسس الكيمياء الفيزيائيه	-	1	-	1	2	-	2	20	10	10	60	100		متطلبات جامعة
	ع104	مواد ثقافية (2)	مادة ثقافيه (1)	-	1	-	2	-	-	2	-	10	10	80	100		
المجموع					7		13	12	4	19					700		
مجموع الفصلين					14		25	20	13	38					1400		

البرنامج الدراسي للتكنولوجيا الحيوية وتطبيقاته١ (مقرر جديد) – مقررات المستوى الثاني

الفصل	كود المادة	إسم المادة	إسم المقرر	متطلبات المقرر	حالة المقرر		توزيع عدد الساعات أسبوعيا				الدرجة						ملاحظات
					إجبارى	إختيارى	نظرى	عملى تطبيقى	تمرينات تطبيقية	المعتمدة	عملى	شفوى	تطبيقى	نظرى	المجموع		
الأول	ن201	نبات	بكتريا عامه و طبيه	-	1	-	2	2	1	3	20	10	10	60	100		
	ن202	نبات	الفطريات و امراض النبات	-	1	-	2	2	1	3	20	10	10	60	100		
	ر201	أساسيات رياضية (2)	رياضه عامه: 2	-	1	-	2	-	2	3	-	10	10	80	100		
	ن203	نبات	مقدمة في الكيمياء الحيويه	-	1	-	2	2	-	3	20	10	10	60	100		
	ن204	نبات	اساسيات و نظريات التنكنولوجيا الحيويه	-	1	-	1	2	-	2	20	10	10	60	100		
	ك201	كيمياء تحليلية	أسس الكيمياء التحليلية	-	1	-	1	2	-	2	20	10	10	60	100		
	ف201	فيزياء حيوية	مبادئ الكهربية فى الأنظمة الحيوية	-	-	1	1	-	1	2	-	10	10	80	100	اختار مقرر واحد	
	ن205	نبات	الوراثة النووية والسيتوبلازمية	-	-		1	-	1	2	-	10	10	80	100		
المجموع					6	1	11	10	5	18					700		
الثاني	ن206	نبات	فيروسات و مناعه	-	1	-	2	2	1	3	20	10	10	60	100		
	ن207	نبات	تغذية معدنية و فسيولوجيا النمو والتطور	-	1	-	2	2	-	3	20	10	10	60	100		
	ن208	نبات	البيولوجيا الجزيئيه للنبات	-	1	-	2	2	-	3	20	10	10	60	100		
	ن209	نبات	علم الطحالب والأشنات	-	1	-	1	2	-	2	20	10	10	60	100		
	ن210	نبات	زراعة أنسجة نباتيه	-	1	-	1	2	-	2	20	10	10	60	100		
	ن211	نبات	أيض الأحماض النووية	-	1	-	2	2	1	3	20	10	10	60	100		
	ن212	نبات	ميكروبيولوجيا التربة والمخصبات الحيوية	-	-	1	1	2	1	2	20	10	10	60	100	اختار مقرر واحد	
	ن213	نبات	التلوث البيئى	-	-		1	2	1	2	20	10	10	60	100		
المجموع					6	1	11	14	3	18					700		
مجموع الفصلين					12	2	22	24	8	36					1400		

البرنامج الدراسي للتكنولوجيا الحيوية وتطبيقاتها (مقرر جديد) – مقررات المستوى الثالث

الفصل	كود المادة	إسم المادة	إسم المقرر	متطلبات المقرر	حالة المقرر		توزيع عدد الساعات أسبوعيا				الدرجة					ملاحظات
					إجبارى	إختيارى	نظرى	عملى تطبيقى	تمرينات تطبيقية	المعتمدة	عملى	شفوى	تطبيقى	نظرى	المجموع	
الأول	ر301	رياضيات	إحصاء حيوي وتصميم تجارب	-	1	-	2	-	2	3	-	10	10	80	100	
	ن301	نبات	فسيولوجيا الكائنات الدقيقه	-	1	-	2	2	-	3	20	10	10	60	100	
	تك 301	تكنولوجيا	التكنولوجيا الحيوية و انتاج البروتين في البكتريا و الفطريات	-	1	-	2	2	-	3	20	10	10	60	100	
	ن302	نبات	الهندسه الوراثيه و نقل الجينات للنبات و الحيوان و الميكروبات	-	1	-	2	2	-	3	20	10	10	60	100	
	ك301	كيمياء طيفية	التحليل الطيفي والكهربى	-	1	-	2	2	-	3	20	10	10	60	100	
	ن303	نبات	الفلورا والنباتات الطبية	-		1	2	2	-	3	20	10	10	60	100	اختار مقرر واحد
	تك 302	تكنولوجيا	وراثه جزيئيه	-			2	2	-	3	20	10	10	60	100	
المجموع					5	1	12	10	2	18					700	
الثانى	تك 303	تكنولوجيا	تكنولوجيا تربية النبات	-	1	-	2	2	-	3	20	10	10	60	100	
	تك 304	تكنولوجيا	التكنولوجيا الحيوية وادارة الموارد الطبيعية	-	1	-	2	2	-	3	20	10	10	60	100	
	تك 305	تكنولوجيا	دور التكنولوجيا الحيويه في انتاج الطعام للانسان و الحيوان	-	1	-	2	2	-	3	20	10	10	60	100	
	ن 304	نبات	تكنولوجيا انتاج الوقود الحيوى	-	1	-	2	2	-	3	20	10	10	60	100	
	تك 306	تكنولوجيا	التكنولوجيا الحيوية لانتاج المواد الاولية	-	1	-	2	2	-	3	20	10	10	60	100	
	تك 307	تكنولوجيا	التكنولوجيا الحيوية للنا نو	-		1	2	2	-	3	20	10	10	60	100	اختار مقرر واحد
	تك 308	تكنولوجيا	تحليل الجينوم وتكنولوجيا المعلومات الحياتية	-			2	2	-	3	20	10	10	60	100	
المجموع					5	1	12	12	2	18					700	
مجموع الفصلين					10	2	24	22	4	36					1400	

* سيتم تدريب الطلاب في الاجازة الصيفية في المصانع ذات الطبيعة التكنولوجية

برنامج الدراسي للتكنولوجيا الحيوية وتطبيقاتها (مقرر جديد) – مقررات المستوى الرابع

الفصل الدراسي	كود المادة	إسم المادة	إسم المقرر	متطلبات المقرر	حالة المقرر		توزيع عدد الساعات أسبوعيا				الدرجة					ملاحظات
					إجبارى	إختيارى	نظرى	عملى تطبيقى	تمرينات تطبيقية	المعتمدة	عملى	شفوى	تطبيقى	نظرى	المجموع	
الأول	تك 401	تكنولوجيا	تكنولوجيا المفاعلات الحيوية	-	1	-	2	2	-	3	20	10	10	60	100	
	تك 402	تكنولوجيا	التكنولوجيا الحيوية للميكروبات	-	1	-	2	2	-	3	20	10	10	60	100	
	تك 403	تكنولوجيا	الكائنات المهندسة وراثيا والامان الحيوي	-	1	-	2	2	-	3	20	10	10	60	100	
	ك 401		كيمياء المنتجات الطبيعية	-	1	-	1	2	-	2	20	10	10	60	100	
	ك 402		كيمياء وتكنولوجيا البولمرات	-	1	-	2	2	-	3	20	10	10	60	100	
	تك 404	تكنولوجيا	تطبيقات التكنولوجيا الحيويه في المجال الطبى و تصنيع الأدويه	-	1	-	2	-	-	2	-	10	10	80	100	
	تك 405	تكنولوجيا	التكنولوجيا الحيوية لانتاج المواد الثانوية	-	-	1	1	2	-	2	20	10	10	60	100	اختار مقرر واحد
	تك 406	تكنولوجيا	حقوق الملكيه الفكريه و براءة الأختراع	-	-		1	-	2	2	-	10	10	80	100	
المجموع					6	1	12	12	2	18					700	
الثاني	تك407	تكنولوجيا	تدريب تفاعلي داخل المصانع (مشروع بحث انتاجي)	-	1	-	1	-	-	1	-	-	-	100	100	
	تك408	تكنولوجيا	التكنولوجيا الحيويه للانزيمات و التصنيع الغذائي	-	1	-	2	2	-	3	20	10	10	60	100	
	تك409	تكنولوجيا	التكنولوجيا الحيويه و الأنتاج الحيواني	-	1	-	2	2	-	3	20	10	10	60	100	
	تك410	تكنولوجيا	التكنولوجيا التطبيقية الصناعية	-	1	-	2	2	-	3	20	10	10	60	100	
	تك411	تكنولوجيا	التكنولوجيا الحيوية للطحالب و انتاج المخصبات الحيويه	-	1	-	2	2	-	3	20	10	10	60	100	
	تك412	تكنولوجيا	دراسه حرة و سيمنار	-	1	-	4	2	-	3	20	10	10	60	100	
	تك413	تكنولوجيا	الاخلاق و التكنولوجيا الحيويه	-	-	1	1	-	2	2	-	10	10	80	100	اختار مقرر واحد
	تك414	تكنولوجيا	مواصفات الجودة والتسويق	-	-		1	-	2	2	-	10	10	80	100	
المجموع					6	1	12	12	2	18					700	

	1400					36	4	24	24	2	12	مجموع الفصلين

Biotechnology & Application Program

Scientific Contents of the Proposed Courses

Code	Course Title	Course Content	Theoretical	Practical	Tutorial	Credit hours
First Level						
B 101	**علم النبات العام** **General Botany**	**Plant morphology:** Types of leaves, roots, shoot system, flowers – inflorescences and their morphology **Plant anatomy:** Structure of plant cell, types of plant tissues, anatomy of roots, stems & leaves. **Pollinology**: Pollen grains, structure, identification, applications **Reproduction,** and importance of plants.	**2**	**2**	**1**	**3**
B 102	**التنوع البيولوجي النباتى** **Plant Biodiversity**	The nature of life- Prokaryotic & eukaryotic cells - modern systems of classification of living organisms – characteristic features of different classes – the developmental steps of complexity, diversity and characteristics of each class – taxonomic hierarchy of the studied living organisms – Environmental adaptations – Economic importance of different classes.	**2**	**2**	**1**	**3**
C 101	**أساسيات الكيمياء غير العضوية** **Inorganic Chemistry**	* Fundamentals of Coordination Chemistry, Cell Biology, Biochemistry and Evolution, Physical Methods for Bioinorganic Chemistry *Binding of Metal Ions to Proteins: Metal-dependent lyases and hydrolases, Zinc Binding domains, Calcium and calcium-binding proteins * Special cofactors and metal clusters: Electron transfer proteins, Cobalamins, Molybdenum-cofactor enzymes * Transport & Storage of Metal Ions: Transport and Storage of iron	**2**	**2**	**1**	**3**

		within organisms, Obtaining iron from the environment. * Oxygen metabolism & * Metals & Health				
Phys 101	**مقدمة فى الفيزياء** **Introduction to Physics**	*Introduction to macromolecular structures and their physical environment *Thermodynamics, calorimetry and surface plasmon resonance *Hydrodynamics: macromolecular diffusion, electrophoresis and centrifugation; fluorescence anisotropy and dynamic light scattering; infrared and Raman spectroscopy * Crystallography and cryo-electron microscopy	**2**	**2**	**-**	**3**
Math 101	**رياضيات عامة: 1** **Mathematics:1**	* Functions- an introduction to linear and quadratic functions, the quadratic formula, exponents and power functions. The exponential and logarithm functions. * Data- the use of histograms, scatter plots pie-charts and log-log plots to represent data. Basic numerical and graphical summaries. The normal distribution. * Fundamentals of calculus and integration	**2**	**-**	**2**	**3**
C S 101	**مادة ثقافية (1): لغة انجليزية** **English Language**	Writing paragraph + topic sentence - Countable and non-countable nouns Speaking, listening, reading & writing skills in English	**1**	**-**	**2**	**2**
C S 102	**مادة ثقافية (2): تنمية بشرية** **Human Development)**	General introduction to the area of Developmental Psychology and a survey of developmental processes that influence the growth of the physical, intellectual, and socio-emotional aspects of the person throughout the lifespan	**1**	**-**	**2**	**2**
Z 101	**التنوع البيولوجى الحيوانى** **Animal Biodiversity**	Mmodern systems of classification of animal living organisms – characteristic features of different classes – the developmental steps of complexity, diversity and characteristics of each class – taxonomic hierarchy of the studied living organisms – Environmental adaptations – Economic importance of different classes.	**2**	**2**	**1**	**3**
B 103	**اساسيات علم وظائف اعضاء**	Cytoplasm and its physical and chemical properties – plants &	**2**	**2**	**-**	**3**

	النبات **Fundamentals of Plant Physiology**	environment interrelationship – plants soil , water & air interrelationships – Enzymes – Respiration and photosynthesis				
C 102	اساسيات الكيمياء العضوية **Principles of Organic Chemistry**	Formation of carbon - Carbon bonds: (a) Base – catalyzed condensation: Condensation of carbanions with aldehydes, ketones and esters – The alkylation of carbanions – Addition of carbanions to activated olefins. (b) Acid – catalyzed condensations: The self condensation of olefins - Friedel Craft's reactions - perkin reaction – condensation of aldehydes and ketones - Mannich reaction.	**2**	**2**	**1**	**3**
B 104	مبادئ علم الخلية و الوراثة **Principles of cytology & Genetics**	Cellular structure - Cell organelles - Monohybrid standard inheritance – Mechanisms – Dihybrid inheritance – Principles of genetics, Kinds & specifications – Effects of environmental pollution on the genetic make up. The organization, evolution, modification, and functions of the cytological and genetic systems.	**2**	**2**	**-**	**3**
B 105	مقدمة فى البيئة النباتية و التصنيف الزهرى **Introduction to Plant Ecology & Taxonomy**	**Plant ecology**: vegetation & its evolution – plant succession – Classification of plants according to their water requirements —Soil formation & characteristics – Soil micro flora . **Plant taxonomy**: Historical review – structure & types of flowers , inflorescence, fruits, pollination, fertilization – Study of concise families of the monocots and dicots	**2**	**2**	**1**	**3**
Chem 141	اسس الكيمياء الفزيائيه **Principles of Physical Chemistry**	Principles of : Chemistry, gas laws, thermochemistry and their laws, solution chemistry and properties of solutions, and basic information about chemical equilibrium and ionic equilibrium and the factors affecting them.	**1**	**-**	**2**	**2**
C S 104	مادة ثقافيه (1) **Cultural Subject (1)**	This course examines the primary role of human resources development (HRD) in the organization to help people & organizations effectively manage change. This highly interactive course focuses on strategies for assessing, designing, & implementing training and organizational development efforts that positively impact the performance of the individual & the work group. The course provides an overview of change interventions,	1	-	2	2

		including training & staff development; succession planning & performance management. factors that influence HRD; the consulting role & skills of the HRD professional, including facilitation & group dynamics; & the trends in HRD, such as human performance technology & the work out process model.				
Second Level						
B 201	**بكتيريا عامه و طبية** **General and Medical Bacteriology**	**Bacteriology**: This includes the basic features of general bacteriology :Classification - cell structure – Nutrition, Growth & control of bacteria-pathogenic bacteria, biotechnology. Describe the common diseases and life-threatening conditions as regards etiology, pathogenesis, clinical features, differential diagnosis and complications.	**2**	**2**	**1**	**3**
	الفطريات و امراض النبات **Mycology & Plant Pathology**	**Mycology**: Classification – Fungal biology – Pathogenic fungi, biotechnology. Biology of fungi and their role as plant pathogens; plant disease epidemiology and understanding fungal populations; infection processes and plant defense.	**2**	**2**	**1**	**3**
B 202	**أساسيات و نظريات التكنولوجيا الحيويه** **Principles and theories of Biotechnology**	Biotechnology: Principles and Theories: The integration of natural science and organisms, cells, parts thereof, and molecular analogues for products and services. Developed techniques of using live organisms or enzymes from organisms to produce products and processes useful to humans. Genetic engineering : Techniques to alter the chemistry of genetic material (DNA and RNA), to introduce these into host organisms and thus change the phenotype of the host organism. Transformation procedures through which a piece of DNA is introduced in a host: microbes, plant and animals. Bioreactors: vessels in which raw materials are biologically converted into specific products, individual enzymes, etc., using microbial plant, animal or human cells.	**1**	**2**	**-**	**2**

Math 201	**رياضيات (2)** **Mathematics (2)**	* Integration I. Introduction to integration * Derivatives I. Introduction to differentiation. * Derivatives II. Rules of differentiation, rates of change. * Applications of derivatives.	**2**	**-**	**2**	**3**
B 204	**مقدمة فى الكيمياء الحيوية** **Plant Biochemistry**	Descriptive biochemistry of macromolecules of plant cell – Functional biochemistry: Carbohydrate metabolism, Lipid metabolism, amino acids and protein metabolism, Plant hormones metabolism.	**2**	**2**	**-**	**3**
Chem 201	**اسس الكيمياء التحليلية** **Principles of Analytical Chemistry**	Introduction to atomic and molecular absorption, quantitative analysis - gravimetric analysis, titrations – introduction to chromatographic separations, methods gas chromatography, liquid chromatography ion exchange chromatography, capillary zone electrophoresis - introduction to oxidation/reduction reactions	**1**	**2**	**-**	**2**
Phys 201	**مبادئ الكهربية و الانظمة الحيوية** **Principles of Electricity and Biological Systems**	* Measuring intracellular Ca2+ signals I: principles of fluorescent indicators based on BAPTA, instrumentation. * Measuring intracellular Ca2+ signals II: genetically encoded Ca2+ sensors, fluorescence resonance energy transfer. * Electrical Signals I: Hodgkin-Huxley equations, basis of cellular excitability. Electrical Signals II: Structure and function of ion channels * Ca2+ entry pathways I: voltage-gated Ca2+ channels. Ca2+ entry pathways II: ligand-gated Ca2+ channels, TRP Channels *Interplay between plasma membrane and intracellular Ca2+ channels: Ryanodine and IP3 receptors, Ca-induced Ca release, cardiac EC coupling, Ca2+ oscillations.	**1**	**-**	**1**	**2**
B 205	**الوراثة النووية السيتوبلازمية** **Nuclear & Cytoplasmic Genetics**	Review of mitosis & meiosis - basis of inheritance; structure of nucleic acids & proteins.-structure & function of nuclear material during the cell cycle - packaging of DNA into the nucleus & ultimately into chromosomes - DNA replication & segregation at the molecular level	**1**	**-**	**1**	**2**
B 206	**فيروسات و مناعه**	What are viruses?, their structures, types, methods of replications, classifications, viruses as pathogens to humans, animals and	**2**	**2**	**1**	**3**

	Virology and Immunology	plants, examples of viral pathogens. Economic importance and use for vaccination. Human immune systems: cells and organs of immune systems, innate and specific systems, antibody diversity, immune disorders.				
B 210	**زراعة انسجة نبات** **Plant Tissue Culture**	Sexual & vegetative propagation of plants- Hormones- differentiation and control of proliferation in cell and protoplast cultures- Morphogenesis in vitro: studies on regeneration- Isolation- culture and fusion of protoplasts from higher plants- Secondary metabolism in tissue cultures- Embryo and organ culture **Nutrient cultures**: Types & composition of nutrient cultures- Specifications and factors affecting nutrient cultures.	**1**	**2**	**-**	**2**
B 208	**فسيولوجيا النمو و التطور و تغذية معدنية** **Physiology of Plant Growth, Development and Mineral nutrition**	Germination & dormancy – Growth: definitions & growth curves – growth conditions – Physiology of flowering, fruiting & yield. Growth hormones: definitions, properties – Classification and mode of action & metabolism. **Mineral nutrition**: Mineral composition of plant ash- Essential & non-essential elements- availability - Functions- Deficiency symptoms of major and minor elements - mineral salt absorption and translocation.	**2**	**2**	**-**	**3**
B 209	**علم الطحالب و الاشنات** **Phycology & Lichens**	Algae in biotic associations - Algal diversity – taxonomy, systematic - Phytoplankton ecology Macroalgae and Periphyton Ecology- Nutrition & growth – Lichen classification & structure	**1**	**2**	**-**	**2**
B 208	**البيولوجيا الجزيئية للنباتات** **Plant Molecular Biology**	The discipline of plant molecular biology uses genetic, genomic, biochemical, cell biological and computational approaches to understand plant growth, physiology, and development at a molecular level. Transfer of molecules across membranes - molecular machines that mediate membrane transport - interactions among transport proteins - Factors affecting transport processes.	**2**	**2**	**-**	**3**
B 211	**ايض الاحماض النووية** **Nucleic Acids Metabolism**	Nucleic acid structure, invivo and invitro biosynthesis of nucleic acids, degradation of nucleic acids, diseases associated with nucleic acid metabolic disorders.	**2**	**2**	**1**	**3**
B 212	**ميكروبيولوجيا التربة و**	**Soil** formation- the soil profile and its layers- Soil classification, physical properties- chemical properties- Soil biology and ecology- Essential	**1**	**2**	**1**	**2**

	المخصبات الحيوية **Soil Microbiology & Biofertilizers**	plant nutrients, bioavailability. **Biofertilizers,** types, production, biofertilizer-plant interaction, Role of biofertilizers in plant growth and development				
B 213	التلوث البيئى **Environmental pollution**	water, air, soil, solid wastes, radioactive pollution. Pollution and environmental management topics. Practical aspects of the characterization of pollution, based on field collection and laboratory analysis of water samples	**1**	**2**	**1**	**2**
Third Level						
Math 301	إحصاء حيوي و تصميم تجارب **Biomathematics & Processing**	Descriptions: Single species population dynamics: Models in discrete and continuous time: basic reproductive number; compensatory and dispensatory competition; transcritical, tangent and period doubling bifurcations, chaos. Harvesting: maximum sustainable yield; yield effort curves. Population dynamics of interacting species	**2**	**-**	**2**	**3**
T 301	التكنولوجيا الحيويه و انتاج البروتينات في البكتيريا و الفطريات **Biotechnology and protein production in Bacteria & Fungi**	Different cloning and strategies into bacteria and fungi. Boosting gene expression in the producing microbe, genetic modifications of cloned genes, tags necessary for protein purifications. Quantification of the product.	**2**	**2**	**-**	**3**
B 301	فسيولوجيا الكائنات الدقيقة **Physiology of Microorganisms**	*Structural organization and molecular architecture of microbial cell *Microbial growth: assessment, kinetics & mechanism * Microbial metabolism * Biodegradation of natural substances * Fermentation & biotechnology.	**2**	**2**	**-**	**3**
B 302	الهندسه الوراثيه و نقل الجينات للنبات و الحيوان و الميكروبات **Genetic**	General introduction to the concepts of genetic engineering -Use of various enzymes in recombinant DNA work - Vectors in gene cloning-plasmids,bacteria phages, shuttle vectors, Ti plasmid, expression vectors, shotgun cloning and cDNA cloning techniques. - Selection of recombinant DNA clones. - Construction of genomic and cDNA	**2**	**2**	**-**	**3**

	Engineering and Gene delivery into Plants, animals & microbes	libraries.- Identification and characterization of insert DNA fragments. Restriction mapping.- Chromosome walking and chromosomal localization of genes. RFLP and other uses of cloned sequences. Cloning of microbial genes PCR-based analysis, microcloning, DNA fingerprinting.				
C 301	التحليل الطيفى و الكمى **Spectral & Quantitative Analysis**	Principles and applications of digital spectral analysis, least squares, random sequences, parametric, and nonparametric methods for spectral estimation	**2**	**2**	**-**	**3**
B 303	الفلورا والنباتات الطبية **Flora & Medicinal Plants**	Ecological characteristics of Egypt, Historical notes on the flora of Egypt, Western desert & its flora, The Sinai peninsula & its flora, The Nile region & its flora. Phytodiversity & Conservation in Egypt - Ethnobotany & Traditional Systems of medicine - Pharmacognosy of Medicinal Plants - Plantation	**2**	**2**	**-**	**3**
T 302	وراثة جزيئية **Molecular Genetics**	Molecular Cloning Methods - Molecular tools- Prokaryotic Transcription - Gene regulation in prokaryotes Genetics and Evolution - DNA Protein Interactions - Eukaryotic RNA polymerases/promoters - General Transcription Factors - Chromatin structure - RNA processing - Genome Organization, Molecular Evolution/bioinformatics, reverse genetics/gene expression - DNA Replication II - Evolutionary Biology	**2**	**2**	**-**	**3**
T 303	تكنولوجيا تربية النبات **Technology of Plant Breeding**	- Importance of genetic resources and plant breeding for sustainable and successful plant growing. - Genetic variation and gene erosion in horticultural plant species. - - Collections and international aspects of genetic resources. - Biotechnological tools and their use in plant breeding. - DNA markers and their use in plant breeding.	**2**	**2**	**-**	**3**
T 304	التكنولوجيا الحيوية و ادارة	Substrates for biotechnology, genetics & biotechnology, bioprocess/fermentation technology, enzyme technology, biological fuel	**2**	**2**	**-**	**3**

	الموارد الطبيعية **Biotechnology & Natural Resource Management**	generation, single cell protein, Biotechnology and medicine, agricultural and forestry industries, Food and beverage . Biotechnology and production of biopolymers from higher plants and from microorganisms. Technology & Resource Management - Aromatic Plants, Nutraceuticals and cosmeceuticals - Marketing Management				
T 304	تكنولوجيا انتاج الوقود الحيوى **Technology of Biofuel Production**	Feedstock economics - Ethanol dry milling production - Ethanol cellulosic technology -Biobutanol and other alcohols - Biodiesel Transesterification - Biodiesel Thermaldepolymerization - Pipeline operations-Boutique fuels - Terminal operations - Fuel-retailing economics - World oil/alternatives environment - Clean Air/Energy Policy Act - Fuel specifications- Global influences - Risk management	**2**	**2**	**-**	**3**
B 305	دور التكنولوجيا فى إنتاج الطعام للإنسان و الحيوان **Role of Biotechnology of Food for man & animals**	Biotechnology of fermented foods – Food Additives – Protein production – Enzymes – Processed meats	**2**	**2**	**-**	**3**
T 306	التكنولوجيا الحيوية لانتاج المواد الاولية **Biotechnology for primary products**	Microbial metabolism - Microbial process development, Bioreactor systems including utilities, Fluid flow and mixing turbine, helical, anchor, bubble column, external loop, airlift etc. Heat transfer – different modes of heat transfer, Mass transfer in microbial processes, Enzyme Kinetics – reaction kinetics, Bioreactor analysis – Ideal and non-ideal reactor, Modes of culturing of microorganisms	**2**	**2**	**-**	**3**
T 307	التكنولوجيا الحيوية للنانو **Nano - Biotechnology**	Introduction to the practice and discipline of nanotechnology - Physical basis and principles of nanotechnology - Industry applications - Carbon Nanotube Technologies (CNT) - MEMS - Micro Electro Mechanical Systems – Nanofabrication – Polymer chemistry applications in nanotechnology – Role of surfaces in nanotechnology	**2**	**2**	**-**	**3**

		devices -				
T 308	**تحليل الجينوم و تكنولوجيا المعلومات الحياتية** **Genome & Bio-informatics**	Scope of Bioinformatics and computational biology; Biological databases and various file formats; Sequence retrieval and submission. Homology search, sequence alignment and analysis using bio-algorithms such as dynamic programming. Gene and promoter predictions, challenges, strategies and tools evaluation. Phylogenetic analysis and tree evaluation. Sequence & structure analysis of RNA and Protein molecule. Applications of bioinformatics	**2**	**2**	**-**	**3**
Forth Level						
T 401	**تكنولوجيا المفاعلات الحيويه** **Bioreactors Technology**	Industrial Microbiology and Fermentation Processes – Reactors design and dynamics – Nonideal mixing bioreactors – Immobilized biocatalysts – multiphase bioreactors – batch fermentation reactors, continuous fermentation reactors.	**2**	**2**	**-**	**3**
T 402	**التكنولوجيا الحيوية للميكروبات** **Microbial Biotechnology**	Down stream processing - Methods for vitamins, amino acids, organic acids, enzymes, antibiotics, alcohols - Applications of cells in bioprocesses (lactic acid bacteria, yeasts, mixed cultures) microbes as biocontrol agents and chemical factories.	**2**	**2**	**-**	**3**
T 403	**الكائنات المهندسة وراثياً و الآمان الحيوي** **Genetically Engineered Organisms and Biosafety**	• Genetically Modified Plants And Microorganisms • Regulation and Containment for: Field Tests of Genetically Modified Plants and Genetically Modified Microorganisms • Roles and Responsibilities of Pertinent Authorities • The National Biosafety Committee • The Institutional Biosafety Committee and the Biological Safety Officer. • Movement of Regulated Material Within or Between Institutions and countries.	**2**	**-**	**2**	**3**
Chem 401	**كيمياء المنتجات الطبيعية**	Natural product chemistry; classification of natural products, isolation techniques and physiochemical data, terpenes, steroids, fatty acids and related compounds, sugars, carboaromatic and	**1**	**2**	**-**	**2**

	Chemistry of Natural Products	related compounds, alkaloids and non-alkaloids containing nitrogen; aspects of natural product photochemistry.				
C 402	**كيمياء و تكنولوجيا البولمرات** **Chemistry & Technology of Polymers**	*Molecular Weights and Distributions *Chain Statistics and Polymer Chain Dimensions *Thermodynamics of Polymer Solutions, Phase Behavior and Polymer Blends *Light Scattering from Polymer Solutions *Hydrodynamic dimensions: Intrinsic Viscosity and Principles of SEC *Dilute Solution Dynamics: Rouse and Zimm Models. * Semidilute Solutions: Reptation Model.	**2**	**2**	**-**	**3**
T 404	**تطبيقات التكنولوجيا الحيويه في المجال الطبى و تصنيع الادوية** **Applicatication of Biotechnology in Medicine and Pharmaceutical Industry**	Biotechnology applies the techniques of modern molecular biology to improve the efficiency and reduce the environmental impacts of industrial processes like , antibiotics, vitamins, insulin, growth hormones….etc. Biotechnical methods are now used to produce many proteins for pharmaceutical and other specialized purposes. Gene therapy – altering DNA within cells in an organism to treat or cure a disease, DNA fingerprinting is the process of cross matching two strands of DNA.	**2**	**-**	**-**	**2**
T 405	**التكنولوجيا الحيوية لانتاج المواد الثانوية** **Biotechnological Production of Secondary Substances**	Upstream processing, including cell culture and fermentation - selection, preparation, and operation of bioreactors (in the batch, fed-batch, and perfusion modes) and related instrumentation (including optical sensors).	**1**	**2**	**-**	**2**
T 406	**حقوق الملكيه الفكريه و براءة الأختراع** **Intellectual Property Rights and patents**	Intellectual property rights (IPR) is a legal concept which refers to creations of the mind for which exclusive rights are recognized. Under intellectual property law, owners are granted certain exclusive rights to a variety of intangible assets, such as discoveries, inventions and designs. Common types of intellectual property rights	**1**	**-**	**2**	**2**

		include copyright, trademarks, patents, industrial design rights, trade dress, and in some jurisdictions trade secrets. Understanding Intellectual Property Rights in Egypt.				
T 407	**تدريب تفاعلى داخل المصنع (مشروع بحث انتاجى) Interactive Training in related Factory (Research Project)**	Application of different feedstock's in various industries	**1**	**-**	**-**	**1**
T 408	**التكنولوجيا الحيوية للانزيمات و التصنيع الغذائى Biotechnology of enzymes & Food Industries**	The nature of enzymes- The application of enzymes- Genetic engineering and protein engineering of enzymes- The technology of enzyme production- Immobilized enzymes.	**2**	**2**	**-**	**3**
T 409	**التكنولوجيا الحيويه و الإنتاج الحيوانى Biotechnology & Animal Production**	Animal biotechnology and the genetic improvement of domesticated animal species, for milk and meat production. animal biotechnology such as the freezing of semen, embryo transfer, in vitro fertilization, gene transfer and cloning – all of which allow scientists and breeders even greater control over future animals. The animal biotechnology industry faces a variety of scientific, regulatory, ethical and public acceptance issues.	**2**	**2**	**-**	**3**
T 410	**التكنولوجيا التطبيقية الصناعية Applied Industrial Technology**	Aerobic and anaerobic fermentations; Kinetics of growth and product formation - chemically structured models; mass transfer, diffusion, membrane transport; Fermentr design - operation, measurement and control in fermentation; Aeration and agitation in fermentation: Oxygen requirement, measurement of adsorption coefficients, bubble aeration, mechanical agitation, correlation between mass-transfer coefficient and operating variables, immobilized cell reactors.	**2**	**2**	**-**	**3**
T 411	**التكنولوجيا الحيويه للطحالب وإنتاج المخصبات الحيوية**	Algal Metabolism, Growth and Biokinetics – Mass production of algae - Bioremediation for Soil, water Environment - Biotreatment of Metals – Biofuels – Animal feedstock – Petroleum biodegradation – Decolorization of dyes – Food supplements – Immune Enhancing	**2**	**2**	**-**	**3**

	Algal Biotechnology and Productions of biofertilizers	factors – Anticancer activity – Soil reclamation. Algal technology- Production of algal biofertilizers- biofertlizers- Types and mode of action- Production of biofertilizers from blue-green algae- Application of biofertilizer and biosafety- Advanced aspects in Algal technology.				
T 412	**دراسه حرة و سيمنار** **Independent study and seminar**	Students will be assigned special topics to write papers and make oral presentations in special sessions	**2**	**-**	**4**	**3**
T 413	**الأخلاق و التكنولوجيا الحيويه** **Ethics & Biotechnology**	safety of genetically engineered food ; distinguish between technology-inherent risks and technology-transcending risks, potential ecological risks identified are increased weediness, The reduction of biodiversity, Labeling food derived from GM plants and animals is an important.	**1**	**-**	**2**	**2**
T 414	**مواصفات الجودة و التسويق** **Quality Specifications and Marketing**	Introduction- Quality specifications- Production of biological invitations; Patent protection- Trade secrets- Plant breeder's rights- Safety in biotechnology: Interaction- Problem of organism pathologicity- Problems of biological active biotechnology products.	**1**	**-**	**2**	**2**

Program Specification

Biotechnology & Applications

Offered by

Botany Department
Faculty of Science
Mansoura University

2013

جامعة : المنصورة
كليـــة : العلوم
قســـم : النبات

توصيف برنامج دراسي

أ ـ معلومات أساسية :
1- اسم البرنامج : التكنولوجيا الحيوية و تطبيقاتها
2- طبيعة البرنامج : أحادى
القسم المسئول عن البرنامج : النبات
تاريخ إقرار البرنامج :
ب – معلومات متخصصة :

1- الأهداف العامة للبرنامج :

The objectives of the program are to provide graduates who are able to:

1. Provide advanced education in biotechnology to support biotech-based industry and research.
2. maintain an up-to-date curriculum, delivered by high quality teaching and informed by research and current applications to cope with community needs.
3. contribute to the advancement of science and technology.
4. think critically, analytically and innovatively in solving problems.
5. practice good management, leadership and decision making.
6. integrate practical and theoretical aspects of biotechnology.
7. communicate across a broad spectrum of issues effectively.

2 –المخرجات التعليمية المستهدفة من البرنامج :

1/2 المعرفة و الفهم :

Graduates must acquire the knowledge and understanding of:

a1- Describe concepts employed in choosing, adapting and developing biotechnological processes.

a2- scientific understanding of practical applications within the biotechnological-based industries.

a3- The integrated nature of biotechnology, which interlinks of

biochemistry, genetics, immunology, virology and microbiology.

a4- Principles and practice of current techniques in biotechnology.

a5- Demonstrate a comprehensive understanding of molecular biotechnology with particular reference to large molecules, understand the properties of biological entities and how these may be used for quantitative and qualitative analysis and prediction.

a6- The mutual influence between professional practice in biotechnological applications and its impact on the environment.

a7- Recognize the significance of statistical techniques in problem solving.

a8- Discuss moral and ethical issues associated with biotechnology research.

A9- Demonstrate a sound understanding of concepts employed in choosing, adapting and developing biotechnological processes.

2/2 القدرات الذهنية :

The graduate must be able to:

b1. Interpret and effectively summarize quantitative data.

b2. Demonstrate creative problem solving.

b3. Integrate theoretical, practical and presentation skills to complete a research project.

b4. Apply specialized knowledge to investigate issues in laboratory management and design protocols.

b5. Demonstrate independent thinking.

b6. Assess the risk in the professional practice.

b7. Suggest a variety of routes by which biotechnology products can be commercialized.

b8. Demonstrate creativity in the identification of problems and their solutions.

b9. Integrate, evaluate and apply concepts of biotechnology.

3/2 المهارات :

1/3/2- مهارات مهنية وعملية :

The graduate must be able to:

c1. Assess the methods and tools used in the field of biotechnology.
c2. Postulate and deduce mechanisms and procedures to handle scientific problems.
c3. Plan, design, report on the investigated data and solve problems.
c4. Organize and manage independent practical project.
c5. Correctly apply quality control and assurance procedures.
c6. Resolve problems using appropriate resources and statistical techniques and critically evaluate published work.

2/3/2- مهارات عامة :

The graduate must be able to:

d1. Use information and communication technology effectively.
d2. Acquire self and long life learning.
d3. Use different sources to obtain information.
d4. Establish the rules and indictors to assess the performance of others.
d5. Work in a team and leading the team in professional contexts.
d6. Mange time efficiently.
d7. Apply scientific models, systems and tools effectively.
d8. Deal with scientific patens considering property right.

3- المعايير الأكاديمية المرجعية للبرنامج :

Generic National Academic Reference Standards (ARS) for B.Sc. Programme.

4- العلامات المرجعية :**(ARS)**

5- متطلبات الالتحاق بالبرنامج :

الحصول علي الثانوية العامة او ما يعادلها او درجة البكالوريوس في العلوم من احدي الجامعات المصرية أو علي درجة معادلة لها من معهد علمي معترف به.

6- طرق و قواعد تقييم الملتحقين بالبرنامج :

الطريقة	ما تقيسه من المخرجات التعليمية المستهدفة
1- الاختبار التحريري	المعرفة والفهم - المهارات الذهنية
2- الاختبار الشفهي	المعرفة والفهم - المهارات الذهنية – المهارات العامة
3- الاختبار العملي	المهارات المهنية والعملية – المهارات العامة
4- اختبارات دورية	المعرفة والفهم - المهارات الذهنية
5- تقرير فردى	المهارات المهنية
6- تقرير جماعي	المهارات العامة
7- دراسة حالة	المهارات الذهنية - المهارات المهنية والعملية - المهارات العامة
8- تدريب ميداني	المهارات الذهنية - المهارات المهنية والعملية - المهارات العامة
9- ملفات انجاز	المعرفة والفهم - المهارات الذهنية- المهارات المهنية - المهارات العامة

7- طرق تقويم البرنامج :

العينة	الوسيلة	القائم بالتقويم
	استطلاع رأى	1 – الحاصلين علي درجة الماجستير
	استطلاع رأى	2 – أصحاب الأعمال
	تقرير	3 – ممتحن خارجي
	تقييم	4 – مقيم خارجي
	تقرير	5 – لجان المراجعة الداخلية
	تقرير	6- لجنة الدعم الفني

The proposed
Academic Reference Standards for
Biotechnology

General attributes of the biotechnologist:

1- Identify the role of basic sciences in the development of the society.
2- Reproduce scientific approaches that meet community needs considering economic, environmental, social, ethical and safety requirements.
3- Precede effectively information technology relevant to the field.
4- Be familiar with the molecular basis and chemistry of the process that take place in cells and organisms.
5- Work safely on a laboratory environment and process the basic competences necessary for a range of practical biochemical techniques.
6- Apply statistical skills in interpretation and illustration of biological data.
7- Criticize and characterize bio molecules and assess the activity of biochemical process.

a- Knowledge and understanding:

Graduates must acquire the knowledge and understanding of:

a1- The related basic scientific facts, concepts, principles and techniques in microbiology.

a2- The relation between the studied topics and the environment.

a3- Possess in-depth the knowledge and skills in specific discipline with global perspective.

a4- Ability to apply knowledge through intellectual inquiry and to develop critical solutions in new situations.

a5- Ability to analyze, and evaluate existing knowledge in order to synthesize scientific findings.

b- Intellectual Skills

The graduates must be able to:

b1- disseminate ideas to the wider community in a confident, effective and coherent manner.

b2- describe and critically evaluate current aspects of biosciences in order to solve related problems.

b3- create and sustain cooperative networking efficiently

b4- Demonstrate independent thinking.

b5- Identify and solve problems.

b7- Analyze and interpret data from a wide range of sources

c- Practical and Professional Skills

The graduates must be able to:

c1. Plan, design, process and report on the investigated data, using appropriate techniques and considering scientific guidance.

c2. Apply techniques and tools considering scientific ethics.

c3. Solve problems using a range of formats and

approaches.

c4. Identify and criticize on the different methods used in addressing subject related issues.

c5. Solve problems in microbiology by a variety of methods including computers and other recent tools.

c6. Collect record and analyze data in microbiology using appropriate techniques in the field and laboratory.

c7. Apply field and laboratory investigations of microbial systems in an ethical and responsible manner.

c8. Select a representative microbial sample considering its validity, accuracy and reliability during collection

d- General and Transferable Skills

d1. Use information and communication technology effectively.

d2. Acquire self and long life learning.

d3. Use different sources to obtain information.

d4. Establish the rules and indictors to assess the performance of others.

d5. Work in a team and leading the team in professional contexts.

d6. Mange time efficiently.

d7. Apply scientific models, systems and tools effectively.

d8. Deal with scientific patens considering property right.
