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**KING FAISAL UNIVERSITY**  
**College of Science**  
**Biological Sciences Department**

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# **UNDERGRADUATE PROGRAM IN BIOLOGY**

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2019

## The Department of Biological Sciences

### Guiding Statement

The program of Biology was started by 1982 as Biology department was included in the Faculty of Education. Given the profound changes in biological sciences and how research is developed and communicated, the Department of Biological Sciences reexamined its current curriculum and teaching approaches to meet the needs of today's undergraduate biology students. The new approaches considered the importance of building a strong bridge between biology, mathematics, chemistry and physics. The updated curriculum presents a plan to enhance undergraduate education in biology. We considered students interests and career goals, Measurement and Assessments (Qiyas), the university and college vision in preparing the course contents. In addition, reinforcing lab works was a priority to enhance student technical skills, recommended by department vision. Because of the pronounced advances in Biology, undergraduate students will need to be aware with a broad range of concepts and skills. The modern biologist uses multiple/advanced techniques, ranging from measuring instruments, microscopes, computer, and quantitative analytical tools and models. Understanding and applying these techniques requires multidisciplinary knowledge and skills.

### Program Structure and Organization

General Framework for the Distribution of Program Units

Category	Number of Credit hours
<b>University Requirements</b>	
Core Courses	4
Elective Courses	4
<b>Total</b>	<b>8</b>
<b>College Requirements</b>	
Core Courses	28
Elective Courses	3
<b>Total</b>	<b>31</b>

Department Requirements	
Core Courses	76
Supporting Courses	8
Elective Courses	9
Total	93
Total Credit hours of the program	132

No	Course code and title	Contact Hours (CR)			Credit Hours (CR)	Pre-requisite	University College Or Department
		Lect. (LT)	Tutorial	Lab. (LB)			
<b>University Requirements.</b>				<b>8 credits</b>			
<b>Core Course.</b>				<b>4 credits</b>			
1.	DEIC-101: Creed and Doctrines (1900101)	2	0	0	2	-	University
2.	DEIC-102: Islamic Culture (1900102)	2	0	0	2	-	University
<b>Elective Courses (two courses).</b>				<b>4 credits</b>			
1.	DEIC-103: Islamic Morals and Occupational Ethics (1900103)	2	0	0	2	-	University
2.	DEIC-104: Studies in the Prophet's Biography (1900104)	2	0	0	2	-	University
3.	DEIC-105: Medical Jurisprudence (1900105)	2	0	0	2	-	University
4.	DEIC-106: Economy and Politics in Islam (1900106)	2	0	0	2	-	University
5.	DEIC-107: Social System and Family Behavior (1900107)	2	0	0	2	-	University

6.	DEIC-108: Management and Entrepreneurship (1900108)	2	0	0	2	-	University
7.	DEIC-109: Health and Fitness (1900109)	2	0	0	2	-	University
8.	DEIC-110: Research Skills (1900110)	2	0	0	2	-	University
9.	DEIC-111: Voluntary Work (1900111)	2	0	0	2	-	University
10.	DEIC-112: Medicine: Type and Usage (1900112)	2	0	0	2	-	University
11.	DEIC-113: Human Rights in Islam (1900113)	2	0	0	2	-	University
12.	DEIC-114: Food and Nutrition (1900114)	2	0	0	2	-	University
<b>College Core Requirements</b>					<b>31 credits</b>		
<b>Core Courses</b>					<b>28 credits</b>		
1	PHYS-101: General Physics 1 (0824101)	3	0	0	3	-	Phys Dept
2	PHYS-111: General physics 1 Lab (0824111)	0	0	1	1	-	Phys Dept
3	CHEM-101: General Chemistry 1 (0825101)	3	0	0	3	-	Chem Dept
4	CHEM-111: General Chemistry 1 Lab (0825111)	0	0	1	1	-	Chem Dept
5	BIO-101: General Biology (0826101)	3	0	0	3	-	Biol Sci Dept
6	BIO-111: General Biology Lab (0826111)	0	0	1	1	-	Biol Sci Dept
7	MATH-101: Calculus 1 (0827101)	3	1	0	4	-	Math Dept
8	MATH-102: Introduction to	3	0	0	3	-	Math Dept

	Computer Sciences (0827102)						
9	MATH-112: Introduction to Computer Sciences Lab (0827112)	0	0	1	1	-	Math Dept
10	MATH-103: Introduction to Statistics (0827103)	3	1	0	4	-	Math Dept
11	ARAB-103: Literary Appreciation (7402103)	2	0	0	2	-	University
12	ARAB-102: Arabic Editing (7402102)	2	0	0	2	-	University
<b>College Elective Courses (one course).</b>				<b>3 credits</b>			
1.	PHYS-426: Astronomy (0824426)	3	0	0	3	-	Phys Dept
2.	CHEM-421: Environmental Chemistry (0825421)	3	0	0	3	-	Chem Dept
3.	CHEM-203: Analytical Chemistry (0825203)	3	0	0	3	CHEM-101: General Chemistry 1 (0825101)	Chem Dept
4.	CHEM-208: Inorganic Chemistry (0825208)	3	0	0	3	CHEM-101: General Chemistry 1 (0825101)	Chem Dept
5.	MATH-204: Linear Algebra 1 (0827204)	3	0	0	3	-	Math Dept
6.	MATH-310: Probability Theory (0827310)	3	0	0	3	Introduction to Statistics (0827103)	Math Dept
<b>Department Requirements</b>				<b>93 credits</b>			
<b>Core Courses</b>				<b>76 credits</b>			
1.	BIO-201: Cell Biology (0826201)	2	0	0	2	General Biology (0826101)	Biol Sci Dept

<b>2.</b>	BIO-211: Cell Biology Lab (0826211)	0	0	1	1	-	Biol Sci Dept
<b>3.</b>	BIO -202: Invertebrates (0826202)	2	0	0	2	General Biology (0826101)	Biol Sci Dept
<b>4.</b>	BIO -212: Invertebrates Lab (0826212)	0	0	1	1	-	Biol Sci Dept
<b>5.</b>	BIO -213: Lab Techniques (0826213)	0	0	1	1	-	Biol Sci Dept
<b>6.</b>	BIO -204: Plant development and diversity (0826204)	2	0	0	2	General Biology (0826101)	Biol Sci Dept
<b>7.</b>	BIO -214: Plant development and diversity Lab (0826214)	0	0	1	1	-	Biol Sci Dept
<b>8.</b>	BIO -205: Histology (0826205)	2	0	0	2	Cell Biology (0826201)	Biol Sci Dept
<b>9.</b>	BIO -215: Histology Lab (0826215)	0	0	1	1	-	Biol Sci Dept
<b>10.</b>	BIO -206: General Microbiology (0826206)	2	0	0	2	General Biology (0826101)	Biol Sci Dept
<b>11.</b>	BIO -216: General Microbiology Lab (0826216)	0	0	1	1	-	Biol Sci Dept
<b>12.</b>	BIO -207: Plant Morphology and Anatomy (0826207)	2	0	0	2	General Biology (0826101)	Biol Sci Dept
<b>13.</b>	BIO -217: Plant Morphology and Anatomy Lab (0826217)	0	0	1	1	-	Biol Sci Dept
<b>14.</b>	BIO -208: General Genetics (0826208)	2	0	0	2	General Biology (0826101)	Biol Sci Dept
<b>15.</b>	BIO -218: General Genetics Lab (0826218)	0	0	1	1	-	Biol Sci Dept

<b>16.</b>	BIO -301: Comparative Vertebrate Anatomy (0826301)	2	0	0	2	General Biology (0826101)	Biol Sci Dept
<b>17.</b>	BIO -311 Comparative Vertebrate Anatomy Lab (0826311)	0	0	1	1	-	Biol Sci Dept
<b>18.</b>	BIO -302: Plant taxonomy and Flora (0826302)	2	0	0	2	Plant Morphology and Anatomy (0826207)	Biol Sci Dept
<b>19</b>	BIO -312: Plant taxonomy and Flora Lab (0826312)	0	0	1	1	-	Biol Sci Dept
<b>20.</b>	BIO -303: Microbial Physiology (0826303)	2	0	0	2	General Microbiology (0826206)	Biol Sci Dept
<b>21.</b>	BIO -313: Microbial Physiology Lab (0826313)	0	0	1	1	-	Biol Sci Dept
<b>22.</b>	BIO -304: Entomology (0826304)	2	0	0	2	Invertebrates (0826202)	Biol Sci Dept
<b>23.</b>	BIO -314: Entomology Lab (0825314)	0	0	1	1	-	Biol Sci Dept
<b>24.</b>	BIO -305: Molecular Biology (0826305)	2	0	0	2	Physical Chemistry 2 (0825301)	Biol Sci Dept
<b>25.</b>	BIO -315: Molecular Biology Lab (0826315)	0	0	1	1	-	Biol Sci Dept
<b>26.</b>	BIO -306: Plant Physiology (0826306)	3	0	0	3	Biochemistry (0825207)	Biol Sci Dept
<b>27.</b>	BIO -316: Plant Physiology Lab (0826316)	0	0	1	1	-	Biol Sci Dept
<b>28.</b>	BIO -307: Animal Physiology (0826307)	3	0	0	3	Histology (0826205)	Biol Sci Dept

29.	BIO -317: Animal Physiology Lab (0826317)	0	0	1	1	-	Biol Sci Dept
30.	BIO -399: Summer Training (0826399)	0	0	other	3	81 Gained Credit hours	Biol Sci Dept
31.	BIO -401 Plant Ecology (0826401)	3	0	0	3	Plant Taxonomy and Flora (0826302)	Biol Sci Dept
32.	BIO -411: Plant Ecology Lab (0826411)	0	0	1	1	-	Biol Sci Dept
33.	BIO-402: Developmental Biology (0826402)	2	0	0	2	Molecular Biology (0826305)	Biol Sci Dept
34.	BIO -412: Developmental Biology Lab (0826412)	0	0	1	1	-	Biol Sci Dept
35.	BIO-403: Parasitology (0826403)	2	0	0	2	Invertebrates (0826202)	Biol Sci Dept
36.	BIO -413: Parasitology Lab (0826413)	0	0	1	1	-	Biol Sci Dep
37.	BIO -404 Applied Microbiology (0826404)	2	0	0	2	Microbial Physiology (0826303)	Biol Sci Dept
38.	BIO -414: Applied Microbiology Lab (0826414)	0	0	1	1	-	Biol Sci Dept
39.	BIO -405: Plant Biotechnology (0826405)	2	0	0	2	Plant Physiology (0826306)	Biol Sci Dept
40.	BIO -415: Plant Biotechnology Lab (0826415)	0	0	1	1	-	Biol Sci Dept
41.	BIO -406: Graduation Project (0826406)	2	0	0	2	98 Gained credit hours	Biol Sci Dept
42.	BIO -407: Animal Ecology and Behavior (0826407)	2	0	0	2	Animal Physiology (0826307)	Biol Sci Dept
43.	BIO -417: Animal Ecology and	0	0	1	1	-	Biol Sci Dept



	Behavior Lab (0826417)						
44.	BIO -408: Immunology (0826408)	2	0	0	2	Animal Physiology (0826307)	Biol Sci Dept
45.	BIO -418 Immunology Lab (0826418)	0	0	1	1	-	Biol Sci Dept
46.	BIO -409: Economic Botany (0826409)	2	0	0	2	Plant Taxonomy and Flora (0826302)	Biol Sci Dept
47.	BIO -410: Medical Microbiology (0826410)	2	0	0	2	Applied Microbiology (0826404)	Biol Sci Dept
<b>Supporting Courses</b>		<b>8 credits</b>					
1.	CHEM- 202: Organic Chemistry 1 (0825202)	3	0	0	3	CHEM-101: General Chemistry 1 (0825101)	Chem Dept
2.	CHEM-212: Organic Chemistry 1 Lab (0825212)	0	0	1	1	-	Chem Dept
3.	CHEM-207: Biochemistry (0825207)	3	0	0	3	CHEM- 202: Organic Chemistry 1 (0825202)	Chem Dept
4.	CHEM-217: Biochemistry Lab (0825217)	0	0	1	1	-	Chem Dept
<b>Elective Courses (3 courses out of 10)</b>		<b>9 credits</b>					
1.	BIO -320: Microbial Genetics (0826320)	3	0	0	3	General Microbiology (0826206)	Biol Sci Dept
2.	BIO 321: Bioinformatics (0826321)	3	0	0	3	General Biology (0826101)	Biol Sci Dept
3.	BIO-322: Cell and Tissue Pathology (0826322)	3	0	0	3	Histology (0826205)	Biol Sci Dept
4.	BIO -323: Microbial Ecology (0826323)	3	0	0	3	General Microbiology (0826206)	Biol Sci Dept
5.	BIO -324: Plant – organism	3	0	0	3	Plant Morphology	Biol Sci Dept

	Interaction (0826324)					and Anatomy (0826207)	
<b>5.</b>	BIO -325: Petroleum Microbiology (0826325)	3	0	0	3	General Microbiology (0826206)	Biol Sci Dept
<b>6.</b>	BIO -420: Sustainable Plant Ecology (0826420)	3	0	0	3	Plant Ecology (0826401)	Biol Sci Dept
<b>7.</b>	BIO -421: Pest Control (0826421)	3	0	0	3	Entomology (0826304)	Biol Sci Dept
<b>8.</b>	BIO -422: Animal Biotechnology (0826422)	3	0	0	3	Molecular Biology (0826305)	Biol Sci Dept
<b>9.</b>	BIO -423: Applied Botany (0826423)	3	0	0	3	Plant Physiology (0826306)	Biol Sci Dept

**Bachelor of Science in Biology Study Plan**

<b>Level</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Required, Core or Elective</b>	<b>* Pre-Requisite Courses</b>	<b>Credit Hours</b>	<b>University, College or Department</b>
<b>Level1</b>	<b>0826101</b>	<b>General Biology</b>	<b>Required</b>	<b>-----</b>	<b>3</b>	<b>College</b>
	<b>0826111</b>	<b>General Biology lab</b>	<b>Required</b>	<b>-----</b>	<b>1</b>	<b>College</b>
	<b>0825101</b>	<b>General Chemistry 1</b>	<b>Required</b>	<b>-----</b>	<b>3</b>	<b>College</b>
	<b>0825111</b>	<b>General Chemistry 1 lab</b>	<b>Required</b>	<b>-----</b>	<b>1</b>	<b>College</b>
	<b>0827103</b>	<b>Introduction to Statistics</b>	<b>Required</b>	<b>-----</b>	<b>4</b>	<b>College</b>
	<b>7402103</b>	<b>Literary Appreciation</b>	<b>Required</b>	<b>-----</b>	<b>2</b>	<b>College</b>
	<b>19xxxxx</b>	<b>University elective, table1</b>	<b>Elective</b>	<b>-----</b>	<b>2</b>	<b>University</b>
<b>Total Semester Credit Hours</b>					<b>16</b>	

<b>Level</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Required, Core or Elective</b>	<b>* Pre-Requisite Courses</b>	<b>Credit Hours</b>	<b>University, College or Department</b>
<b>Level 2</b>	<b>7402102</b>	<b>Arabic Editing</b>	<b>Required</b>	<b>-----</b>	<b>2</b>	<b>College</b>
	<b>0827102</b>	<b>Introduction to Computer Sciences</b>	<b>Required</b>	<b>-----</b>	<b>3</b>	<b>College</b>
	<b>0827112</b>	<b>Introduction to Computer Sciences lab</b>	<b>Required</b>	<b>-----</b>	<b>1</b>	<b>College</b>
	<b>0827101</b>	<b>Calculus 1</b>	<b>Required</b>	<b>-----</b>	<b>4</b>	<b>College</b>
	<b>0824101</b>	<b>General Physics 1</b>	<b>Required</b>	<b>-----</b>	<b>3</b>	<b>College</b>
	<b>0824111</b>	<b>General Physics 1 lab</b>	<b>Required</b>	<b>-----</b>	<b>1</b>	<b>College</b>
	<b>19xxxxx</b>	<b>University Elective, table1</b>	<b>Elective</b>	<b>-----</b>	<b>2</b>	<b>University</b>
<b>Total Semester Credit Hours</b>					<b>16</b>	

<b>Level</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Required, Core or Elective</b>	<b>* Pre-Requisite Courses</b>	<b>Credit Hours</b>	<b>University, College or Department</b>
<b>Level 3</b>	<b>0826201</b>	<b>Cell Biology</b>	<b>Core</b>	<b>0826101</b>	<b>2</b>	<b>Biol Sci Dept</b>
	<b>0826211</b>	<b>Cell Biology lab</b>	<b>Core</b>	<b>-----</b>	<b>1</b>	<b>Biol Sci Dept</b>
	<b>0826202</b>	<b>Invertebrates</b>	<b>Core</b>	<b>0826101</b>	<b>2</b>	<b>Biol Sci Dept</b>
	<b>0826212</b>	<b>Invertebrates lab</b>	<b>Core</b>	<b>-----</b>	<b>1</b>	<b>Biol Sci Dept</b>
	<b>0826213</b>	<b>Lab techniques</b>	<b>Core</b>	<b>-----</b>	<b>1</b>	<b>Biol Sci Dept</b>
	<b>0826204</b>	<b>Plant development and diversity</b>	<b>Core</b>	<b>0826101</b>	<b>2</b>	<b>Biol Sci Dept</b>
	<b>0826214</b>	<b>Plant development and diversity lab</b>	<b>Core</b>	<b>-----</b>	<b>1</b>	<b>Biol Sci Dept</b>
	<b>0825202</b>	<b>Organic Chemistry 1</b>	<b>Required</b>	<b>0825101</b>	<b>3</b>	<b>Chem Dept</b>
	<b>0825212</b>	<b>Organic Chemistry 1 lab</b>	<b>Required</b>	<b>-----</b>	<b>1</b>	<b>Chem Dept</b>
	<b>1900101</b>	<b>Creed and doctrines</b>	<b>Required</b>	<b>-----</b>	<b>2</b>	<b>University</b>
<b>Total Semester Credit Hours</b>					<b>16</b>	

Level	Course Code	Course Title	Required, Core or Elective	* Pre-Requisite Courses	Credit Hours	University, College or Department
Level 4	0826205	Histology	Core	0826201	2	Biol Sci Dept
	0826215	Histology lab	Core	-----	1	Biol Sci Dept
	0826206	General Microbiology	Core	0826101	2	Biol Sci Dept
	0826216	General Microbiology lab	Core	-----	1	Biol Sci Dept
	0826207	Plant Morphology and Anatomy	Core	0826101	2	Biol Sci Dept
	0826217	Plant Morphology and Anatomy lab	Core	-----	1	Biol Sci Dept
	0826208	General Genetics	Core	0826101	2	Biol Sci Dept
	0826218	General Genetics lab	Core	-----	1	Biol Sci Dept
	0825207	Biochemistry	Required	0825202	3	Chem Dept
	0825217	Biochemistry lab	Required	-----	1	Chem Dept
	1900102	Islamic Culture	Required	-----	2	University
<b>Total Semester Credit Hours</b>					<b>18</b>	

<b>Level</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Required, Core or Elective</b>	<b>* Pre-Requisite Courses</b>	<b>Credit Hours</b>	<b>University, College or Department</b>
<b>Level 5</b>	<b>0826301</b>	<b>Comparative Vertebrate Anatomy</b>	<b>Core</b>	<b>0826101</b>	<b>2</b>	<b>Biol Sci Dept</b>
	<b>0826311</b>	<b>Comparative Vertebrate Anatomy lab</b>	<b>Core</b>	<b>----</b>	<b>1</b>	<b>Biol Sci Dept</b>
	<b>0826302</b>	<b>Plant Taxonomy and Flora</b>	<b>Core</b>	<b>0826207</b>	<b>2</b>	<b>Biol Sci Dept</b>
	<b>0826312</b>	<b>Plant Taxonomy and Flora lab</b>	<b>Core</b>	<b>----</b>	<b>1</b>	<b>Biol Sci Dept</b>
	<b>0826303</b>	<b>Microbial Physiology</b>	<b>Core</b>	<b>0826206</b>	<b>2</b>	<b>Biol Sci Dept</b>
	<b>0826313</b>	<b>Microbial Physiology lab</b>	<b>Core</b>	<b>----</b>	<b>1</b>	<b>Biol Sci Dept</b>
	<b>082Xxxx</b>	<b>College Elective, table2</b>	<b>Elective</b>	<b>----</b>	<b>3</b>	<b>College</b>
	<b>0826xxx</b>	<b>Department Elective, table3</b>	<b>Elective</b>	<b>----</b>	<b>3</b>	<b>Biol Sci Dept</b>
<b>Total Semester Credit Hours</b>					<b>15</b>	

<b>Level</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Required, Core or Elective</b>	<b>* Pre-Requisite Courses</b>	<b>Credit Hours</b>	<b>University, College or Department</b>
<b>Level 6</b>	<b>0826304</b>	<b>Entomology</b>	<b>Core</b>	<b>0826202</b>	<b>2</b>	<b>Biol Sci Dept</b>
	<b>0826314</b>	<b>Entomology lab</b>	<b>Core</b>	<b>-----</b>	<b>1</b>	<b>Biol Sci Dept</b>
	<b>0826305</b>	<b>Molecular Biology</b>	<b>Core</b>	<b>0826208</b>	<b>2</b>	<b>Biol Sci Dept</b>
	<b>0826315</b>	<b>Molecular Biology lab</b>	<b>Core</b>		<b>1</b>	<b>Biol Sci Dept</b>
	<b>0826306</b>	<b>Plant Physiology</b>	<b>Core</b>	<b>0825207</b>	<b>3</b>	<b>Biol Sci Dept</b>
	<b>0826316</b>	<b>Plant Physiology lab</b>	<b>Core</b>	<b>-----</b>	<b>1</b>	<b>Biol Sci Dept</b>
	<b>0826307</b>	<b>Animal Physiology</b>	<b>Core</b>	<b>0826205</b>	<b>3</b>	<b>Biol Sci Dept</b>
	<b>0826317</b>	<b>Animal Physiology lab</b>	<b>Core</b>	<b>-----</b>	<b>1</b>	<b>Biol Sci Dept</b>
<b>Total Semester Credit Hours</b>					<b>14</b>	
<b>Summer</b>	<b>0826399</b>	<b>Summer Training</b>	<b>Core</b>	<b>81 Gained hours</b>	<b>3</b>	<b>Biol Sci Dept</b>



Level	Course Code	Course Title	Required, Core or Elective	* Pre-Requisite Courses	Credit Hours	University, College or Department
Level 7	0826401	Plant Ecology	Core	0826302	3	Biol Sci Dept
	0826411	Plant Ecology lab	Core	-----	1	Biol Sci Dept
	0826402	Developmental Biology	Core	0826305	2	Biol Sci Dept
	0826412	Developmental Biology lab	Core	-----	1	Biol Sci Dept
	0826403	Parasitology	Core	0826202	2	Biol Sci Dept
	0826413	Parasitology lab	Core	-----	1	Biol Sci Dept
	0826404	Applied Microbiology	Core	0826303	2	Biol Sci Dept
	0826414	Applied Microbiology lab	Core	-----	1	Biol Sci Dept
	0826405	Plant Biotechnology	Core	0826306	2	Biol Sci Dept
	0826415	Plant Biotechnology lab	Core	-----	1	Biol Sci Dept
	0826406	Graduation Project	Core	98 Gained hours	2	Biol Sci Dept
<b>Total Semester Credit Hours</b>					<b>18</b>	

<b>Level</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Required, Core or Elective</b>	<b>* Pre-Requisite Courses</b>	<b>Credit Hours</b>	<b>University, College or Department</b>
<b>Level 8</b>	<b>0826407</b>	<b>Animal Ecology and Behavior</b>	<b>Core</b>	<b>0826307</b>	<b>2</b>	<b>Biol Sci Dept</b>
	<b>0826417</b>	<b>Animal Ecology and Behavior lab</b>	<b>Core</b>	<b>-----</b>	<b>1</b>	<b>Biol Sci Dept</b>
	<b>0826408</b>	<b>Immunology</b>	<b>Core</b>	<b>0826307</b>	<b>2</b>	<b>Biol Sci Dept</b>
	<b>0826418</b>	<b>Immunology lab</b>	<b>Core</b>	<b>-----</b>	<b>1</b>	<b>Biol Sci Dept</b>
	<b>0826409</b>	<b>Economic Botany</b>	<b>Core</b>	<b>0826302</b>	<b>2</b>	<b>Biol Sci Dept</b>
	<b>0826410</b>	<b>Medical Microbiology</b>	<b>Core</b>	<b>0826404</b>	<b>2</b>	<b>Biol Sci Dept</b>
	<b>0826xxx</b>	<b>Department Elective, table3</b>	<b>Elective</b>	<b>-----</b>	<b>3</b>	<b>Biol Sci Dept</b>
<b>0826xxx</b>	<b>Department Elective, table3</b>	<b>Elective</b>	<b>-----</b>	<b>3</b>	<b>Biol Sci Dept</b>	
<b>Total Semester Credit Hours</b>					<b>16</b>	

**Table 1: Students must select two courses from the University elective courses**

<b>Course number</b>	<b>Course title</b>	<b>Credits</b>
1900103	Islamic morals and Occupational Ethics	2
1900104	Studies in the Prophet's Biography	2
1900105	Medical jurisprudence	2
1900106	Economy and politics in Islam	2
1900107	Social system and family behavior	2
1900108	Management and Entrepreneurship	2
1900109	Health & Fitness	2
1900110	Research skills	2
1900111	Volunteer work	2
1900112	Medicine: Type and use	2
1900113	Human Rights in Islam	2
1900114	Food and Nutrition	2

<b>Table 2: Students must select one course from the College elective courses</b>					
<b>Course number</b>	<b>Course title</b>	<b>Lecture</b>	<b>Practice</b>	<b>Lab</b>	<b>Prerequisites</b>
<b>0824426</b>	<b>Astronomy</b>	<b>3</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>0827204</b>	<b>Linear algebra 1</b>	<b>3</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>0827310</b>	<b>Probability Theory</b>	<b>3</b>	<b>-</b>	<b>-</b>	<b>0827103</b>
<b>0825203</b>	<b>Analytical chemistry</b>	<b>3</b>	<b>-</b>	<b>-</b>	<b>0825101</b>
<b>0825208</b>	<b>Inorganic chemistry</b>	<b>3</b>	<b>-</b>	<b>-</b>	<b>0825101</b>
<b>0825421</b>	<b>Environmental chemistry</b>	<b>3</b>	<b>-</b>	<b>-</b>	<b>-</b>

<b>Table 3: Students must select three courses from the Department elective courses</b>					
<b>Course number</b>	<b>Course title</b>	<b>Lecture</b>	<b>Practice</b>	<b>Lab</b>	<b>Prerequisites</b>
<b>0826320</b>	<b>Microbial Genetics</b>	<b>3</b>	<b>-</b>	<b>-</b>	<b>0826206</b>
<b>0826321</b>	<b>Bioinformatics</b>	<b>3</b>	<b>-</b>	<b>-</b>	<b>0826101</b>
<b>0826322</b>	<b>Cell and Tissue Pathology</b>	<b>3</b>	<b>-</b>	<b>-</b>	<b>0826205</b>
<b>08263203</b>	<b>Microbial Ecology</b>	<b>3</b>	<b>-</b>	<b>-</b>	<b>0826206</b>
<b>0826324</b>	<b>Plant-organism Interactions</b>	<b>3</b>	<b>-</b>	<b>-</b>	<b>0826207</b>
<b>0826325</b>	<b>Petroleum Microbiology</b>	<b>3</b>	<b>-</b>	<b>-</b>	<b>0826206</b>
<b>0826420</b>	<b>Sustainable Plant Ecology</b>	<b>3</b>	<b>-</b>	<b>-</b>	<b>0826401</b>
<b>0826421</b>	<b>Pest Control</b>	<b>3</b>	<b>-</b>	<b>-</b>	<b>0826304</b>
<b>0826422</b>	<b>Animal Biotechnology</b>	<b>3</b>	<b>-</b>	<b>-</b>	<b>0826305</b>
<b>0826423</b>	<b>Applied Botany</b>	<b>3</b>	<b>-</b>	<b>-</b>	<b>0826306</b>

## Course Descriptions

### A. Specialization Requirements

#### 1. Cell Biology 0826201 (2 credit)

The course will cover basic concepts of cells as a unit of life. Topics include the biochemical structure of macromolecules of the cell, the structure and function of eukaryotic cell organelles including cell membrane and cytoskeleton. The course will focus on the mechanisms of cell-cell communications, cellular protein secretion, cytoskeleton dynamics, cellular bioenergetics, cell reproduction and cell death.

Pre-requisites for this course (if any): 0826-101

Co-requisites for this course (if any): None

Textbook:

- Lisa A. et al., (2016). Campbell Biology-Pearson , 11th edition, Pearson Education, Inc., USA

#### 2. Cell Biology Lab 0826211 (1 credit)

This course will provide the laboratory techniques to understand the basic and fundamental concepts of cell biology. The course will focus on training the students for the use of basic microscope, cell culture techniques, experimental preparation of animal and plant cells and observation of electron microscopic images of all subcellular organelles

Co-requisites for this course (if any): 0826-201

Textbook:

- Stephen R Bolsver, et al. (2011). Cell Biology, A short course. 3rd Edition, A JOHN WILEY & SONS, INC. Hoboken, New Jersey, USA

#### 3. Invertebrates 0826202 (2 credit)

The course will cover the principles of invertebrates classification and binomial nomenclature. It will also differentiate between invertebrates groups (phyla) and classify invertebrates. Other topics include importance of invertebrates to human life and life cycles of most important invertebrate animals.

Pre-requisites for this course (if any): 0826-101

Co-requisites for this course (if any): None

Textbook:

-Kotpal, R. L. (2014): Modern Textbook of Zoology – Invertebrates. 11th edition. Rastogi Publications, Uttar Pradesh, India

**4. Invertebrates Lab 0826212 (1 credit)**

The present course covers a wide range of topics related to classification, and characteristic features of invertebrate groups.

Co-requisites for this course (if any): 0826202

Textbook:

Lal, S. S. (2016): Practical Zoology Invertebrate. 11th edition. Rastogi Publications, Uttar Pradesh, India.

**5. Lab techniques 0826213 (1 credit)**

This course describe information about the materials and technologies used in preservation and preparation of animal and plant specimens, and the application of these technologies.

Pre-requisites for this course (if any): None

Co-requisites for this course (if any): None

Textbook:

Edward Chee Tak Yeung, Claudio Stasolla, Michael John Sumner, Bing Quan Huang (2015). Plant Microtechniques and Protocols.

**6. Plant Development and Diversity 0826 204 (2 credit)**

The aim of this course is to provide a basic background of plant kingdom diversity, structure, classification and evolution. The course starts with lower plants, following the evolutionary progression to higher plants (from Bryophyta to Tracheophyta). All groups classified as plants in the six-kingdom system of classification is used. Examples are emphasized and economic importance of the various groups.

Pre-requisites for this course (if any): 0826-101

Co-requisites for this course (if any): None

Textbook:

Tran D. Thang Do N. Dai (2016): Bryophytes, Pteridophytes, and Gymnosperms. Intelliz Press LLC.

**7. Plant Development and Diversity Lab (0826 214) (1 credit)**

This course aims to provide the students with the knowledge about the basic structure, classification and diversity of plant kingdom. The course includes different slides and samples show the main characters of some examples of Bryophyta, Pteridophyta, Gymnosperms and Angiosperms.

Co-requisites for this course (if any): 0826- 204

Textbook:

Mohammed Gufran, Khanshitie Gatew and Bedilu Bekele (2012): Practical Manual For Bryophytes And Pteridophytes. LAP Lambert Academic Publishing.

**8. Organic chemistry 1 0825202 (3 credits)**

The course aims to introduce students to basic knowledge and principle in organic chemistry. The following topics will be covered during this course: Fundamentals of organic chemistry, molecular structure, properties and reactivity of organic molecules. Organic functional groups. Fundamental reactions of organic chemistry. A study of different classes of aliphatic compounds, their nomenclatures, physical properties, preparations, reactions, reaction mechanism, stereochemistry, and common uses. Detailed coverage of hydrocarbons, cyclic compounds, alkyl halides, alcohols, ethers, epoxides, aldehydes and ketones, carboxylic acids and their derivatives, amines, and Sulphur compounds.

Pre-requisites for this course (if any): 0825101

Co-requisites for this course (if any): None

Textbook:

J. McMurry (2016), 9<sup>th</sup> edition. Organic Chemistry. Brooks/Cole.

Organic Chemistry (7th Edition) by Paula Yurkanis Bruice, Prentice Hall publishing.

**9. Organic chemistry 1 Lab 0825212 (1 credit)**

Selected experiments in Organic Chemistry 1 including purification of organic liquids and solids (distillation, crystallization and re-crystallization); measurements of melting points and boiling points; assignee test &



characterization of the different classes of organic functional groups; Characterization of hydrocarbons (saturated and unsaturated); Characterization and identification of alkyl halides, alcohols, phenols, aldehydes, ketones, carboxylic acids, amides and amines.

Pre-requisites for this course: General Chemistry 1 Lab (0825111)

Co-requisites for this course: Organic Chemistry 1 (0825202)

Textbook:

J. R. Mohrig, D. Alberg, G. Hofmeister, P. F. Schatz and C. N. Hammond (2014), 4th edition. Laboratory Techniques in Organic Chemistry. W.H. Freeman and Company.

**10. Histology 0826205 (2 credit)**

The course deals with fundamental concepts of basic tissues: (1) epithelial tissues; (2) connective tissues, including blood, bone and cartilage; (3) muscular tissues; and (4) nervous tissues. The course also provides an overview of the tissue organization of organs in relation to their function, as of respiration, digestion, etc.

Pre-requisites for this course (if any): 0826201

Co-requisites for this course (if any): None

Textbook:

Junqueira, L.C.U and Carneiro, J. (2005). Basic Histology, 11th edition, McGraw-Hill, Medical Pub. Division, New York.

**11. Histology Lab 0826215 (1 credit)**

The course will focus on the microscopic architecture of the basic types of animal tissues, i.e., epithelium, connective tissue, muscle and nerve. The Lab topics will also include detailed histomorphology of body organs. Cells, fundamental tissues and organs will be studied with gross slides and microscopes. In addition, digital images of light and electron microscopic preparations will be used.

Co-requisites for this course (if any): 0826205

Textbook:

Gartner, L.P. and James L.H. (2006). Color Atlas of Histology. 4th edition, Lippincott Williams and Wilkins, Philadelphia.

**12. General Microbiology 0826206 (2 credit)**

This course covers basic principles of microbiology. The course will cover characteristic, classification, structure of microorganisms. Topics include prokaryotic and eukaryotic microorganisms such as viruses, bacteria, cyanobacteria, microalgae, actinomycetes and fungi. Furthermore, their life cycles and interaction with each other as well as their interaction with the environment.

Pre-requisites for this course (if any): 0826-101

Co-requisites for this course (if any): None

Textbook:

Madigan, Michael T., John M. Martinko, and Jack Parker. Brock biology of microorganisms.13th edition. [Benjamin Cummings, Boston, MA).

**13. General Microbiology Lab 0826216 (1 credit)**

This course includes standard microbiological techniques commonly used in microbiology labs such as sterilization, preparation of growth media, isolation and purification of different microbes. Microscopic examination of different groups of microorganisms and introduction to biochemical activities of microorganisms will also be covered.

Co-requisites for this course (if any): 0826-206

Textbook:

Goldman, Emanuel; Green, Lorrence H (2015). Practical Handbook of Microbiology, Third Edition. Publisher: CRC Press, Year: 2015, ISBN: 978-1-4665-8740-3,1466587407

**14. Plant Morphology and Anatomy (0826 207) (2 credit)**

This course is an introduction to the basic external and internal structure of vascular plants. A full study of morphology of different plant organs and a detail anatomical study of plant cell, tissues and organs will be studied in this course. At the end of the course, the students will have good knowledge about vascular plants structure and their adaptation to the environmental conditions. Also, students will be able to compare between different organs and groups of plants depending on their morphological and anatomical features.

Pre-requisites for this course (if any): 0826-101

Co-requisites for this course (if any): None

Textbook:

Beck B. Charles (2010): An Introduction to Plant Structure and Development - Plant Anatomy for the Twenty-First Century. Cambridge University Press.

Bryan A (2008): Plant Form: An Illustrated Guide to Flowering Plant Morphology. Timber Press; New edition.

**15. Plant Morphology and Anatomy Lab (0826 217) (1 credit)**

This course aims to provide students with practical skills and knowledge required for understanding external and internal structures of different plant organs. During the course, students will prepare high quality of morphological samples and slides.

Co-requisites for this course (if any): 0826-207

Textbook:

Rajan S. Sundara (2003): Practical Manual of Plant Anatomy and Embryology. Anmol Publications Pvt Ltd.

**16. General Genetics (0826 208) (2 credit)**

The initial part of the course will focus on the classical principles of genetics emphasizing Mendelian and non-Mendelian inheritance, Mendelian Laws and exception to Mendel's laws such as incomplete dominance, epistasis, Gene interactions and evolutionary genetics. The course will consist of other various topics including inheritance of Autosomes versus sex-linked traits, recombination and gene mapping, Human mutations, Introduction to the laws of probability and Biometry. The Hardy-Weinberg principle and population genetics. The composition and structure of DNA, RNA and protein and describe the structure and function of a gene.

Pre-requisites for this course (if any): 0826-101

Co-requisites for this course (if any): None

Textbook:

Brooker, R. J. (2011). Genetics, Analysis and Principles, Mc Graw-Hill, NY, USA. ISBN: 0073525286,9780073525280.

**17. General Genetics Lab (0826 218) (1 credit)**

This course covers principles of practical genetics including: Preparation of mitosis and meiosis stages by squash method in Onion and Zea maize flowers. Mendelian ratios, endosperm color in Zea maize ears (Black and white, sugary and starchy etc.). Investigation of polytene chromosomes and linkage in fruit fly in addition to sickle cell smears and human blood group.

Co-requisites for this course (if any): 0826-218

Textbook:

Lewis, R., (2014). Human Genetics, Concepts and Applications, 7th ed., McGraw Hill Higher Education, Boston, USA. . ISBN-13 978-0-07-110689-4.

**18. Biochemistry 0825207 (3 credit)**

The course explores the basic principles of biochemistry by providing molecular composition and understanding of living cells. It includes the following topics: Structure, synthesis, configuration and function of biological molecules (carbohydrates, proteins, lipids, and nucleic acids), enzymology, special properties of biological membranes, hormones, vitamins and metabolic pathways.

Pre-requisites for this course: Organic Chemistry 1 (0825202)

Co-requisites for this course: None

Textbook:

V. W. Rodwell, D. Bender and K. M. Botham (2018), 31st edition. Harper's Illustrated Biochemistry. McGraw-Hill Education.

**19. Biochemistry Lab 0825217 (1 credit)**

This course aims to introduce some of the most widely used experimental procedures in biochemistry, including qualitative determination and quantitative estimation of the major biological molecules (carbohydrates, lipids, proteins and amino acids) as well as enzyme assays and kinetics.

Pre-requisites for this course: Organic Chemistry 1 Lab (0825212)

Co-requisites for this course: Biochemistry (0825207)

Textbook:

A. Hofmann and S. Clokie (2018), 8th edition. Wilson and Walker's Principles and Techniques of Biochemistry and Molecular Biology. Cambridge University Press.

**20. Comparative Vertebrate Anatomy 0826301 (2 credit)**

This course Deals with comparative anatomical structures of different classes of vertebrates including: Integumentary, Skeletal, Muscular, Circulatory, Excretory , and Nervous system. An emphasis on the functional significance of structures and how suit to fit to different ecological conditions will be addressed.

Pre-requisites for this course (if any): 0826-101

Co-requisites for this course (if any): None

Textbook:

- Comparative Vertebrate Anatomy: A Laboratory Dissection Guide by Kenneth Kardong and Edward Zalisko (Feb 18, 2011).

**21. Comparative Vertebrate Anatomy Lab 0826311 (1 credit)**

The course will focus on the structural and functional dermal and skeletal system involved in regulating animal development. Laboratories use live material whenever possible for specific topics including formation of early body exoskeleton, organogenesis, and morphogenesis. This course deals also with the structure of the skin among vertebrates referring the exoskeletal derivatives and the endoskeleton.

The course investigates the structural and functional of dermal and skeletal system involved in regulating animal development. Laboratories use live material whenever possible for Specific topics include formation of early body exoskeleton, organogenesis, morphogenesis, .This course study the structure of the skin among vertebrates referring the exoskeletal derivatives and the endoskeleton

Co-requisites for this course (if any): 0826- 301

Textbook:

Comparative Anatomy of the Vertebrates 1997, by George C. Kent and Larry Miller. Wm. C. Brown Publishers. ISBN # 0-697-24378-8.

**22. Plant Taxonomy and Flora 0826 302 (2credit)**

This course is composed of two parts, flowering plant taxonomy and Flora of KSA. The part of Taxonomy will introduce the principles of flowering plant taxonomy. The students will study history and methods of plant taxonomy, flower as a reproductive organ, pollination and fertilization as well as sources of taxonomy characters such as inflorescence and fruits. The course also addresses families' description and identification. In the Flora part, phytogeography of KSA is addressed together with herbarium establishment with special focus on plant collection and preservation. The course also includes a general survey of Flora of KSA and Al-Ahsaa specifically.

Pre-requisites for this course (if any): 0826-207

Co-requisites for this course (if any): None

Textbook:

Balfour A (2016): Plant Taxonomy. Amazon, ISBN-13: 978-1682862704

Migahid A M (2014): Flora of Saudi Arabia. King Saud University.

**23. Plant Taxonomy and Flora Lab 0826 312 (1 credit)**

This practical course is divided into two distinct themes with a practical exam dedicated to each theme: Taxonomy and Flora. In Taxonomy part, students will study the flower, floral parts and the floral formulas and diagram of different families representing major groups of flowering plants. In the Flora part, the establishment of Herbarium and Plant collection and preservation is studied. Also the flora from KSA in general and from Al-Ahsaa specifically will be focused on.

Co-requisites for this course (if any): 0826302

Textbook:

Sinha R K (2010): Practical Taxonomy of Angiosperms. I.K. International Publishing House Pvt. Limited

Migahid, Ahmad Mohammad (2014): Flora of Saudi Arabia. King Saud University.

**24. Microbial Physiology 0826303 (2 credit)**

This course focuses on the microbial physiological processes that are performed by microorganisms with examples from bacteria, fungi and microalgae. The

course gives an overview of central metabolic pathways with some reference to their ecological and biotechnological importance.

Pre-requisites for this course (if any): 0826-206

Co-requisites for this course (if any): None

Textbook:

Madigan, M.T., J.M. Martinko, D. Stahl, and D.P. Clark. 2010. Brock: Biology of Microorganisms (14th or 13th eds.), Prentice Hall (ISBN: 9780321649638).

David White, James Drummond and Clay Fuqua (2012). The Physiology and Biochemistry of Prokaryotes. Published by Oxford University Press, Inc.

**25. Microbial Physiology Lab 0826313 (1 credit)**

The course focuses on experimentally studying the different microorganisms and their different modes of nutrition and growth requirements. Different physiological processes are addressed such as aerobic respiration, fermentation, photosynthesis and nitrogen fixation. Stress tolerance and antibiotic resistance are also demonstrated.

Co-requisites for this course (if any): 0826303

Textbook:

Madigan, M.T., J.M. Martinko, D. Stahl, and D.P. Clark. 2010. Brock: Biology of Microorganisms (14th or 13th eds.), Prentice Hall (ISBN: 9780321649638).

David White, James Drummond and Clay Fuqua (2012). The Physiology and Biochemistry of Prokaryotes. Published by Oxford University Press, Inc.

**26. Entomology 0826304 (2 credit)**

The course introduces the internal and external structures of insects and their functions, classification and identification. Topics also include an introduction to insect control, recognition of economically important beneficial and destructive insects, with special emphasis on their life histories and behavior.

Pre-requisites for this course (if any): 0826-202

Co-requisites for this course (if any): None

Textbook:

P. J. Gullan and P. S. Cranston (2014), 5th edition. The insects: an outline of entomology. Wiley-Blackwell.

**27. Entomology Lab 0826314 (1 credit)**

The course includes basic morphological and anatomical features of insects as well as insect classification. The course will focus on some economic and medical insects and use of insecticides for insect control.

Co-requisites for this course (if any): 0826- 304

Textbook:

M. M. Trigunayat (2016), 5th edition. A Manual of Practical Entomology 3rd Edition. Scientific Publisher.

**28. Molecular Biology 0826305 (2 credit)**

This course introduces student to the genetic materials: Nucleic acids as well as proteins. This course will highlight some of the concepts learned in other courses such as General Genetics, only at the molecular level. Students are also introduced to the reasoning behind experiments while practicing some related techniques in the laboratory. This course, also, aims to prepare students to apply knowledge and techniques of molecular biology in answering questions by designing and executing experiments at the graduate level and analyzing the obtained data.

Pre-requisites for this course (if any): 0826-208

Co-requisites for this course (if any): None

Textbook:

- Molecular Biology of the cell 2014; 6th Edition. Alberts et al. New York: Garland Science. ISBN: 9780815344322.

**29. Molecular Biology Lab 0826315 (1 credit)**

This course introduces student to the fundamental techniques of molecular biology like, extraction of genomic DNA from plant tissues and bacteria, the use of PCR in DNA replication, Gel electrophoresis, restriction digestion and cloning of DNA. Learning the extraction of RNA and an introduction to bioinformatics gene bank and blast is necessary.

Co-requisites for this course (if any): 0826- 305

Textbook:



- John Wilson, Tim Hunt (2014). Molecular Biology of the Cell. The Problems Book. Publisher: Garland Science. 6th Edition. ISBN: 0815344538,9780815344537.

**30. Plant Physiology 0826 306 (3 credit)**

The course provides an introduction to basic principles of plant function including physical processes occurring in plants, water relations in whole plants and plant tissues, cell physiology and biochemistry, plant mineral nutrition, and growth and development. Also, the course addresses important environmental factors influencing plant growth and how plants reacting to these factors.

Pre-requisites for this course (if any): 0825 - 207

Co-requisites for this course (if any): None

Textbook:

Taiz, L. and Zeiger, E. (2015): Plant physiology, 6th ed. Publisher: Sinauer Associates.

Hopkins, W. G. and Hüner, N.PA (2008): Introduction to Plant Physiology, 4th ed. John Wiley & Sons.

**31. Plant Physiology Lab 0826 316 (1 credit)**

This course consists of a series of laboratory experiments and exercises to familiarize students with main concepts and phenomena in plant physiology. During the course, students will perform and demonstrate experiments about some topics in plant physiology as water relations, mineral nutrition, photosynthesis, respiration and plant growth regulators.

Co-requisites for this course (if any): 0826 – 306

Textbook:

Acharyya Choudhuri, M and Gupta, K. K. (2009): Practical plant physiology, New Central Book Agency ISBN-13: 978-8173819322

Aldesuquy, H. S. (2008): Practical plant physiology. Gazirat Al- Ward Library- Cairo- Egypt. Number 3878/ 2008, ISBN 3878/ 2008

**32. Animal physiology 0826307 (3 credit)**

The course will study the physiology of different principal body systems in animals, how they operate and how they are regulated. Topics include nervous,

muscular, cardiovascular, respiratory, renal, digestive, and endocrine physiology. The coordination between systems will be in focus.

Pre-requisites for this course (if any): 0826-205

Co-requisites for this course (if any): None

Textbook:

Fox, S. I. (2012): Human Physiology. 13th Edition (International Edition), Mc Grow-Hill Companies, New York, USA.

**33. Animal physiology Lab 0826317 (1 credit)**

The practical course describes how different systems work in detail with special experiments for each system. Disease markers rates detection will be studied in comparing with healthy ones. Focus light on the physiology of different systems in healthy and diseased status.

Co-requisites for this course (if any): 0826- 307

Textbook:

C.L., M.D. Ghai (2013): A Textbook of Practical Physiology: Jaypee Brothers Medical Publishers (P) Ltd, New Delhi.

**34. Plant Ecology 0826 401 (3 credit)**

Plant Ecology is the study of plants in relation to their environment. The course explores the definition of the Ecology, ecosystem components, environmental succession, plant communities and their general characteristics. It covers both autecology and synecology so that students recognize the spectrum of environmental factors (abiotic and biotic) and how these factors influence individual plant and communities. The course includes studies on the bio-geochemical cycles, different levels of organization of living matter and mechanisms of plant adaptation to their habitats (Hydrophytes, Xerophytes and Mesophytes). It focuses on the succession, ecosystem conservation, dynamics of communities and ecosystems as well as the human impact and the effect of environmental pollution (sources and types of pollutants), and global change on plant ecology.

Pre-requisites for this course (if any): 0826- 302

Co-requisites for this course (if any): None

Textbook:

Paul A. Keddy (2017). Plant Ecology: Origins, Processes, Consequences (2nd Edition). Cambridge University Press, University Printing House, Cambridge CB2 8BS, United Kingdom.

**35. Plant Ecology Lab 0826 411 (1 credit)**

The course provides students with principal knowledge and concepts of plant ecology. During this course students will recognize and measure some climatic and edaphic factors (determination of soil parameters such as physical and chemical soil properties). They could analyze different types of vegetation and plant communities. The relationships between plants and their environment will also be included.

Co-requisites for this course (if any): 0826-401

Textbook:

D.R. Chalise, A. Sharma (2012). Fundamentals of Soil Science and Geology: Physico-chemical properties of soil and soil genesis. LAMBERT Academic Publishing.

**36. Developmental Biology 0826402 (2 credit)**

Course covers the current understanding of animal development at tissue, cellular, and molecular levels. Specific topics include formation of early body plan, cell type determination, organogenesis and morphogenesis.

Pre-requisites for this course (if any): 0826- 305

Co-requisites for this course (if any): None

Textbook:

Scott F. Gilbert, Developmental Biology, 9th Edition. Sinauer Associates, 2010.

**37. Developmental Biology Lab 0826412 (1 credit)**

The course investigates the cellular and molecular processes involved in regulating animal development. Laboratories use live material whenever possible for Specific topics include formation of early body plan, cell type determination, organogenesis, morphogenesis, role do embryonic and adult stem cells play during development.

Co-requisites for this course (if any): 0826- 402

Textbook:

Manuel Marí-Beffa and Jennifer Knight (2009). Key Experiments in Practical Developmental Biology. Cambridge University Press, UK.

**38. Parasitology 0826403 (2 credit)**

This course shall give a broad view of general parasitology with respect to types of parasites, type of hosts, relationship between parasite and host, effect of parasitism on hosts, study on some important protozoa, helminths and arthropods that infect man and animals in relation to their (classification, distribution, habitat, morphology, life cycle and pathogenicity).

Pre-requisites for this course (if any): 0826202

Co-requisites for this course (if any): None

Textbook:

L Roberts, J Janovy, Jr. and Nadler (2013):" Foundations of parasitology, 9th Ed", McGraw-Hill Education.

**39. Parasitology Lab 0826413 (1 credit)**

The course will examine and identify the microscopic morphology of commonly occurring parasites and their life cycle-stages in fixed stained smears, in addition to study different protozoa, helminths and arthropods and their hosts with special emphasis on the taxonomy, morphology, life cycles, and histopathology.

Co-requisites for this course (if any): 0826-403

Textbook:

Schmids, G.D. and Roberts ,L.S. (2000):"FOUNDATIONS OF PARASITOLOGY".McGraw Hill.

**40. Applied Microbiology 0826404 (2 credit)**

This course covers principles of applied microbiology and microbial technology. The course provides an overview on the utilization and application of microbes in different products and processes. Moreover, the course discusses the interrelationship between microbes and the environment in which they exist, changes that microorganisms do in (water, dairy, sewage, food, industry).

Pre-requisites for this course (if any): 0826303

Co-requisites for this course (if any): None

Textbook:

M.J. Waites, N.L. Morgan, J.S. Rockney & G. Highton. Industrial Microbiology. An Introduction , Blackwell Science Publishers, 2001; ISBN 0-63205307-0.

**41. Applied Microbiology Lab 0826414 (1 credit)**

This course covers introduction to microbiological tools, media types, culture collection methods. Direct Microscopic Count of Microorganisms in Milk will be included. The course provides a practical overview on production of bioactive compounds, enzymes, antibiotics, phytohormones. Moreover, the course provides skills on water quality and biochemical characterization using commercially available systems.

Co-requisites for this course (if any): 0826404

Textbook:

Duncan, F. (2009). Applied Microbiology Lab Manual (Published by Kendall Hunt Publishing, ISBN 10: 1602501300 / ISBN 13: 9781602501300.

**42. Plant Biotechnology 0826 405 (2 credit)**

The aim of this course is to provide knowledge and understanding of plant biotechnology. The course explores the basic principles and application of tissue, cell and protoplast culture. It includes studies on recombinant DNA technology and genetic transformation of plants and its application in plant improvement.

Pre-requisites for this course (if any): 0826 306

Co-requisites for this course (if any): None

Textbook:

Umesha S (2017): Plant Biotechnology. The Energy and Resources Institute, TERI.

**43. Plant Biotechnology Lab 0826 415 (1 credit)**

The aim of this course is to provide knowledge of the basic principles of plant biotechnology through different applications such as plant tissue culture.

Co-requisites for this course (if any): 0826-405

Textbook:

Adhav M (2018): Practical Book of Biotechnology & Plant Tissue Culture. Kindle Edition.

Singh B D (2017): A Laboratory Manual Of Plant Biotechnology. Centrum Press

**44. Graduation project 0826 406. (2 credit)**

Graduation project is a broad overview course designed to give an introduction to the core tenets of how students deal with the scientific research. Basic concepts covered in the course are the basic definition of scientific research, concept and practical skills of research, how to deal with the experiments in the lab. How to deal with the experimental organisms and microorganisms, and how to write scientific reports and papers.

Pre-requisites for this course (if any): 98 gained credit hours

Co-requisites for this course (if any): None

**45. Animal Ecology and Behavior 0826407 (2credit)**

The course describes the animal ecosystem, community and population with their main components, dynamics and interrelationships. It identifies the effects of non- living factors upon the living organisms of an ecosystem. The course also defines the different patterns of animal behavior. It describes the physiological bases controlling behavior and gives an overall review of the most acknowledged theories of evolution and behavior.

Pre-requisites for this course (if any): 0826- 307

Co-requisites for this course (if any): None

Textbook:

Morin, P.J (2011): Community Ecology. 2nd edition. Blackwell Science. UK.

**46. Animal Ecology and Behavior Lab 0826417. (1 credit)**

This course covers some lab experiments on ecological factors, conduct different methods to study animal communities and population and analysis the obtained data and also some the different patterns of animal behavior.

Co-requisites for this course (if any): 0826-407

Textbook:

Krebs, C. (1989). Laboratory manual of ecological methodology, Univ. of British Columbia, UK.

**47. Immunology 0826408 (2 credit)**

The course provides the basic knowledge and ability to give the student a broad understanding of the immune system and its functions. Topics include: terminology, history and fields of immunology. It also provides basic concepts of

immune responses, vaccines and vaccination and different immunological disorders.

Pre-requisites for this course (if any): 0826307

Co-requisites for this course (if any): None

Textbook:

Abul Abbas, Andrew H. Lichtman, Shiv Pillai (2016). Basic Immunology, 5th Edition. ISBN: 9780323400145.

**48. Immunology Lab 0826418 (1 credit)**

The course provides students with basic knowledge and ability to different experimental techniques in the field. Topics include: handling, treatment and dissection of experimental animals, commonly used immunological techniques for disease diagnosis, which train them to perform basic research.

Co-requisites for this course (if any): 0826408

Textbook:

Hay F. C., and O M.R. Westwood, 2008. Practical Immunology, 4th Ed, Blackwell Science.

**49. Economic Botany (0826 409) (2 credit)**

This course introduces the importance of secondary metabolites produced from different plants. Topics that will be covered include the secondary metabolites and the use of plants as medicines, food, beverages, and textiles. The course will also explore the use of plants in ornamental gardening.

Pre-requisites for this course (if any): 0826 302

Co-requisites for this course (if any): None

Textbook:

Kochhar S L (2016): Economic Botany: A Comprehensive Study. Amazon, ISBN-13: 978-1107112940.

**50. Medical microbiology 0826410 (2 credit)**

This course will introduce students to the microbial species that cause human disease. It will cover diseases of the skin, the gastrointestinal- and urogenital tract, the cardiovascular system, the nervous system, and the respiratory tract: pathogens, modes of transmission, symptoms/disease, virulence factors and

therapy and discuss current topics including antibiotic resistance, public health threats, and global health.

Pre-requisites for this course (if any): 0826 404

Co-requisites for this course (if any): None

Textbook:

Murray PR, Rosenthal KS, Pfaller MA Medical Microbiology, 8th Edition Elsevier (2016).

**51. Summer Training – 0826399 (3 Credit)**

The Summer Training Program is a training for 6 weeks during the summer semester of the third year (200 contact hours). It is oriented to the students, after finishing 81 gained credit hours. It aims to provide those students the basic skills that qualifies them to join the labor market.

Pre-requisites for this course: Completion of 81 gained Credit hours

Co-requisites for this course: None

**B. Department Elective Courses**

**1. Microbial Genetics 0826320 (3 credit)**

This course covers principles of microbial genetics including, the genetic material of bacteria and its replication, the gene expression and regulation, Natural DNA transfer, transposons, mutagenesis and mechanisms of genetic recombination.

Pre-requisites for this course (if any): 0826206

Co-requisites for this course (if any): None

Textbook:

Chaudhari Keya (2014) Microbial Genetics, New Delhi TERI (The Energy and Recourses Institue), India.

**2. Bioinformatics 0826321 (3 credit)**

The course covers basic concepts, methods, and tools used in Bioinformatics. Topics include, biological databases accessing, sequence alignment, gene and protein structure prediction, phylogeny, in addition to genomics and proteomics. Students will acquire practical skills using bioinformatics tools and developing basic information by collecting and presenting bioinformatics data and analyze them via specific software.



Pre-requisites for this course (if any): 0826101

Co-requisites for this course (if any): None

Textbook:

Jeremy J. Ramsden (2009) Bioinformatics: An Introduction. Second Edition. Springer-Verlag Berlin Heidelberg.

**3. Cell and Tissue Pathology 0826322 (3 credit)**

This course is devoted to the study of specific and nonspecific responses of cells and tissues of the human body/animals to various unfavorable factors. It describes the changes in organs and tissues, as well as the manifestations and mechanisms of the development of pathological processes of major diseases. Attention is paid to the processes of cellular adaptation, inflammation, repair/compensation of lost function, and neoplasia.

Pre-requisites for this course (if any): 0826205

Co-requisites for this course (if any): None

Textbook:

Kumar V., Abbas A. and Aster J. (2017). Robbins Basic Pathology, 10th Edition, Saunders/Elseiver, Philadelphia.

**4. Microbial ecology 0826323 (3 credit)**

This course covers the basic concepts of microbial ecology. Topics include the general characteristics of microbial life and microbes in natural habitats (air, water, soil and symbionts), microbial interactions with other organisms in the ecosystems. Microbial populations, communities and ecosystems, biogeochemical cycles. Brief introduction of methods used in studying microbial ecology. Microbial Interactions Pelagic food webs and eutrophication.

Pre-requisites for this course (if any): 0826-206

Co-requisites for this course (if any): None

Textbook:

Larry L. Barton and Diana E. Northup (2011). Microbial Ecology. Published by John Wiley & Sons, Inc., Hoboken, New Jersey.

**5. Plant-organism Interactions 0826 324 (3 credit)**

This course is designed to allow students to explore the various ways in which organisms can interact with plants and the outcomes of these interactions. The

focus is on examination of the physiological, biochemical and genetic basis of these interactions.

Pre-requisites for this course (if any): 0826-207

Co-requisites for this course (if any): None

Textbook:

Lugtenberg Ben (2015): Principles of Plant-Microbe Interactions. Springer Foundation N and Chadwick D J (2009).

Insect-Plant Interactions and Induced Plant Defence. Wiley, ISBN: 978-0-470-51568-6.

**6. Petroleum Microbiology 0826325 (3 credit)**

Course Description: This course explores microbial activities related to petroleum, microbial metabolism of hydrocarbons aliphatic and cyclic aromatic hydrocarbons under anaerobic and aerobic conditions. Also, this course will be covered physical, chemical and biological factors affecting petroleum degradation. Microbial degradation of petroleum products and use of microorganisms in oil clean-up operations; oil spillage.

Pre-requisites for this course (if any): 0826206

Co-requisites for this course (if any): None

Textbook:

Ollivier, B. and Magot, M. (2005) Petroleum Microbiology. ASM Press, Washington DC, USA.

**7. Sustainable Plant Ecology 0826 420 (3 credit)**

The course provides data that engage students in sustainability topics. It covers changing in climate which poses daily changes and challenges in the world's demand for food and plant products. The appropriate management of the crop ecosystem and critical aspects of soil-plant relationships are emphasized. The course focuses on the science and practices associated with sustainable plant production and/or use within managed systems. It also emphasizes on practices and concepts related to reducing environmental impact. The current course includes studies on the role of sustainable plant ecology in solving modern socio-economic problems.

Pre-requisites for this course (if any): 0826-401

Co-requisites for this course (if any): None

Textbook:

Francisco I. Pugnaire and Fernando Velladares (2006). Functional Plant Ecology. Second Edition. The Ecology of Plants (2nd Edition). CRS Press, Francis and Taylor Group. Boca Raton, USA.

**8. Pest Control 0826421 (3 credit)**

The present course covers a wide range of topics related to pest control including cultural, mechanical, biological and chemical control of pests. In addition, it covers control of common medical and agricultural pests such as insects, mites, nematodes, snails, slugs, mice and birds.

Pre-requisites for this course (if any): 0826304

Co-requisites for this course (if any): None

Textbook:

Emden, H. F. Van and Service, M. W. (2004). Pest and vector control. Cambridge University Press, UK. 363 PP.

**9. Animal Biotechnology 0826422 (3 credit)**

The course will cover topics including an introduction to the application of biotechnology to animals, challenges facing the intensive and extensive livestock industries, as well as wildlife management and conservation. Debated in the context of biotechnologies that may be applied. The contribution of biotechnology to laboratory animal models for human and animal disease will be addressed. A range of genetic, immunological and reproductive technologies in industry will be introduced.

Pre-requisites for this course (if any): 0826-305

Co-requisites for this course (if any): None

Textbook:

Ashish S. Verma and Anchal Singh, (2014). Animal Biotechnology-Models in Discovery and Translation (1st Edition), Elsevier 2014.

**10. Applied Botany 0826 423 (3 credit)**

This course introduces the students to many areas of plant applications such as production of natural products under stress, bio-fertilizers, biofuel and bio-pesticides. Also, students will be informed about biomonitoring and

phytoremediation of environmental pollution. Basic principles of seed quality and seed production are addressed and study of gene manipulation in plants, plant breeding as well as modern farming practices like hydroponic is also covered in the course.

Pre-requisites for this course (if any): 0826 306

Co-requisites for this course (if any): None

Textbook:

Deshmukh A. M., Khobragade R. M. and Dixit P. P. (2007): Handbook of Biofertilizers and Biopesticides. 307 pp. Oxford Book Company.

Singh, B.D. (2005). Plant Breeding: Principles and Methods. Kalyani, New Delhi.

### **Required Physical Resources and Facilities**

### **Teaching Staff**

**The department of biological Sciences has the following:**

<b>Faculty and teaching assistants</b>	<b>Male Section</b>	<b>Female Section</b>	<b>Total</b>
<b>Full time Faculty</b>	<b>24</b>	<b>22</b>	<b>46</b>
<b>Full time Lecturers</b>	<b>1</b>	<b>4</b>	<b>5</b>
<b>Full time Demonstrators</b>	<b>4</b>	<b>11</b>	<b>15</b>
<b>Total</b>	<b>29</b>	<b>37</b>	<b>66</b>

The full time faculty members hold doctorate degrees from well-known Universities of the world (1 professor, 7 associate professors and 38 assistant professors).

<b>Classrooms and Labs</b>	<b>Male Section</b>	<b>Female Section</b>	<b>Total</b>
<b>Classrooms</b>	<b>6</b>	<b>5</b>	<b>11</b>
<b>Classroom Capacity</b>	<b>354</b>	<b>385</b>	<b>739</b>
<b>Teaching Labs</b>	<b>12</b>	<b>8</b>	<b>20</b>
<b>Labs Capacity</b>	<b>360</b>	<b>176</b>	<b>536</b>
<b>Research Labs</b>	<b>4</b>	<b>4</b>	<b>8</b>