

**Kurukshetra University Kurukshetra**  
**(Established by the State Legislature Act XII of 1956; 'A+' Grade, NAAC Accredited)**  
**Model Curriculum for**  
**Bachelor of Technology (B.Tech.) in Bio-Technology**  
**General, Course Structure & Scheme & Semester-Wise Credit Distribution**  
**(Credit-Based Scheme of Studies/Examination ((2018-19 Onwards in Phased Manner) )**

**A. Definition of Credit:**

1 Hour Lecture (L) per week	1 credit
1 Hour Tutorial (T) per week	1 credit
1 Hour Practical (P) per week	0.5 credit
2 Hours Practical (Lab) per week	1 credit

**B. Range of credits:**

A total credit of about 160 is required for a student to be eligible to get Under Graduate degree in Biotechnology. A student will be eligible to get Under Graduate degree (B.Tech.) with Honours, if he/she completes an additional 20 credits. These could be acquired through MOOCs at Swayam portal or with in-house examination being conducted. In order to have an Honours degree, a student may choose minimum 20 credits provided that the student must ensure the course is approved by the Competent Authority, Government of India.

**C. Structure of Undergraduate Engineering program:**

S.No	Category Suggested	Approx. Breakup of Credits
1	Humanities and Social Sciences including management courses	12
2	Basic Science courses 25	24
3	Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc.	24
4	Professional core courses	52.5
5	Professional Elective courses relevant to chosen specialization/branch	12
6	Open subjects – Electives from other technical and /or emerging subjects	14
7	7 Project work, seminar and internship in industry or elsewhere	14
8	Mandatory Courses	(credit less)

**Bachelor of Technology (Biotechnology)**  
**Credit-Based**  
**SCHEME OF STUDIES/EXAMINATIONS**  
**Semester – III**

S. No.	Course No.	Course Title	Teaching Schedule				Credits	Allotment of Marks				Duration of Exam (Hrs.)
			L	T	P	Hours/Week		Major Test	Minor Test	Practical	Total	
1	BTE-201	Cell Biology & Genetics	3	0	0	3	3.0	75	25	0	100	3
2	BTE-203	Microbiology	3	0	0	3	3.0	75	25	0	100	3
3	BTE-205	Biochemistry	3	0	0	3	3.0	75	25	0	100	3
4	BTE-207	Principles of Biostatistics	3	0	0	3	3.0	75	25	0	100	3
5	HM-901	Organizational Behavior	3	0	0	3	3.0	75	25	0	100	3
6	BTE-209L	Cell Biology & Genetics Lab	0	0	3	3	1.5	0	40	60	100	3
7	BTE-211L	Microbiology Lab	0	0	3	3	1.5	0	40	60	100	3
8	BTE-213L	Biochemistry Lab	0	0	3	3	1.5	0	40	60	100	3
		<b>Total</b>	<b>15</b>	<b>0</b>	<b>9</b>	<b>24</b>	<b>19.5</b>	<b>375</b>	<b>245</b>	<b>180</b>	<b>800</b>	
9	BTE-215	Industrial Training-I	2	0	0	2	-	-	100	-	100	-
10	*MC-902	Constitution of India	3	0	0	3		75	25	0	100	3

**Note:** BTE-215 is a mandatory credit less course in which the students to be evaluated for the industrial training undergone after 2<sup>nd</sup> semester and students will be required to get passing marks to qualify.

\***MC-902** is a mandatory credit less course in which the student will be required to get passing marks in the major test.

**Bachelor of Technology (Biotechnology)**  
**Credit-Based**  
 SCHEME OF STUDIES/EXAMINATIONS  
**Semester – IV**

S. No.	Course No.	Course Title	Teaching Schedule				Credits	Allotment of Marks				Duration of Exam (Hrs.)
			L	T	P	Hours/Week		Major Test	Minor Test	Practical	Total	
1	BTE-202	Molecular Biology	3	0	0	3	3.0	75	25	0	100	3
2	BTE-204	Bio-analytical Techniques	3	0	0	3	3.0	75	25	0	100	3
3	BTE-206	Immunology	3	0	0	3	3.0	75	25	0	100	3
4	BTE-208	Industrial Biotechnology	3	0	0	3	3.0	75	25	0	100	3
5	BS-202	Organic Chemistry	3	0	0	3	3.0	75	25	0	100	3
6	BTE-212L	Molecular Biology Lab	0	0	3	3	1.5	0	40	60	100	3
7	BTE-214L	Bio-analytical Techniques Lab	0	0	3	3	1.5	0	40	60	100	3
8	BTE-216L	Industrial Microbiology Lab	0	0	3	3	1.5	0	40	60	100	3
9	BTE-218L	Immunology Lab	0	0	3	3	1.5	0	40	60	100	3
		<b>Total</b>	<b>15</b>	<b>0</b>	<b>12</b>	<b>27</b>	<b>21</b>	<b>375</b>	<b>285</b>	<b>240</b>	<b>900</b>	
10	MC-901*	Environmental Sciences*	3	0	0	3		75	25	0	100	3

\*MC-901 is a mandatory credit less course in which the student will be required to get passing marks in the major test.

**Note:** All the students have to undergo 4-6 weeks industrial training after IV semester and to be evaluated in V semester.

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**SCHEME OF STUDIES/EXAMINATIONS**  
**Semester – V**

S. No.	Course No.	Course Title	Teaching Schedule				Credits	Allotment of Marks				Duration of Exam(Hrs.)
			L	T	P	Hours /Week		Major Test	Minor Test	Practical	Total	
1	BTE-301	Recombinant DNA Tech	3	0	0	3	3.0	75	25	0	100	3
2	BTE-303	Bioprocess Engineering	3	0	0	3	3.0	75	25	0	100	3
3	BTE-305	Downstream Processing	3	0	0	3	3.0	75	25	0	100	3
4	BTE-307	Healthcare Biotechnology	3	0	0	3	3.0	75	25	0	100	3
5	OEC-I*		3	0	0	3	3.0	75	25	0	100	3
6	BTE-307L	Recombinant DNA Technology Lab	0	0	3	3	1.5	0	40	60	100	3
7	BTE-309L	Fermentation & Downstream Processing Lab	0	0	3	3	1.5	0	40	60	100	3
8	OEC-IL		0	0	2	2	1.0	0	40	60	100	3
		<b>Total</b>	<b>15</b>	<b>0</b>	<b>10</b>	<b>25</b>	<b>19</b>	<b>375</b>	<b>245</b>	<b>180</b>	<b>800</b>	
9	**MC-903	Essence of Indian Traditional Knowledge	3	0	0	3		100		0	100	3
10	*BTE-311	Industrial Training-II	0	0	2	2	0	0	100		100	

**\*\*MC-903** is a mandatory credit less course in which the student will be required to get passing marks in the major test.

\* BTE-311 is a mandatory credit less course in which the students to be evaluated for the industrial training undergone after 4<sup>th</sup> semester and students will be required to get passing marks to qualify.

**The course of both Program Elective and Open Elective will be offered at 1/3<sup>rd</sup> strength or 20 students (whichever is smaller) of the section.**

The students should select one open Elective Courses (OEC) from the following list.

Course No.	OEC-I*
ES-201	Essentials of Information Technology
ES-211L	Information Technology Lab
ES-213	Python
ES-215L	Python Lab
MOOC-1	Any one MOCC course with lab through SWAYAM

**Bachelor of Technology (Biotechnology)**  
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**SCHEME OF STUDIES/EXAMINATIONS**  
**Semester – VI**

S. No.	Course No.	Course Title	Teaching Schedule				Credits	Allotment of Marks				Duration of Exam (Hrs.)
			L	T	P	Hours/Week		Major Test	Minor Test	Practical	Total	
1	OEC-II		3	0	0	3	3.0	75	25	0	100	3
2	BTE-304	Plant Biotechnology	3	0	0	3	3.0	75	25	0	100	3
3	BTE-306	Animal Biotechnology	3	0	0	3	3.0	75	25	0	100	3
4	BTE-308	Food Biotechnology	3	0	0	3	3.0	75	25	0	100	3
5	BTE-310	Environmental Biotechnology & Engineering	3	0	0	3	3.0	75	25	0	100	3
6	HM-902	Business Intelligence & Entrepreneurship	3	0	0	3	3.0	75	25	0	100	3
7	BTE-312	Animal Cell Culture Lab	0	0	3	3	1.5	0	40	60	100	3
8	BTE-314	Plant Cell Culture Lab	0	0	3	3	1.5	0	40	60	100	3
9	BTE-316	Food & Environmental Biotechnology Lab	0	0	3	3	1.5	0	40	60	100	3
		<b>Total</b>	<b>18</b>	<b>0</b>	<b>9</b>	<b>27</b>	<b>22.5</b>	<b>450</b>	<b>270</b>	<b>180</b>	<b>900</b>	

**Note:** All the students have to undergo 4-6 weeks industrial training after VI semester and it will be evaluated in VII semester.

The students should select two open Elective Courses (OEC) from the following list.

**The course of both Program Elective and Open Elective will be offered at 1/3<sup>rd</sup> strength or 20 students (whichever is smaller) of the section.**

Course No.	OEC-II	Course No.	OEC-II
OEC-BT-302	Nano Biotechnology	OEC-BT-322	Introduction to Arts & Aesthetics
OEC-BT-318	Introduction to MEMS	MOOC-2	Anyone MOOC through SWAYAM
OEC-BT-320	Non Conventional Energy Resources		

**Bachelor of Technology (Biotechnology)**  
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**SCHEME OF STUDIES/EXAMINATIONS**  
**Semester – VII**

S. No.	Course No.	Course Title	Teaching Schedule				Credits	Allotment of Marks				Duration of Exam (Hrs.)
			L	T	P	Hours/Week		Major Test	Minor Test	Practical	Total	
1	BTE-401	Bioinformatics	2	1	0	3	3.0	75	25	0	100	3
2	BTE-403	Pharmaceutical Biotechnology	3	0	0	3	3.0	75	25	0	100	3
3	*PE-I	Program Elective-I*	2	1	0	3	3.0	75	25	0	100	3
4	*PE-II	Program Elective-II*	2	1	0	3	3.0	75	25	0	100	3
5	BTE-405	Bioinformatics Lab	0	0	3	3	1.5	0	40	60	100	3
7	BTE-407	Project-I**	0	0	8	8	4.0	0	100	100	200	3
		<b>Total</b>	<b>9</b>	<b>3</b>	<b>11</b>	<b>23</b>	<b>17.5</b>	<b>300</b>	<b>240</b>	<b>160</b>	<b>700</b>	
8	*BTE-409	Industrial Training (Viva-Voce)***	0	0	2	2	-	0	0	100	100	

The course of both Program Elective and Open Elective will be offered at 1/3<sup>rd</sup> strength or 20 students (whichever is smaller) of the section.

Course No.	*PE-I	Course No.	*PE-II
BTE-411	Biosensor and Bioinstrumentation	BTE-417	Advanced Management Information System and Information Technology
BTE-413	Biochips and Microarray Technology	BTE-419	Stem Cell Technology
BTE-415	Enzyme Technology	BTE-421	Herbal Drug Technology

\*\*The project should be initiated by the students in the beginning of VII semester and will be evaluated at the end of the semester on the basis of a presentation and report.

\*BTE-409 is a mandatory credit less course in which the students to be evaluated for the industrial training undergone after 6<sup>th</sup> semester and students will be required to get passing marks to qualify.

**Bachelor of Technology (Biotechnology)**  
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 SCHEME OF STUDIES/EXAMINATIONS  
**Semester – VIII**

S. No.	Course No.	Course Title	Teaching Schedule				Credits	Allotment of Marks				Duration of Exam (Hrs.)
			L	T	P	Hours/Week		Major Test	Minor Test	Practical	Total	
1	*PE-III		2	1	0	3	3.0	75	25	0	100	3
2	*PE-IV		2	1	0	3	3.0	75	25	0	100	3
3	BTE-402	Biocatalysis & Biotransformation	3	0	0	3	3.0	75	25	0	100	3
4	**OEC-III		3	0	0	3	3.0	75	25	0	100	3
5	BTE-416	Project-II	0	0	15	15	7.5	0	100	100	200	3
		<b>Total</b>	<b>10</b>	<b>2</b>	<b>15</b>	<b>27</b>	<b>19.5</b>	<b>300</b>	<b>200</b>	<b>100</b>	<b>600</b>	

The course of both Program Elective and Open Elective will be offered at 1/3<sup>rd</sup> strength or 20 students (whichever is smaller) of the section.

\*The student should select two Program Elective Courses (PEC) from the following list.

Course No.	PE-III	Course No.	PE-IV
BTE-404	Metagenomics	BTE-410	Developmental Biology
BTE-406	Molecular Modeling and Drug Design	BTE-412	Protein Engineering
BTE-408	Cancer Biology	BTE-414	Bioethics, IPR and Bio-safety

\*The student should select one Open Elective Courses (OEC) from the following list.

Course No.	OEC-III
OEC-BT-418	Biomedical Electronics
OEC-BT-420	MATLAB & Simulation
OEC-BT-422	History of Science
OEC-BT-424	Internet of things
MOOC-3	Anyone MOOC through SWAYAM

### Additional Courses for B.Tech. (Honours Degree)

#### Branch/Course: Biotechnology

In order to have an Honours degree, a student may choose 20 credits from the following professional electives courses or MOOC through SWAYAM in addition. In addition to the following list, the student can also opt some more courses offered under MOOCs at Swayam portal from time to time

<b>Bachelor of Technology Biotechnology</b>										
<b>Scheme of Studies/Examination</b>										
<b>Additional Courses for B.Tech. (Honours Degree)</b>										
S. No.	Course Code	Subject	L:T:P	Hours/W eek	Credits	Examination Schedule (Marks)				Duration of Exam (Hrs)
						Major Test	Minor Test	Practical	Total	
1	PEC-BT-H 801	Chemical Genetics	3:0:0	3	3	75	25	0	100	3
2	PEC-BT-H 802	Biological Waste Treatment	3:0:0	3	3	75	25	0	100	3
3	PEC-BT-H 803	Industrial Biotechnology	3:0:0	3	3	75	25	0	100	3
4	PEC-BT-H 804	Enzyme Engineering & Technology	3:0:0	3	3	75	25	0	100	3
5	PEC-BT-H 805	Bioprocess Equipment design & Economics	3:0:0	3	3	75	25	0	100	3
6	PEC-BT-H 806	Protein Engineering	3:0:0	3	3	75	25	0	100	3
7	PEC-BT-H 807	Biomaterial Sciences	3:0:0	3	3	75	25	0	100	3
8	PEC-BT-H 808	Biosensors	3:0:0	3	3	75	25	0	100	3
9	PEC-BT-H 809	Biodiversity, Bio-prospecting and Organic farming	3:0:0	3	3	0	40	60	100	3
10	PEC-BT-H 810	Molecular Biophysics	3:0:0	3	3	0	40	60	100	3
11	PEC-BT-H 811	Virology	3:0:0	3	3	0	40	60	100	3
12	PEC-BT-H 812	Vaccine Biotechnology	3:0:0	3	3	0	40	60	100	3

#### Open Elective Course for B. Tech. Students of other Departments

Course No.	OEC
BTE 401	Bioinformatics
BTE-414	Bioethics, IPR and Biosafety