وصف البرنامج الاكاديمى لمسار بولوجيا

كلية العلوم / قسم علوم الحياة

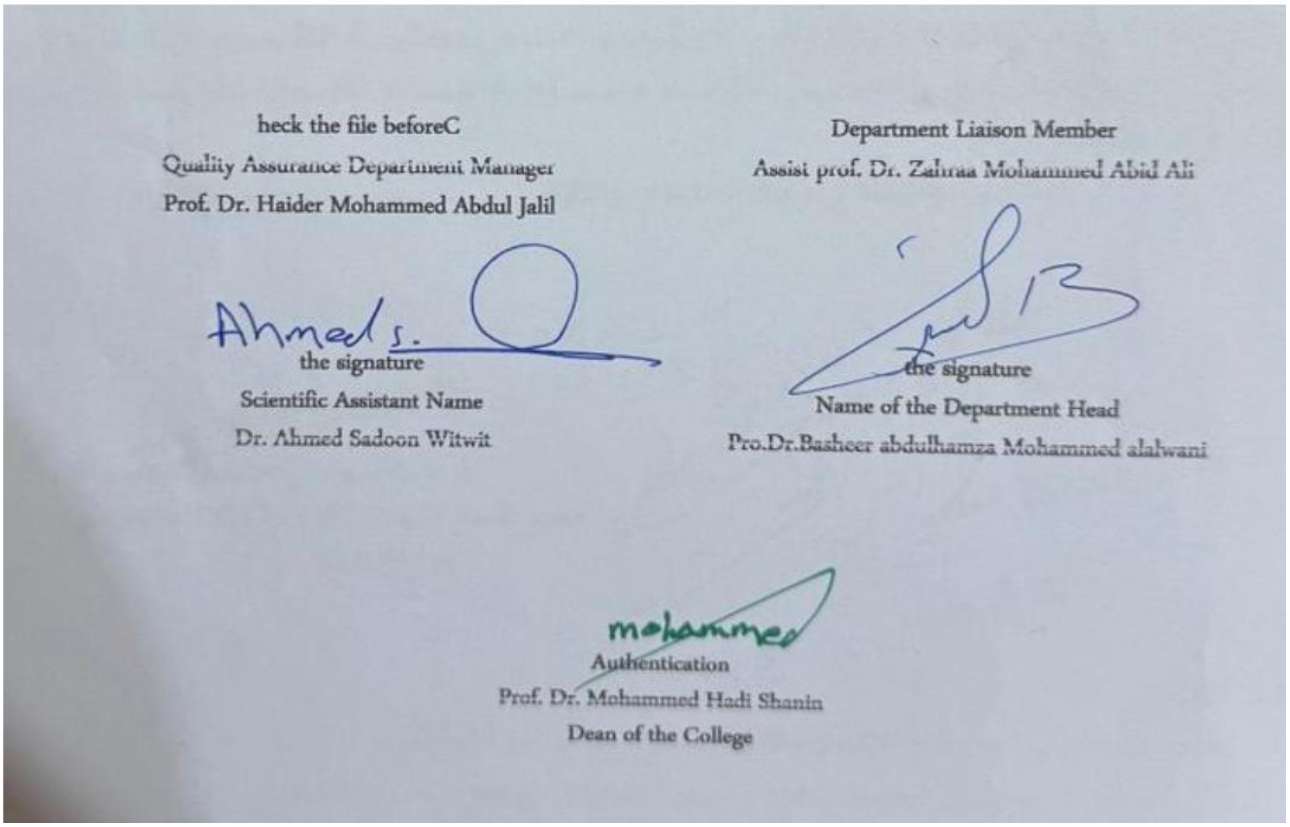
اعداد لجنة الجودة فى القسم

DESCRIPTION OF ACADEMIC PROGRAM

BIOLOGY DEPARTMENT

COLLAGE OF SCIENCE

University of Babylon	University name
College of Science	College/Institute
Biology Department of	Scientific Department
Biology Bachelor of	Name of academic or professional program
Biology Bachelor of	Final Certificate Name
First ,second and third stages are Bologna route. Fourth stage courses	The educational system
9-4-**2025**	Description preparation date
1-4-2026	Date of filling out the file



Introduction

The Department of Biology within the College of Science is one of the core academic units dedicated to preparing highly qualified professionals capable of keeping pace with contemporary scientific advancements across diverse fields of biology. The academic program is designed to provide students with a solid foundation in both general and specialized biological sciences, integrating theoretical coursework with hands-on laboratory training.

The department aims to graduate students who possess strong analytical and research skills, enabling them to explore and interpret biological phenomena at multiple levels—from molecules and cells to organisms and ecosystems. Emphasis is also placed on fostering critical thinking, problem-solving abilities, and the application of modern techniques in biological analysis and diagnostics.

In addition to its educational mission, the department places great importance on both basic and applied scientific research, addressing pressing environmental, health, and agricultural challenges facing the country. It also promotes collaborative partnerships with local, regional, and international research centers to ensure alignment with global scientific developments and to strengthen academic outcomes.

Thus, the Biology Department's program serves as a cornerstone for preparing future generations of graduates qualified to contribute effectively in education, research institutions, and sectors related to health, environment, and agriculture—ultimately supporting sustainable development and enhancing the university's role within the scientific community.

Program vision .1
a generation that is aware and creative in understanding life and living organisms, Preparing contributing to the development of biological sciences to solve environmental, health and life .challenges

Program message .2
integrated academic and research programs in life sciences that enhance a deep Providing understanding of biological processes, develop research and scientific analysis skills, and prepare thical values and students for the job market and advanced academic fields, while adhering to e .environmental responsibility

Program objectives .3
Providing students with advanced knowledge in the branches of life sciences (cell science, -1 .(.genetics, molecular biology, physiology, ecology, zoology, botany, etc
skills through practical training in laboratories and participation in scientific Develop research -2 .research projects
solving skills using approved scientific -Enhance scientific analysis and problem -3 .methodologies
as electron microscopy, Integrating modern technology into study and research, such -4 .molecular biology, bioinformatics, and genetic techniques
Preparing students to contribute to the labor market in fields such as education, health, -5 .agriculture, pharmaceutical industries, and research centers
.on and scientific entrepreneurship in the fields of applied life sciencesEncouraging innovati -6
Instilling ethical and professional values in research and handling of living organisms and -7 .biotechnology
ion and research to Supporting environmental sustainability and biodiversity by linking educat -8 .environmental and societal issues

Program accreditation .4
Application submitted

Other external influences .5

economic situation and **Security, political**	.1
University infrastructure and services	.2
cultural impacts social and , Environmental, health	.3
Global technological influences	.4
International Relations and Research	.5

Program structure .6

* comments	percentage	Study unit	Number of courses	Program structure
	15.2%	8	4	Institutional requirements
	12.31%	8	3	College requirements
	75.65%	180	47	Department requirements
			There is	Summer training
				Other

.Notes may include whether the course is core or optional *

Program Description -7

year	Course code	Course name	Credit hours	
			Theoretical	Practical
1st grade				
1st semester	UOBAB0501011	General Zoology	2	2
	UOBAB0501012	Chemistry General	2	2
	UOBAB0501013	General Mathematics	2	
	UOBAB0501014	Biophysics	2	2
	UOBAB0501015	Human Rights and Democracy	2	

	UOBAB0501016	Arabic Language	2	
2nd semester	UOBAB0501021	Botany General	2	2
	UOBAB0501022	Biology Cell	2	2
	UOBAB0501023	Biostatistics	2	
	UOBAB0501024	Safety and bioscurity	2	2
	UOBAB0501025	Computer Science	2	
	UOBAB0501026	English Language	2	
2nd grade				
1st semester	UOBAB0501031	Entomology anatomy	2	2
	UOBAB0501032	Plant Anatomy	2	2
	UOBAB0501033	Microbiology 1	2	2
	UOBAB0501034	Invertebrates	2	2
	UOBAB0501035	Biochemistry 1	2	2
	UOBAB0501036	Plant Groups	2	2
2nd semester	UOBAB0501041	EntomologyTaxonomy	2	2
	UOBAB0501042	Taxonomy Plant	2	2
	UOBAB0501043	Microbiology2	2	2
	UOBAB0501044	Parasitology	2	2
	UOBAB0501045	Biochemistry2	2	2
	UOBAB0501046	English Language 2	2	2
3rd grade Microbiology				
1st semester	**BIO3511**	Soil microbiology	2	2
	BIO3512	Immunology	2	2
	BIO3513	Plant physiology	2	2
	BIO3514	Animal histology	2	2
	BIO3515	Principals of biotechnology	2	2
	BIO3516	Ecology	2	2
2nd semester	**BIO3611**	Microbial physiology	2	2
	BIO3612	Sewage and water microbiology	2	2
	BIO3613	Microbial ecology	2	2
	BIO3614	Animal physiology	2	2
	BIO3615	Molecular biology	2	2
	BIO3616	Pollution	2	2
3rd grade Biotechnology				
1st semester	**BIO3521**	Principals of biotechnology	2	2
	BIO3522	Human genetic	2	2
	BIO3523	Animal histology	2	2
	BIO3524	Principals of ecology	2	2

	BIO3525	Microbial genetic	2	2
	BIO3526	Plant physiology	2	2
2nd semester	**BIO3621**	Molecular biology	2	2
	BIO3622	Secondary metabolism	2	2
	BIO3623	General genetic	2	2
	BIO3624	Animal physiology	2	2
	BIO3625	Pollution	2	2
	BIO3626	Vaccines	2	2
3rd grade General biology				
1st semester	**BIO3531**	Animal histology	2	2
	BIO3532	Plant physiology	2	2
	BIO3533	Environmental plant physiology	2	2
	BIO3534	Principals of biotechnology	2	2
	BIO3535	Principals of ecology	2	2
	BIO3536	Microbial toxins	2	2
2nd semester	**BIO3631**	Animal physiology	2	2
	BIO3632	plant pathology	2	2
	BIO3633	Comparative anatomy	2	2
	BIO3634	Molecular biology	2	2
	BIO3635	Pollution	2	2
	BIO3636	Soil microbiology	2	2
3rd grade Ecology				
1st semester	**BIO3541**	Principals of ecology	2	2
	BIO3542	Phytoplankton	2	2
	BIO3543	Air and bio radiation	2	2
	BIO3544	Animal histology	2	2
	BIO3545	Principals of biotechnology	2	2
	BIO3546	Plant physiology	2	2
2nd semester	**BIO3641**	Biodiversity	2	2
	BIO3642	Pollution	2	2
	BIO3643	Ecosystems	2	2
	BIO3644	Animal physiology	2	2
	BIO3645	Molecular biology	2	2
	BIO3646	Ecological microbiology	2	2

4th stage
Curriculum system

Expected learning outcomes of the program **8**	
knowledge	
.about the history of life sciences in various fields The student learns -A1 .Classify the special needs of each laboratory analysis -A2 .The student separates all the tools for each analysis -A3 .The student can analyze the results of laboratory testing techniques -A4	Knowledge and understanding -A
Skills	
.The student learns about the role of life sciences with other sciences -B1 The student can identify biological activities and their relationship with -B2 .different organisms to different statistical results according measure the The student can -B3 .tests The student is able to identify the different relationships between living -B4 .organisms	specific -Subject -b skills
.Thinking skill according to the student's ability -A1 well before making a High thinking skill (the student learns to think -A2 (decision .Critical thinking skill in education -A3 .The skill of thinking rationally -A4	Thinking skills -C

Teaching and learning strategies .9
Thinking strategy according to the student's ability (for example: if the student is able to -1 learn the concept of correct systems analysis, he will acquire the skill of managing and organizing (his personal life .
if a student wants to make a good decision, it is ,High thinking skill strategy (for example -2 important to think well before making the decision. If he decides without thinking, or if he cannot think well, or if he cannot decide, or perhaps will not decide, this means he does not have high (skill thinking
is a term that refers to the) (Critical Thinking) Critical Thinking Strategy in Learning **-3 highest levels of thinking, which aims to pose a problem and then analyze it logically to reach) . the required solution**
brainstorming -4

methods Evaluation .10
(daily and monthly exams)Exams -1
Reports -2
DesignProjects -3

LearningFeedback MoodleE-Learning using	-4

Faculty - 1 1							
Faculty preparation		Special skill requirements, if any	Faculty members				
			Specialization		Certificate	Instructor's name	Academic rank
lecturer	angel		private	The year			
	√		Microbiology	Biology	PhD	Anwar Kahdm Hussein	professor
	√		Plant physiology and tissue culture	Biology	PhD	Dr. Bashir Abdul Hamza Muhammad	professor
	√		Animal physiology	Biology	PhD	Dr. Haider Kamel Zidane	professor
	√		genetic engineering	Biology	PhD	Dr. Ali Hamoud Saadi-Al	professor
	√		immunity	Biology	PhD	Dr. Alaa Jawad Hassan	professor
	√		Microbiology	Biology	PhD	Dr. Azhar Imran Latif	professor
	√		Industerial microbiology	Biology	PhD	Dr. Iman Muhammad Jarallah	professor
	√		Environment and -Pollution Freshwater Environment	Biology	PhD	Jassim Mohammed Salman	professor
	√		Biotechnology/Enzymes	Biology	PhD	Dr. Muhammad Abdullah Jabr	professor
	√		Genetic engineering	Biology	PhD	D. Rabab Imran Radi	professor
	√		mushrooms	Biology	PhD	Dr. Ibtihal Moez Abdul Mahdi	professor
	√		Animal Biology Environment	Biology	PhD	Dr. Muayad Jassim Yas	professor
	√		immunity	Biology	PhD	Dr. Farial Jamil Abdel	professor
	√		Embryos	Biology	PhD	Amal Ali .Dr Mohsen	professor
	√		Viruses	Biology	PhD	Dr. Shaker Hammad	professor

						Muhammad	
	√		Microbiology	Biology	PhD	Dr. Wejdan Reda Mahmoud	professor
	√		plant cell	Biology	PhD	Dr. Rehab Eidan Kahdm	professor
	√		Environmental biotechnology	Biology	PhD	Dr. Ayad Mohammed Jabr	professor
	√		Plant classification	Biology	PhD	Nidaa Adnan Mohammed	professor
	√		animal cell	Biology	PhD	Dr. Maysaa Adel Hadi	professor
	√		animal tissues	Biology	Master's	Janan Mahdi Jawad	professor
	√		Reproductive physiology	Biology	PhD	A. Noha Ya'rab Muhammad	professor
	√		Plant physiology	Biology	PhD	Dr. Evan Ibrahim Marhej	professor
	√		Parasite immunity	Biology	PhD	Dr. Qasim Abdullah Hamza	professor
	√		Parasite immunity	Biology	PhD	Dr. Alaa Tariq Shaker	professor
	√		Antibiotic	Biology	PhD	Muroog Saadi Abbas	professor
	√		Molecular Biologist	Biology	PhD	Dr. Hussein Aliwi Matlab	professor
	√		environment	Biology	PhD	Dr. Batoul Mohammed Hassan	professor
	√		Micr\Microbiology obial toxins	Biology	PhD	Dr. Shaima Jassim Muhammed	professor
	√		Biotechnology	Biology	Master	Thikra abdulali	professor
	√		Biotechnology and Genetic Engineering	Biology	PhD	Dr. Anwar Ali Abdullah	professor
	√		Microbiology	Biology	Master's	Farah Tariq Abdul Redha	professor
	√		Molecular biology and biotechnology	Biology	PhD	Dr. Zeina Hadi Obaid	professor
	√		Environmental treatments	Biology	PhD	Dr. Nuha Faleh Kahdm	professor
	√		Microbiology	Biolo	PhD	D. Nour Salman	professo

				gy		Kazem	r
	√		Biodiversity	Biology	PhD	Dr. Adi Jassim Abdul Razzaq	professor
	√		hematology	Biology	PhD	Dr. Walaa Saleh Hassan	professor
	√		medicinal plants	Biology	PhD	Dr. Fadia Hamid Mohammed	professor
	√		Biotechnology	Biology	PhD	Dr. Mona Najah Hassan	professor
	√		Microbiology	Biology	PhD	Dr. Yazi Abdullah	professor
	√		Microbiology	Biology	PhD	Sura Ihssan Abed	professor
	√		Animal tissue culture	Biology	PhD	Dr. Hala Mohi Nagi	professor
	√		Plant classification	Biology	PhD	Dr. Shaimaa Mohi Hassoun	professor
	√		Diversify my life	Biology	PhD	Dr. Wameed Kahdm Adel	professor
	√		mathematics	Biology	PhD	Dr. Hassanein Kassam Zidan	assistant professor
	√		Biotechnology	Biology	Master's	Rafel Ahmed Lilo	assistant professor
	√		insects	Biology	Master's	Rasha Kahdm Mahdi	assistant professor
	√		Environmental treatments	Biology	Master's	Suad Ghali Kahdm	assistant professor
	√		insects	Biology	Master's	Janan Mohammed Obaid	assistant professor
	√		Zoology	Biology	Master's	Shaima Abdel Kahdm Hadi	assistant professor
	√		Environmental Biology	Biology	PhD	Dr. Bassam Musa Abdul Amir	assistant professor
	√		Biotechnology	Biology	PhD	Dr. Zahraa Mohammed Abdel Ali	assistant professor

	√		Comparative anatomy	Biology	PhD	Dr. Rafala Sabiq Hussein	assistant professor
	√		environment	Biology	PhD	Dr. Wathiq Jassim Mohammed	assistant professor
	√		animal behavior	Biology	PhD	Dr. Hala Abdel Hadi Abdel Ghani	assistant professor
	√		Microbiology	Biology	PhD	Dr. Liqa Yahya Mohsen	assistant professor
	√		medicinal plants	Biology	PhD	Dr. Hanan Ahmed Hadi	teacher
	√		Reproductive physiology	Biology	Master's	Iman Fadel Abbas	teacher
	√		Microbiology	Biology	Master's	Mohammed Hussein Obaid	teacher
	√		Biotechnology	Biology	Master's	Dalia Salah Mahdi	teacher
	√		environment	Biology	Master's	Shaima Abis Hussein	teacher
	√		Microbiology	Biology	Master's	Hawra Muhammad Reda	teacher
	√		Microbiology	Biology	Master's	Dalal Muhammad Reda Mohsen	teacher
	√		mushrooms	Biology	Master's	Ali Nasser Hussein	teacher
	√		plant anatomy	Biology	Master's	Nour Mahmoud Naji	teacher
	√		Microbiology	Biology	Master's	Zahraa Ali Abdullah	teacher
	√		environmental pollution	Biology	Master's	Hala Fayez Abdel Hadi	teacher
	√		Microbial environment	Biology	Master's	Nour Saad Allah	teacher
	√		Biotechnology	Biology	Master's	Yosra Abdel Hamza	teacher
	√		Microbiology	Biology	Master's	Anmar Mahdi Kahdm	teacher
	√		cell	Biolo	PhD	Dr. Farah	teacher

				gy		Mumtaz	
	√		Microbiology	Biology	PhD	Dr. Amani Abdel Nasser	teacher
	√		Microbiology	Biology	PhD	Dr. Iman Mubdar Nayef	teacher
	√		Biotechnology	Biology	PhD	Dr. Hadi Sajid Abdul Abbas	teacher
	√		Microbiology	Biology	Master's	Zainab Hamid Karim	Assistant Professor
	√		Plant physiology	Biology	Master's	Zahraa Abdel Nour Nema	Assistant Professor
	√		Comparative anatomy	Biology	Master's	Yasser Salam	Assistant Professor
	√		Animal branch	Biology	Master's	Iman Karim	Assistant Professor
	√		mushrooms	Biology	PhD	Dr. Heba Hadid Rashid	Assistant Professor
	√		Animal branch	Biology	Master's	Noor Rahi Jassim	Assistant Professor
	√		environment	Biology	Master's	Mais Mohammed Waber	Assistant Professor
	√		Biotechnology	Biology	Master's	Tabarak Fahri Hashim	Assistant Professor
	√		Animal branch	Biology	PhD	Hanna Abd Alkareem	Assistant Professor

	√		Biotechnology and genetic engineering	Biology	PhD	Dr. Ataf Talal Shaker	Assistant Professor
	√		Biotechnology	Biology	Master's	Issam Murad Youssef	Assistant Professor
	√		Animal branch	Biology	Master's	Nour Mohsen Jawad	Assistant Professor
	√		Microbiology	Biology	Master's	Safaa Abbas Kazem-Abdul	Assistant Professor
	√		Animal branch	Biology	Master's	Roaa Amin Rahoumi	Assistant Professor
	√		environment	Biology	Master's	Fatima Hassoun Yassin	Assistant Professor
	√		Fore\Biotechnology nsic Evidence	Biology	Master's	Ali Shaker Obaid	Assistant Professor
	√		plants	Biology	Master's	Ali Rahman Shaker	Assistant Professor
	√		Microbiology	Biology	Master's	Nour Abbas Jawad	Assistant Professor
	√		Calculators	Biology	Master's	Maryam Ayad Jabbar	Assistant Professor
	√		Microbiology	Biology	Master's	Shahd Fadel Hashem	Assistant Professor

Professional development -12
Orientation of new faculty members
- Academic guidance for new faculty members and its impact on improving university performance . - The needs of new faculty members for academic and administrative guidance in to set higher education institutions . - entation program for new faculty members in Preparing a proposal for a comprehensive ori light of international standards for academic quality . - The role of orientation programs in enhancing institutional belonging and motivation among new faculty members .
members Professional development for faculty
- training programs to develop teaching skills among faculty members-E . - faculty performance in light of the requirements of digital higher Workshops to develop education . - Improving active teaching strategies for faculty members . - Professional development programs and their role in increasing the research production of faculty members . - Designing a professional development program based on action research to improve academic performance . - pment and scientific publishing skills in peerThe relationship between professional develo reviewed journals

Acceptance criteria -13
Central Admission

The most important sources of information about programs -14
Textbooks -1 **:Internet sources include -2** **أ- books-e** **ب- Scientific research**

Plan Program Development
%20-Annual update of curricula by no more than 15 -1 **Merging, separating, limiting or adding courses in line with scientific development and the labor market -2**

Program Skills Map
Required learning outcomes of the program

stage	Course code	Course name	Essential or ?optional	knowledge and understanding				specific skills-Subject				thinking skills			
				A1	A 2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
1st stage	UOBAB0501011	General Zoology	essential	*	*				*				*		*
	UOBAB0501012	General Chemistry	essential	*		*				*		*			
	UOBAB0501013	General Mathematics	essential		*		*		*				*		*
	UOBAB0501014	Biophysics	essential		*	*			*	*		*			
	UOBAB0501015	Human Rights and Democracy	essential		*			*		*				*	
	UOBAB0501016	Arabic Language	essential	*			*		*						
	UOBAB0501021	General Botany	essential	*		*				*			*		
	UOBAB0501022	Biology Cell	essential	*	*			*			*				*
	UOBAB0501023	Biostatistics	essential	*	*				*				*		*
	UOBAB0501024	Safety and bioscurity	essential	*		*				*		*			
	UOBAB0501025	Computer Science	essential		*		*		*				*		*
	UOBAB0501026	English Language	essential		*	*			*	*		*			

stage	Course code	Course name	Essential or ?optional	knowledge and understanding				specific skills-Subject				thinking skills			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
2nd stage	UOBAB0501031	Entomology anatomy	**essential**	*	*				*				*		*
	UOBAB0501032	Plant Anatomy	**essential**	*		*				*		*			
	UOBAB0501033	Microbiology 1	**essential**		*		*		*				*		*
	UOBAB0501034	Invertebrates	**essential**		*	*			*	*		*			
	UOBAB0501035	Biochemistry 1	**optional**		*			*		*				*	
	UOBAB0501036	Plant Groups		*			*		*						
	UOBAB0501041	EntomologyTaxonomy	**optional**	*		*				*			*		
	UOBAB0501042	Plant Taxonomy		*	*			*			*				*
	UOBAB0501043	Microbiology2	**essential**	*	*				*				*		*
	UOBAB0501044	Parasitology	**essential**	*		*				*		*			
	UOBAB0501045	Biochemistry2	**essential**		*		*		*				*		*
	UOBAB0501046	English Language 2	**essential**		*	*			*	*		*			

3rd stage microbiology	**BIO3511**	Soil microbiology	Essential	*	*	*	*	*	*			*	*	*	*
	BIO3512	Immunology	Essential	*	*	*	*	*	*	*	*	*	*	*	*
	BIO3513	Plant physiology	Essential	*	*	*	*	*	*	*	*	*	*	*	*
	BIO3514	Animal histology	Essential	*	*	*	*	*	*	*	*	*	*	*	*
	BIO3515	Principals of biotechnology	Essential	*	*	*	*	*	*			*	*	*	*
	BIO3516	Ecology	Essential	*	*	*	*	*	*	*	*	*	*	*	*
	BIO3611	Microbial physiology	Essential	*	*	*	*	*	*			*	*	*	*
	BIO3612	Sewage and water microbiology	Essential	*	*	*	*	*	*	*	*	*	*	*	*
	BIO3613	Microbial ecology	Essential	*	*	*	*	*	*	*	*	*	*	*	*
	BIO3614	Animal physiology	Essential	*	*	*	*	*	*	*	*	*	*	*	*
	BIO3615	Molecular biology	Essential	*	*	*	*	*	*			*	*	*	*
	BIO3616	Pollution	Essential	*	*	*	*	*	*	*	*	*	*	*	*

3rd stage Biotechnology	**BIO3521**	Principals of biotechnology	Essential	*	*	*	*	*	*			*	*	*	*
	BIO3522	Human genetic	Essential	*	*	*	*	*	*	*	*	*	*	*	*
	BIO3523	Animal histology	Essential	*	*	*	*	*	*	*	*	*	*	*	*
	BIO3524	Principals of ecology	Essential	*	*	*	*	*	*	*	*	*	*	*	*
	BIO3525	Microbial genetic	Essential	*	*	*	*	*	*			*	*	*	*
	BIO3526	Plant physiology	Essential	*	*	*	*	*	*	*	*	*	*	*	*
	BIO3621	Molecular biology	Essential	*	*	*	*	*	*			*	*	*	*
	BIO3622	Secondary metabolism	Essential	*	*	*	*	*	*	*	*	*	*	*	*
	BIO3623	General genetic	Essential	*	*	*	*	*	*	*	*	*	*	*	*
	BIO3624	Animal physiology	Essential	*	*	*	*	*	*	*	*	*	*	*	*
	BIO3625	Pollution	Essential	*	*	*	*	*	*			*	*	*	*
	BIO3626	Vaccines	Essential	*	*	*	*	*	*	*	*	*	*	*	*
3rd stage General Biology	**BIO3531**	Animal histology	Essential	*	*	*	*	*	*			*	*	*	*
	BIO3532	Plant physiology	Essential	*	*	*	*	*	*	*	*	*	*	*	*
	BIO3533	Environmental plant	Essential	*	*	*	*	*	*	*	*	*	*	*	*

		physiology													
	BIO3534	Principals of biotechnology	Essential	*	*	*	*	*	*	*	*	*	*	*	*
	BIO3535	Principals of ecology	Essential	*	*	*	*	*	*			*	*	*	*
	BIO3536	Microbial toxins	Essential	*	*	*	*	*	*	*	*	*	*	*	*
	BIO3631	Animal physiology	Essential	*	*	*	*	*	*			*	*	*	*
	BIO3632	plant pathology	Essential	*	*	*	*	*	*	*	*	*	*	*	*
	BIO3633	Comparative anatomy	Essential	*	*	*	*	*	*	*	*	*	*	*	*
	BIO3634	Molecular biology	Essential	*	*	*	*	*	*	*	*	*	*	*	*
	BIO3635	Pollution	Essential	*	*	*	*	*	*			*	*	*	*
	BIO3636	Soil microbiology	Essential	*	*	*	*	*	*	*	*	*	*	*	*
3rd stage Ecology an Pollution	**BIO3541**	Principals of ecology	Essential	*	*	*	*	*	*			*	*	*	*
	BIO3542	Phytoplankton	Essential	*	*	*	*	*	*	*	*	*	*	*	*
	BIO3543	Air and bio radiation	Essential	*	*	*	*	*	*	*	*	*	*	*	*
	BIO3544	Animal histology	Essential	*	*	*	*	*	*	*	*	*	*	*	*
	BIO3545	Principals of	Essential	*	*	*	*	*	*			*	*	*	*

		biotechnology													
	BIO3546	Plant physiology	Essential	*	*	*	*	*	*	*	*	*	*	*	*
	BIO3641	Biodiversity	Essential	*	*	*	*	*	*			*	*	*	*
	BIO3642	Pollution	Essential	*	*	*	*	*	*	*	*	*	*	*	*
	BIO3643	Ecosystems	Essential	*	*	*	*	*	*	*	*	*	*	*	*
	BIO3644	Animal physiology	Essential	*	*	*	*	*	*	*	*	*	*	*	*
	BIO3645	Molecular biology	Essential	*	*	*	*	*	*			*	*	*	*
	BIO3646	Ecological microbiology	Essential	*	*	*	*	*	*	*	*	*	*	*	*

4th stage

Curriculum system