Prospectus of the Program of

"DESERT LAND RECLAMATION AND CULTIVATION"

A Credit Hours Program in English Language for B.Sc. students

(Faculty Program)

June 2017

CONTENTS

1.INTRODUCTION

1.1 Definition and importance of desert Land reclamation and cultivation:

Desert land reclamation and cultivation is a transformation of desert barren lands into arable productive lands capable of providing crops and supporting farm livestock; all of which are important for the welfare of people living in those regions. Based on knowledge of properties of such desert Land barren lands (vast areas of which deserts and saline lands), scientific solutions and adequate handling and management can turn them into productive arable lands. The ability to identify the multiple facets of properties needing such rectification is important in improving these lands. Methods and techniques of reclamation and cultivation of desert lands, saline lands, calcareous lands and others are to be implemented. Knowledge of certain crops, plants and systems suited for these lands, and the ability to work with such characteristics very precisely, make improvements in crops and livestock of utmost importance. Methodology and technology in handling and managing newly reclaimed desert lands have become more sophisticated. Scientific management of crop and animal husbandry under stress of drought and other adverse environmental conditions prevailing in the desert regions are vital in this concern.

1.2 Fields of desert Land reclamation and cultivation:

1) **Desert Land Reclamation**: Scientists have acquired the necessary knowledge and skills for reclaiming desert land soils which are unsuitable for agriculture, particularly desert sandy soils and salt-affected soils. Reclamation involves the use of mechanical, chemical, physical and other means to covert such soils into productive ones. Behavior of plant nutrients in reclaimed soils, soil conditioners and other topics are involved. Negative effects of salinity conditions and the biological response to media of high salinity are covered.
2) **Land Cultivation:** Acquiring understanding and skills on cultivation crop husbandry operations, environments and crop growth are involved. Assessment of field crops suited for reclaimed desert lands is important. Adapting the environmental requirements for crops in desert zones and the cultural practices for crops are vital.
3) **Crop Production:** Most appropriate crops involved in cultivation of reclaimed desert lands include (a) field crops such as wheat, barley and maize, (b) horticulture crops include fruits such as citrus, olives and figs, vegetables, and ornamentals are of vital importance in cultivation of reclaimed desert lands. Forage crops include millets and clovers.
4) **4-Animal, Poultry and Fish Production:** Establishment of farm animals suited for desert zones for dairy and meat production is essential. Management

of livestock in different stages and methods of natural and artificial insemination are included. Operations of poultry and intensive fish production and aquaculture technology are involved.

5) **Agricultural Engineering**: Knowledge on engineering principles to soil and water conservation, agricultural power machinery, agricultural structures, and material handling are involved. Irrigation and drainage basics, compost making are important. Types of drains, planning and designing of irrigation and drainage networks are involved. Farm machinery including tractors is fundamentals in agricultural engineering.
6) **Basics of Main Agricultural Disciplines**: Basics and fundamentals of agricultural sciences including microbiology, physiology, food and dairy, genetics, plant pathology, economics are to be included.

2. VISION AND MISSION OF THE PROGRAM:

2.1 Vision:

The vision of desert land reclamation and cultivation program is to orient students towards practical and up-to-date methods and technologies relating reclamation and cultivation of desert lands. This enables attaining vital levels in desert land improvement and rehabilitation, converting them into productive resource for the welfare of people living in desert Zone Regions, particularly people in the middle east where such lands prevail

2.2 Mission:

The mission of desert land reclamation and cultivation program is providing the agricultural sector with graduates capable of successful engagement and management in reclamation and cultivation of desert lands. The main goal is to transform barren desert, calcareous, and saline lands into productive arable lands capable of producing crops to humans and animals. Also having BSc graduates competent in scientific assessment based on aspects involving scientific disciplines mathematics, biology, physics, engineering and others concerning desert land reclamation and cultivation. Graduates shall have the necessary skills in creative thinking, problem formulation, effective and efficient communication, collaborate work, and practical experimentation for problem solutions.

3. LANGUAGE OF THE PROGRAM:

English is the language for all courses of the program throughout all its levels and stages so that the graduate is fully qualified for competition in the work market on local as well as international levels. The graduate will be capable of handling

aspects relating modern means of information and science arenas. Studying in English allows students on the international levels to join the program, particularly students from countries in the arid and desert zones

4. FACULTY DEPARTMENTS, STAFF MEMBERS, AND FACILITIES:

4.1. Faculty Scientific Departments and Courses:

The courses and their contribution in the *desert Land Reclamation and Cultivation* by each Department are given in Table 1.

TABLE 1. Departments and courses engaged in Desert Land Reclamation & cultivation program

Serial	Department	Code	Number of courses
1	**Agronomy**	(AG 01)	5
2	**Horticulture**	(HO 02)	4
3	**Animal Production**	(AP 03)	7
4	**Plant Protection**	(PP 04)	4
5	**Plant Pathology**	(PD 05)	4
6	**Soil and Water Science**	(SO 06)	8
7	**Agricultural Economics & Extension**	(EE 07)	4
8	**Food Science**	(FS 08)	3(+0.5 in CJ)
9	**Dairy Science**	(DS 09)	3(+0.5 in CJ)
10	**Agricultural Botany**	(AB 10)	5
11	**Agricultural Biochemistry**	(AC 11)	3
12	**Genetics & Genetic Engineering**	(GE 12)	3
13	**Agricultural Engineering**	(AE 13)	7
14	**Common and joint courses**	(CJ 14)	8
Total number of courses Departmental & joint		69	

4.2. Faculty Teaching Staff Members:

Teaching members and assistants in the main Departments contributing to the program are presented in Table 2.All the Departments contributing to the program and their staff are listed in Table 3.

TABLE 2. Main Departments contributing to the program and their staff

Serial	Department	Code	Teaching staff and assistants.(June 2017)				
			Professor	Assistant Professor	Lecturer	Assistant Lecturer	Demonstrator
1	Agronomy	(AG 01)	20	1	2	3	3
2	Horticulture	(HO 02)	22	0	3	1	2
3	Animal Production	(AP 03)	13	0	3	7	8
4	Soils and Water	(SO 06)	9	5	5	1	3
5	Agricultural Botany	(AB 10)	11	3	3	4	3
6	Agricultural Engineering	(AE 13)	6	2	3	5	7
Total			81	11	19	21	26

TABLE 3. Teaching staff members and their assistants in Faculty Scientific Departments (June 2017)

Serial	Department	Code	Teaching staff and assistants				
			Professor	Assistant Professor	Lecturer	Assistant Lecturer	Demonstrator
1	Agronomy	(AG 01)	20	1	2	3	3
2	Horticulture	(HO 02)	22	0	3	1	2
3	Animal Production	(AP 03)	13	0	3	7	8
4	Plant Protection	(PP 04)	9	4	6	4	4
5	Soils and Water	(SO 06)	9	5	5	1	3
6	Agricultural Economics & Extension	(EE 07)	8	3	5	1	3
7	Food Science	(FS 08)	11	1	2	1	2
8	Agricultural Botany	(AB 10)	11	3	3	4	3
9	Agricultural Biochemistry	(AC 11)	6	2	2	6	5
10	Genetics & Genetic Engineering	(GE 12)	5	1	5	4	4
11	Agricultural Engineering	(AE 13)	6	2	3	5	7
12	Dairy Science	(DS 09)	4	0	3	1	2
13	Plant Pathology	(PD 05)	8	3	5	1	3
Total			132	25	57	39	49
Total of Teaching Staff and Assistants			Teaching Staff = 214			Assistants=88	

4.3. Faculty Facilities:

Lecturing rooms, laboratories, symposium rooms, farms and Animal farms in the Faculty of Agriculture, Moshtohor are presented in Table 4.

TABLE 4. Faculty lecturing halls, laboratories, symposium rooms, farms and animal farms

Serial	Description*	Number*
1	Lectures halls for more than 250 students.	6
2	Lectures rooms for less than 150 students.	25
3	Student laboratories	20
4	Seminar and discussion rooms	15
5	Research laboratories	16
6	Research and consultancy laboratories	18
7	Research and experiments center	1
8	Agricultural analysis and consultancy center	1
9	Animal and poultry farms (4 Feddans. "1.7 hectares")	2
10	Youth Development Centre (10 Feddans)	
11	University Student Housing (For more than 2000 Students)	
12	Crop farms and horticulture & fruit orchard (total area of 105 Feddan - `44 ha`).	
*** See article 2 of the Moshtohor Faculty of Agriculture Prospectus (Credit hours).**		

5. ENROLLMENT AND STUDY SYSTEM:

The followings are the enrollment and study system articles of the prospectus:-

5.1. Article 1:

The BOARD responsible for running the Program

The Board responsible for running the program is headed by the Dean of the Faculty of Agriculture, Moshtohor. Board members are : Vice Dean for Under-graduate and Education Affairs, Director of English Programs, Director General of the Faculty and Program Coordinator.

The students and graduates eligible for enrollment in the program (*in line with articles 4, 5 and 6 of the Faculty Prospectus)*:

- **Students eligible for enrollment** are those (A) who obtained Certificate of Completing Secondary School Education (Science or Mathematics), or (B) students who are accepted for BSc enrolment according to the rules of the Faculty of Agriculture, Moshtohor

- **Graduates eligible for enrollment** are those who obtained BSc in Agriculture, Veterinary Medicine, Science, Pharmacy, Medical Science, Education, and Home Economy.

5.2. Article 2:

The Body Awarding the Degree: The BSc Degree in ***Desert Land Reclamation and Cultivation*** is awarded by the University of Benha, upon a request by the Faculty of Agriculture, Moshtohor.

5.3. Article 3:

Study system, Student Evaluation and Degree Award (in line with articles 7 to 10 of the Faculty Prospectus):

1) The study Program for each of the Degrees of B.Sc. in Agriculture Biotechnology is based on the credit-hour system.
2) There are two kinds of courses (A) compulsory (Obligatory) all of which are studied by the student, and (B) Optional (Selective) from which the student select one of his/her choice to study.
3) The credit hour is an assessment parameter defining the relative weight of the academic study course. One credit-hour is: (i) one hour theoretical lecture per week; or (ii) two hours practical/laboratory lessons per week.
4) The program is in 4 levels (Academic Years), no less than 8 semesters. Each level is in two Semesters. Each Semester is 15 weeks. Final examinations are held at end of each semester, the overall result of examinations for each level is fulfilled after the second semester.
5) For each of the 4 **levels each semester has two kinds of courses**: (i) Compulsory Courses (Obligatory Courses), all of which should be studied by students; and (ii) Optional Courses (Selective Courses) out of which the student chooses one according to his/her preference and aptitude.
6) Each student should study at least 6 courses in each semester in addition to any other course(s) essential for all students as decided by the University or the Faculty Board.
7) The student must register for 12 credit hours minimum and 21 maximum per semester. (The Faculty Board may ***waive*** this requisite as seen fit).
8) The number of students registered in an optional course is no less than three. Total number of credit hours during the 4-level BSc degree is **139.**

5.4. Article 4:

The Summer Session: The Faculty Board may add a **Summer Session** within any of the 4 academic levels for students who wish to sit examination for a course that he/she failed to pass (whether in semester 1 or 2). Duration of such Summer Session is 8 weeks, at the end of which an examination should be done. The number of hours/week, for each lecture in the Summer Session is double that of the normal Semester. Courses that a student is entitled to enroll per Summer Session are no more than three. A student can enroll for a Summer Session if (a) successfully passing such courses so as to allow him/her to transfer to the next level; or (b) fulfilling requirements of the entire full program.

5.5 Article 5:

Award of BSc Degree: For a student to be awarded a **BSc** degree in **Desert Land Reclamation and Cultivation**, he/she must fulfill successfully the study throughout the entire duration of the full program (all in English language) of **no less than 139 credit hours** (**58** Compulsory Courses in levels 1 and 2; **57** Compulsory Courses in levels 3 and 4; and **24** Selective Courses in all four levels. Table **5** shows the distribution of the credit hours.

Table 5. Credit hours for the BSc Degree in Desert Land Reclamation and Cultivation

Level (L)	Number of credit hours						Grand total of credit hours
	Compulsory(Obligatory) Courses in each semester			Optional(Selective) Courses in each semester			
	S 1	S 2	Total	S 1	S 2	Total	
L 1	17	12	29	3	3	6	35
L 2	17	12	29	3	3	6	35
L 3	15	15	30	3	3	6	36
L 4	12	15	27	3	3	6	33
Total	61	54	115	12	12	24	139

S1 = First semester, S2 = Second semester.

5.6. Article 6:

Categorization of students and their status:

- **Level 1:** Fresh students (are enrolled for the first time). Also students in this level who are failed to pass **32** credit hours of the Program.
- **Level 2:** Students who are elevated from level **1** and passing successfully **32** credit hours at least. Also students who did not pass beyond 70 credit hours of the Program.
- **Level 3:** Students who are successfully pass **70** credit hours. Also students who are fail to pass successfully beyond **112** credit hours of the Program.
- **Level 4:** Students who are successfully pass 112 credit hours at least of the program.

5.7. Article 7:

Student Academic Guide: Students are assigned academic guides **(*in line with article 16 of the Faculty Prospectus*)**. The Academic Guide is a Faculty Teaching Staff Member (Professor or Assistant-Professor or a lecturer of more than two years' experience as a lecturer) who helps and guides the student relating the study program and the possible career opportunity. The activity also concerns choosing the optional courses and any related issue concerning the studies of the student. The opinion of the student's Academic Guide is advisory and not necessarily compulsory since the final decision on any choice is the student's. Each guide should keep records containing relative information and academic history of students under his/her guidance. Students are enrolled and their courses registered according to the rules of this Prospectus.

5.8. Article 8:

Exchanging one course by another: Based on a recommendation by the Student Guide and a confirmation by the Faculty Board **(*in line with article 16 to 18 of the Faculty Prospectus*)** the student can:(a) Omit a course and replace it by another from the optional, or (b) add an extra course within the accepted limit of studied courses. This must be done within the first two weeks of the course commencement in the 1st or 2nd semester.

5.9. Article 9:

Withdrawal from a Course: The student can withdraw from a course within the first 6 weeks of the 1st or 2nd semester; or within the first 3 weeks of the summer

session. In case of any withdrawal, the number of courses remaining should not be less than the minimum number of courses eligible for a student studying the Program. If withdrawal occurs within a semester, the student can study the course in the summer session.

5.10. Article 10:

Proceeding to higher levels within the program: The student can proceed from one level to another (higher above it) if (a) succeeded in all courses or (b)failed in one or two courses. Students failing a course have a right to re-register and sit their exams as others.

5.11 Article 11:

Failure in a Course: In case of failing the final examination in any compulsory (obligatory) course, the student should (***in line with article 19 of the Faculty Prospectus***) re-register in it, and sit the examination (s) for it. In case of failing an optional (selective) course, the student can re-register in it or register in another optional course of his/her choice.

5.12. Article 12:

Attendance of practical lessons: *In line with article 20 of the Faculty Prospectus*, the student should attend practical lessons fulfilling an attendance rate of no less than 75%. The board of the Faculty has the right to bar the, whose rate of attendance is less than 75%, from sitting the examination of the concerned course, and consequently the student is considered failed in the examination with a mark of zero. The same applies to the student who fails to attend the final examination of a course with no acceptable alibi or permissible excuse (and in such case, the student is considered as *absent without acceptable reason)*.If could not (or will not) attend an examination, the student should submit a request before the examination date or within the time of the examination; and if such a request is accepted by the Faculty Board, the student`s absence would be acceptable. If the student attends an examination during the time that a decision is being issued, result of such examination is *null and void*.

5.13. Article 13:

Follow-up tests and examinations: *In line with article 21 of the Faculty Prospectus*, follow-up tests (at least 2 tests per semester "or session" per course) must be done, organized by the concerned scientific Department. At end of each semester (or session), oral, practical and written terminal examinations for each course should be

done. The duration time for the terminal written-examination is two hours, unless decided otherwise by the Faculty Board.

5.14. Article 14:

Distribution of examination marks by courses: In line with *article 22 of the Faculty Prospectus,* distribution percentages of full marks for any course are as follows:

a) For courses having practical examinations: 60% for the written terminal examination: 15% for the final practical examination; 10% for the oral examination and 15% for the periodical and follow-up tests.
b) For courses having no practical examinations: 70% for the written terminal examination; 15% for the oral examination and 15% for the periodical and follow-up tests.

5.15. Article 15:

Panels for oral, practical and laboratory examinations: In line with ***article 23 of the Faculty Prospectus,*** teaching staff members constituting the panels of oral, practical and laboratory examinations are appointed by the relevant Scientific Department. The number of teaching staff per panel is no less than two and no more than **four**. The minimum number of students per one examination sitting is five or the total number of students registered in the course (***fulfilling article 290 of the Egyptian Low for Universities` organization***).

5.16. Article 16:

Cumulative Grade-Point Average (CGPA) earned by student upon termination of examination: In line with ***article 24 of the Faculty Prospectus***, the grade-points earned by the student are averaged so as to give a value of CGPA ranging from 0.0 to 4.0. Table 5 shows each grade in terms of CGPA value, Code-letter, and percent of maximum marks, noting the followings: **(a)** the student is considered failed if obtained less than 30% of maximum marks allocated to the terminal written examination (thus ***considered "*Prospectus-Failure"**), irrespective of the overall total percentage of his/her marks relative to the **total maximum** of the course (***total maximum*** is the sum of marks for practical + oral + terminal). **(b)** The student who passes examination(s)-in which he/she formerly failed-and obtain marks exceeding the Pass Grade marks, gets no more than the highest mark of the Pass Grade. An exception is the student who formerly failed due to absence with accepted alibi

*(**acceptable reason)***; he/she is entitled to the deserved grade if exceeding the highest Pass marks.

5.17. Article 17:

The cumulative grade for each study level: In line with article 25 of the Faculty Prospectus, calculation of the "cumulative grade point average" (CGPA) is as follows: concerning any particular level (academic year):

a) **For one study level (an academic year)**: Summation of the {(**CGPA** points for the course multiplied by the number of credit hours of the course) regarding all courses attempted by student)} divided by the total sum of **credit hours** for all courses of *the academic year*.

b) **For the entire 4-year program:** Summation of the (**CGPA** points for the course multiplied by the number of credit hours of the course, regarding all courses attempted by student); divided by *(the total sum of **credit hours** for all courses of the four academic years, i.e. the 4 levels).*

5.18. Article 18:

The Honor Grade: A student gets an *Honour* grade if the grade is *excellent* or *very good* for each of the four academic years; and in the same time has a cumulative 4-year grade of *excellent* or *very good* (with at least 15 credit hours in any semester, and no failure in any of the courses).

5.19. Article 19:

Student Dismissal: In line with ***article 26 of the Faculty Prospectus*** a student enrolled in Level 1 is not allowed to continue and is dismissed if (a) his/her grade score for level 1 is less than 30%, or (b) if during the first two years of his/her joining the program failed to fulfill a minimum of 29 **credit hours.**

5.20. Article 20:

Summer Training and Scientific Excursions: In line with ***article 27 of the Faculty Prospectus***, a student completing successfully at least 70 **credit hours** can carry out a summer training program given by the Faculty`s Scientific Departments. The duration is one month (6 days per week; 8 hours per day). Students who successfully complete 106 **credit hours** must join the 6-week field summer training.

Table: 6. Percentages, scores of Grade Point Average (GPA) Codes:

Grade	Percentage of maximum marks (%)	Grade score	Grade Code
Excellent	95 and more	4.0	A
	90 to less than 95	3.7	A^-
	85 to less than 90	3.4	B^+
Very Good	80 to less than 85	3.0	B
	75 to less than 80	2.8	B^-
Good	70 to less than 75	2.4	C^+
	65 to less than 70	2.0	C
Pass	60 to less than 65	1.6	C^-
	55 to less than 60	1.3	D^+
	50 to less than 55	1.0	D
Weak	30 to less than 50	0.0	F
Very Weak	less than 30	0.0	F^-

This is as follows (a) 2 weeks in the scientific Department; and (b) 4 weeks in an outside institute, research center, factory, firm or other bodies involved in agriculture, under joint supervision (the **Scientific Department and the outside body**). The student may fulfill the summer training abroad in a factory or research institute or a firm of comparable activity (private or governmental). In line of ***article 28 of the Faculty Prospectus***, students of the 3rd and 4th levels must do scientific excursion to an Egyptian Agricultural Research Station or a body or institute of scientific research during the semester time.

5.21. Article 21:

(A) Graduation Announcement: Successful Graduation results are announced following the **June examination**; (i.e. the **June Graduation**) in cases where the student succeeds in all of the examination for all courses for fulfilling the program (***article 30 of the Faculty Prospectus)***.Students failing to succeed in all attempted courses are to re-sit the 2nd chance examination(s), and if succeeded they can obtain their graduation in the **September Graduation.**

(B) Rewards for Students of exceptionally high academic standards: Student who acquire the highest cumulative grade point "CGPA" marks, among those who obtain above 4.00 CGPA for entire level, is entitled for a refund of the tuition fees of the level. If more than one student acquires the same of such CGPA marks, they would share the value of the refund.

5.22. Article 22:

The curriculum and the Required Credit Hours: Students are required to complete at least **139** credits for all courses. Distribution of credit hours (compulsory "obligatory" + optional "selective") for each level (L) are as follows: **L1= 35**; **L2=35**; **L3= 36**; **L4 = 33.** The compulsory courses are as follows: **L1= 29**; L2= **29**; **L3=30**; **L4= 27**. Departments contributing to the program courses are listed in Table 7.

Table: 7. Scientific Departments contributing to the Program courses:

Serial	Department (& Joint)	Code	*No of courses
1	Agronomy	AG 01	5
2	Horticulture	HO 02	4
3	Animal Production	AP 03	7
4	Plant Protection	PP 04	4
5	Soils and Water science	SO 05	8
6	Agricultural Economics & Extension	EE 06	4
7	Food Science	FS 07	3(+0.5joint)
8	Agricultural Botany	AB 08	5
9	Agricultural Biochemistry	AC 09	3
10	Genetics and Genetic Engineering	GE 10	3
11	Agricultural Engineering	AE 11	7
12	Joint (Common and Joint)	CJ 12	8
13	Dairy Science	DS 13	3(+0.5joint)
14	Plant Pathology	PD 14	4
Total			69

* Total of courses (compulsory + optional).

6. DETAILS OF COURSES OF THE PROGRAM:

Detailed contents of the courses of the program are shown in Appendix 1. The followings are details of each course, Common & Joint as well as those given by each Department; with course Code and Prerequisite (PrRq), or Co-requisite (CoRq) Code. Description, contents and references for each are given. The courses distributions among levels are also shown in Appendix 1.

6.1 Common & Joint Courses:

The list of common and joint courses involved in the program is shown in Table 8.

Table 8. List of common and joint courses involved in the program (Code: CJ 12).

Serial	Course Title	Code
1.	English 1	(CJ 1201)
2.	English 2	(CJ 1202)
3.	Computer Science	(CJ 1203)
4.	Human Rights & Agricultural Legislations	(CJ 1206)
5.	Effective Communication Skills	(CJ 1207)
6.	Graduation Project	(CJ 1208)
7.	Agricultural Entrepreneurship	(CJ 1209)
8.	Meat and Dairy Products	(CJ 1210)

6.1.1 Course Title: English 1 (Code: CJ 1201, PrRq: None)

Course description: The course aims at making the student be familiar with the use of English language to express himself /herself in proper English, differentiating from spoken and written English. Basic grammar and vocabulary are taught in this course. Combining comprehension with awareness is included.

Course contents: Introduction - Simplified English - Difficulties for English language users Grammar and vocabulary - Informative statements - Passive and Active - Countable and uncountable nouns - Comparative (qualified and unqualified) statements - Definitions: general and formula definition - Spoken English and written English - American English and UK English - Determinate indeterminate expressions.

References:

1) **Bauer, L. 2007.** The linguistics student`s handbook. Edinburgh University Press, UK. http://books.google.com.eg/books?id=WsrtrmHkLvoC&pg=PA386&dq=The+linguistics+student%60s+handbook&hl=en&sa=X&ei=lfPzUtaCHcTL4AT394Bo&ved=0CCwQ6AEwAA#v=onepage&q=The%20linguistics%20student%60s%20handbook&f=false.

2) **Murphy, R. 2012** English Grammar in Use. 4th Ed, Cambridge University Press,UK. https:// ia800307.us.archive.org/23/items/MurphyR.EnglishGrammarInUse4thEdition/Murphy%20R.%20- 20English%20Grammar%20in%20 Use%20 4th%20 Edition).pdf

3) **Swan, M. 2005.** Practical English usage.New International, Oxford University Press, UK http://books.google.com.eg/books?id=nS8YAAAACAAJ&dq=Practical+English+usage&hl=en&sa=X&ei=qPXzUqDmGOS24ASIpoHwCA&ved=0CCoQ6AEwAA

6.1.2 Course Title: English 2 (Code: CJ 1202, PrRq: CJ 1201)

Course Description: The course gives the student more insight of English language oriented more to the scientific side, properly suited for the agriculture science discipline. Specific aspects will be stressed upon. Precise usage of English terms is included. Scientific English and specific nomenclature and glossary are included.

Course Contents: Introduction to Scientific English and its requisites - Dimensions and properties - Scientific statements and verb tense Description styles of experiments - Explanatory descriptions - Subject-forms in experiment description (imperative, passive and others) - Concise statements - Proper statements on Tables, Figures, Maps and Graphs - SI-units and non-SI units (SI units: *Systeme International d'Unites ;* i.e. International systems of units) - Scientific Prefixes in measuring units nomenclature.(kilo, mega, giga, tera.. etc. & deci, centi, milli, micro, nano... etc.).

References:

1)Swales, J.M. 1990. Genre analysis: English in academic and research selttings.13th Printing, Cambridge University Press, UK.
http://books.google.com.eg/books?id=shX_EV1r30C&printsec=frontcover&dq=Genre+analysis:+English+in+academic+and+research+settings&hl=en&sa=X&ei=EvTzUpbSLIb64QSysoGwCw&ved=0CCoQ6AEwAA#v=onepage&q=Genre%20analysis%3A%20English%20in%20academic%20and%20research%20settings&f=false.

2) Wallwork, A. 2011. English for writing research papers. Springer,UK.
http://books.google.com.eg/books?id=I6_8kSeQ4LYC&printsec=frontcover&dq=English+for+writing+research+papers&hl=en&sa=X&ei=gPTzUo3DBcjWsgbx8YCABA&ved=0CCoQ6AEwAA#v=onepage&q=English%20for%20writing%20research%20papers&f=false

3) Bauer, L. 2007. The linguistics student`s handbook. Edinburgh Univ. Press, UK.
http://books.google.com.eg/books?id=WsrtrmHkLvoC&pg=PA386&dq=The+linguistics+student%60s+handbook&hl=en&sa=X&ei=lfPzUtaCHcTL4AT394Bo&ved=0CCwQ6AEwAA#v=onepage&q=The%20linguistics%20student%60s%20handbook&f=false

6.1.3. Course Title: Computer Science (Code: CJ 1203, PrRq: none)

Course description: The course aims at preparing the student for handling and using the computer in carrying out issues suited to its use. It enables students to use software for a variety of disciplines.

Course Contents: Introduction to computer science - Learning about different uses of computer - Familiarizing with Windows© software (e.g. Windows 95; Windows 7) - Microsoft Word software - Microsoft systems - Reasons and problem-solving - Software applications - Maximizing performance.

References:

1) **Bhattachajee, A.K.,Mukherjee, S. and Brookshear, J.G.2012.** Computer science. Pearson Education Ltd., London, UK.
http://books.google.de/books?id=2JJjMwEACAAJ&dq=Computer+Science.+Pearson+Education&hl=en&sa=X&ei=Mzv3UoSAAYHlswbJooDYAw&ved=0CEsQ6AEwAg

2) **Lalanda, P., McCann, J.A., and Diaconescu, A. 2013**. Autonomic computing: Principles, design and implementation. Springer-Verlag London, UK.
http://books.google.de/books?id=1RQ_AAAAQBAJ&printsec=frontcover&dq=Autonomic+Computing:+Principles,+design+and+implementation&hl=en&sa=X&ei=TDv3UqaHAoaMtQa6hoGADw&ved=0CDcQ6AEwAA#v=onepage&q=Autonomic%20Computing%3A%20Principles%2C%20design%20and%20implementation&f=falsee

6.1.4. Course Title: Human Rights and Agricultural Legislations (Code: CJ 1206, PrRq: none)

Course Description: The course covers to human rights laws mentioned in the United Nations (UN) organization and similar other international organizations. Particular mentions are stressed of the human rights of babies, young's, adults, olds, men and women. The course includes agricultural legislations, lows and regulations related to the agriculture section.

Course Contents: Human rights lows in the United Nations and the Organization of African Unity (OAU) with its 53 member states - Human rights or babies, men, women and adults - Agricultural legislations and lows related to the agricultural sector in.Regulations related to agricultural production and environment and Agricultural production and impact on the on the environment.

References:

1) **Heyns**, **C 2002.** Human rights laws in Africa 2004. Brill, London, UK. http://books.google.com.eg/books?id=J3nX5NtDQe0C&printsec=frontcover&dq=Human+Rights+Law+in+Africa+1999&hl=en&sa=X&ei=dCroUsaxDJCOyQOpq4HoBQ&ved=0CCoQ6AEwAA

2) **Fedtke, J. 2003.** Human rights and the private sphere: A comparative Study. Routledge Pub. Abingdon, UK.
http://books.google.com.eg/books?id=bODo_dfYFZMC&printsec=frontcover&dq=Human+Rights+and+the+Private+Sphere&hl=en&sa=X&ei=kyroUoTrF8bFyQP_8YDADg&ved=0CCoQ6AEwAA

6.1.5. Course Title: Effective Communication Skills: (Code:CJ 1207, PrRq:EE 0602)

Course Description: The course teaches how to undertake effective communications with others. It develops ability to convey one's message effectively and humanely.

Course Contents: Introduction on human communication. - How to start communications with others - Precision in communication - Refining communication skills - Ability to ability to influence and make a profound change - Persuasion modifying human habits.

References

1) **Grenny, J., McMillan, R., Switzler, A. And Roppe, L.2014.**Crucial conversation. McGraw-Hill, London, UK.
https://www.google.com.eg/search?q=g&ie=utf8&oe=utf8&client=firefoxb&gfe_rd=cr&ei=A8FSWbnKDfDBXoDwuLgP#q=Grenny,+J.+,McMillan,+R.,+Switzler,+A.++and++Roppe,+L.+2014.+Crucial++conversation. +McGraw-Hill+,+London,+UK..+.

2) O'Brian, A. 2016. Declutter your mind: A life changing guide.Old-Town Publ.,London, UK https://www.google.com.eg/search?q=google&ie=utf8&oe=utf8&client=firefoxb&gfe_ rd=cr&ei=yWJSWenZH8as8wfOgqr4Dw#q=Grenny,+J.+,+McMillan,+R.,+Switzler,+A.++and++Roppe,+L.+2014.+Crucial++conversation.+McGraw-Hill+,+London,+UK.

6.1.6. Course Title: Graduation Project (Code: CJ 1208, PrRq: none)

Course Description: A project should be done and fulfilled within "**Level 4"** of the **BSc Program**. It could be done individually or by a group of students. It is supervised by one or more of the teaching staff of the faculty headed by a professor.

Course Contents: Project subject, scheme, discipline are planned according to University rules - A dissertation is prepared and a seminar is given, after which a panel of examiners gives the final decision and verdict.

References:

1) CMS 2011. The graduate project handbook for students. Charlotte-Mecklenburg Schools (CMS), Charlotte, NC, USA.
http://books.google.de/books?id=IVwnWFbu6KkC&pg=PA157&dq=The+graduation+project+handbook+for+students&hl=en&sa=X&ei=lDv3UuiHEYestAb4IDIBA&ved=0CDUQ6AEwAA#v=onepage&q=The%20graduation%20project%20handbook%20for%20students&f=false

2) ASA/CSSA/SSSA 2013. Publications handbook and style manual. Am. Soc. Agron. (ASA), Crop. Sci. Soc. Am. (CSSA) and Soil Sci. Soc. Am. (SSSA), Madison, WI, USA.http://books.google.de/books?id=zWfQFePFmwQC&q=Publications+handbook+and+style+manual.&dq=Publications+handbook+and+style+manual.&hl=en&sa=X&ei=ujv3UsTMAYnRtAbd14DABw&ved=0CCwQ6AEwAA

6.1.7. Course Title: Agricultural Entrepreneurship (Code: CJ 1209, PrRq:EE 0602)

Course Description: The course gives students the knowledge about entrepreneurship. An entrepreneur is an innovator able to enlarge the business. The course informs students the entrepreneurial skills to upgrade the level of his/her enterprise.

Course Contents: Introduction and discussion of entrepreneurship - Developing an entrepreneurial identity - Relations between business ownership (self-employment) and entrepreneurship - Major factors driving entrepreneurial learning: developing entrepreneurial identities; crossing agriculture boundaries; enlarging family farms - How small entrepreneurial companies get large - Transition from production-oriented to multifunctional farming - Utilization of entrepreneurial learning in practical context - Move agriculture beyond its current status to entrepreneurial levels.

References:

1) **Lans, L., Seuneke, P.and Klerk, L. 2013**. Agricultural Entrepreneurship. Springer, Netherland.https://www.researchgate.net/publication/317821527_Agricultural_Entrepreneurship
2) **Alsos, G.A., Carter, S. and Ljunggren, E. 2011.** The handbook of research on entrepreneurship in agriculture and rural development. Edward Elgar Publ.**,UK.**
https://books.google.com.eg/books/about/The_Handbook_of_Research_on_Entrepreneur.html?id=4V7_cTwI6QUC&source=kp_cover&redir_esc=y

6.1.8. Course Title: Meat and Dairy Products (Code: CJ 1210 PrRq: AP 0301)

Course Description: The course provides information on animal and poultry meat production and their products. Problems relating meat microbiology are addressed. Production of milk products including fatty dairy products of cream,butter, Samna; as well as cheese, ice cream, condensed and dried milk are all included. Students will be acquainted with basic education on dairy products technology.

Course Contents: Animal and poultry (A&P) meat as food - Methods of slaughter, safety, preservation, and production of products - Chemical composition and nutritive value of products - Classification and quality properties of meat and poultry - Sensory and chemical evaluation of A&P meat - Modern trends in preparation of A&P meat and products - Pathogens and spoilage bacteria of A&P meat and products - Milk products and their importance as food - Milk production - Starter cultures in dairy products - Condensed and dried milk - Making of dairy products.

References:

1) **Fotitt, R.J. and Lewis, A.S. 1999**. The canning of fish and meat. Aspen Publ. Inc., Chapman and Hall, London, UK.
http://books.google.com.eg/books?id=HnXdPn6D6p8C&printsec=frontcover&dq=The+canning+of+fish+and+meat&hl=en&sa=X&ei=U2npUsrkFuuy7AaYr4HwDw&ved=0CCoQ6AEwAA#v=onepage&q=The%20canning%20of%20fish%20and%20meat&f=false

2) **Gouffe**, **J. 2011.**Methods for preserving meat and fishVintage Cookery Books Publ., UK. http://books.google.com.eg/books?id=sqPJX7U3sNkC&dq=Methods+for+preserving+meat+and+fish&hl=en&sa=X&ei=cmnpUpnRL4uv7QbhloHIBQ&ved=0CC8Q6AEwAQ

3) **Pearson, A.M. and Dutson, T.R.** 1**997**.Healthy production and processing of meat, poultry and fish products. Advances Meat Res. Vol. 11, Springer, London, UK.
http://books.google.com.eg/books?id=diLA6IVcuZEC&printsec=frontcover&dq=Healthy+production+and+processing+of+meat,+poultry+and+fish+products&hl=en&sa=X&ei=iWnpUovpK8aL7AaAqYGACA&ved=0CCoQ6AEwAA

4) **Walstra, P., Wouters, J.T. and Geurts, T.J. 2006**. Dairy Science and technology.2nd Ed CRC,Taylorand Francis Group. NY, USA.
http://www. Amazon. com/Dairy-Science-Technology-Second-Food/dp /0824727630 /ref= sr_1_1?s=books&ie=UTF8&qid=1390949383&sr=1-1&keywords =Dairy+Science+and+technology

5) **Britz, T. and Robinson**, R.K. **2008.** Advanced dairy science and technology. Wiley-Blackwell, London, UK..
http://www.amazon.com/Advanced-Dairy-Science-Technology-Trevor/dp/ 1405136189 /ref=sr11?s=books&ie=UTF8&qid=1390949453&sr=1-1&keywords=Advanced +Dairy+ Science+ and+Technology

6.2 Courses of Agronomy Department:

The list of Agronomy Department Courses involved in the program is shown in Table 9.

Table: 9. List of Agronomy Department Courses involved in the program (AG01).

Serial	Course Title		Code
1.	**Field Crops**	Comp.	(AG 0107)
2.	**Biostatistics and Experimental Design**	Comp.	(AG 0104)
3.	**Pasture &Fodder Production in Desert Lands**	Comp.	(AG 0108)
4.	**Crop Adaptation in Desert Lands**	Opt.	(AG 0109)
5.	**Desert Crop Breeding**	Opt.	(AG 0110)

6.2.1. Course Title: Field Crops (Code: AG 0107, PrRq: AB 0810)

Course Description: The course teaches students conditions of desert lands on which selection of target crops is done. Cultural practices are viewed. Objectives of attaining high production and quality from crops of high net-assimilation rate are covered. Basic principles of agronomic practices under desert climates are included.

Course Contents: Agronomy of major cereals oil seed, fiber and sugar crops - Agronomy of industrial crops as Jajoba stativa, quinow and. Sufflowr - Effective use of plant residues, organic manures, biofertilizers and bio-pesticide in crop husbandry - Agricultural sustainability and require requirements in desert lands - Intercropping and crop rotation - Determination of cropping potentiality estimated by CGR, RGR, NAR, LAD.

References:

1) **Scherr, S.J., and J.A. McNeely . 2007**: Farming with nature: The science and practice of eco-agriculture. Island Press Washington, D.C. USA https://islandpress.org/book/farming- with-nature
2) **Martin, J.H., Deceased, L., Warren H., Stamp, D. L. and Waldren, R. P. 2005**. Principles of field crop production .4th Ed. Nashua, NH, U.S.A https://www.abebooks.com/servlet/SearchResults?an=Martin%2C+John+H.%3B+Leonard+Deceased%2C+Warren+H.%3B+Stamp%2C+David+L.%3B+Waldren%2C+Richard+P.&cm_sp=det-_-bdp-_-author
3) **Tarvageet, N., Gill, S.S. and Tuteja, R. 2012.** Improving crop productivity in sustainable Agriculture, John Wiley & Sons,NY, USA.. http://eu.wiley.com/WileyCDA/WileyTitle/productCd-3527332421.html#

6.2.2.Course Title: Biostatistics & Experimental Design (Code:AG0104, PrRq: None)

Course Description: The course aims at teaching students the use of biostatistics in studies and designs of experiments. Execution of experiments and relevant statistical analyses of data are covered. Analyses of inventory and survey data are included.

Course Contents: Use and different pathways of statistics - Basic rules of experimental designs - Simple and factorial experiments and analysis of variance - Tests for significant differences between treatments - Correlation and regression analysis - Test of homogeneity and combined analysis - Covariance analysis - Response curves.

References:

1) **El-Akhdar, A.2013**.Statistical procedures for agricultural research.Academia Press, UK. https://www.google.com.eg/search?q=g&ie=utf-8&oe=utf-8&client=firefox-b&gfe_rd=cr&ei=DqZSWeXhF8HA8geq7JLACQ#q=1)%09El-Akhdar,+A.+2013.+Statistical+procedures+for+agricultural+research.+Academia+Press, +UK.
2) **Gomez, K.A. and Gomez, A.A. 1984.** Statistical procedures for agricultural research, 2nd Ed. John Wiley & Sons, NY, USA. https://www.google.com.eg/search?q=g&ie=utf-8&oe=utf-8&client=firefox-b&gfe_rd=cr&ei=DqZSWeXhF8HA8geq7JLACQ#q=2)%09Gomez,+K.A.+and+Gomez,+A.A.+1984.+Statistical+procedures+for+agricultural+research,+2nd+Ed.+John+Wiley+%26+Sons,+NY,+USA.+.
3) **Snedecor, G.W. and Cochran, W.G. 1989.** Statistical methods, 8th Ed. Iowa State, Univ. Press Ames Iowa, USA.

http:// books.google. de/books ?id =f8EOBjMJMZcC&dq= statistical+ methods&hl=en&sa=X&ei=jTz3UuJzitSzBqyTgDA&ved=0CC4Q6AEwAA

6.2.3. Course Title: Pasture & Fodder Production in Desert Lands (Code: AG 0108, PrRq: AG 0107)

Course Description: The course aims at teaching students the botany of leguminous and cereal forage and pasture plants. Establishment and renovation forage production and grazing systems are included. Quantitative and qualitative measurements and procedures of forage production are covered. Surplus forage and pasture processed as hay, haulage and silage are included.

Course Contents: Introduction to pasture and grasslands in and their role - Silvi-pasture, silviculture and agroforestry in desert lands - Botany, morphology, growth, regrowth of legumes, grasses and their mixture - Ecological and physiological in determining forage productivity - Nutritive evaluation of fresh and dry forage - Animal disorders and forage composition - Forage-animals / relations: quality and anti-quality; nutrient deficiencies - Preservation, conservation and storage of forage - Practices for establishment, maintenance and renovation of pastures - Pastures management and animal stoking density, grazing pressure, and foraging behavior.

References:

1) **Singh, A.K. Khan, M.A., Subash, N. and Singh. K. M. 2011**. Forages and fodder: Indian prospective. Daya Publ. House, Delhi, India.
https://www.booksmela.com/forages-and-fodder-indian-perspective-anil-kumar-singh-m-a-khan-natraja-subash-krishna-murari-singh-8170356679-9788170356677

2) **Miller, D. 1984.** Forage crops., McGraw-Hill Book Co. NY. USA.
https://www.abebooks.co.uk/servlet/BookDetailsPL?bi=22006299580&searchurl=&cmtrack_data=cm_abecat%3D100200046

3) **Heath, M.E., Metcalff, D.S. and Barness, R. F. 1980**. Forages, the science of grassland agriculture. 3rd printing, Iowa State University Press, Ames, Iowa, USA.
https://www.bdpa.cnptia.embrapa.br/consulta/busca?b=ad&id=579721&biblioteca=vazio&busca=autoria:"BARNES,R.F."&qFacets=autoria:"BARNES,R.F."&sort=& paginacao=t &paginaAtual=1

6.2.4. Course Title: Crop Adaptation in Desert Lands (Code: AG 0109, PrRq: AG 0107)

Course Description: The course aims at teaching students the stress and strain behavior and changes in structural and physiological characteristics in field crops according to the desert environment. Effects of drought, salinity, high temperature, light intensity, are covered. Treatments which increase capabilities of crop plants for adaptation are included.

Course Contents: Introductions on stress and strain**:** nature and stress injury and resistance - High temperature and heat stress: injury and resistance - Water deficit

stress and plant growth and ways to overcome the effects - Salt stress and ways to overcome the effects - Mechanical impedance of soil and impact on plant growth - Light and wind stress and ways to overcome the effects - Dealing with more than one stress at a time - Man-made stress - Edaphic (soil) stress.

References:

1) **Levit, J. 1980**. Response of plants to environmental stresses. Vol. I and II, water, reduction, salts and other stresses .Academic Press, NY, USA..
https://books.google.com.eg/books/about/Responses_of_Plants_to_Environmental_Str.html?id=tVAVAQAAIAAJ&redir_esc=y

2) **Tuteja,T and Sing-Gill, S. 2012.** Plant acclimation to environmental stress. Springer Science and Business Media, NY, USA.
https://books.google.com.eg/books?id=gkrEuHjptzQC&printsec=frontcover&dq=Plant+acclimation+to+environmental+stress+Narendra+Tuteja,+Gill+Sarvajeet+Sing,+editor+(2012)&hl=ar&sa=X&ved=0ahUKEwj_rabigPLUAhXLuRQKHdxCC-4Q6AEIFTAA#v=onepage&q&f=false

3) **Ahmad, P. and Prasad, M.N.V. 2006.** A biotic stress response in plants. Metabolism, productivity and sustainability. Springer,NY, USA.
http://www.esalq.usp.br/lepse/imgs/conteudo_thumb/Abiotic-Stress-Responses-in-Plants-by-Parvaiz-Ahmad-and-M-N-V--Prasad--2012-.pdf

6.2.5. Course Title: Desert Crop Breeding (Code:AG 0110, PrRq:AG 0107)

Course Description: The course aims at acquainting the student with the discipline of crop breeding. Principles of hybridization and modern methods of plant breeding particularly in desert regions are included.

Course Contents: Overview of plant breeding - Genetic consequences of hybridization - Breeding self-pollinated crops - Breeding hybrid varieties of outcrossing crops - Marker analysis techniques - Crop breeding for low agriculture inputs.

References:

Allard, R.W.1999. Principles of plant breeding. 2nd Ed. John Wiley & Sons, NY, USA.
https://books.google.com.eg/books?id=74hdQoEc8XsC&printsec=frontcover&hl=ar&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false

6.3 Courses of Horticulture Department:

The list of Horticulture Department Courses involved in the program is shown in Table 10.

Table: 10. List of Horticulture Department Courses involved in the program (HO02).

Serial	Course Title		Code
1.	**Desert Vegetable Production**	Comp.	(HO 0209)
2.	**Desert Fruit Production**	Comp.	(HO 0210)
3.	**Desert Aromatic & Medicinal Plants**	Comp.	(HO 0211)
4.	**Desert Timber Plantation**	Opt.	(HO 0212)

6.3.1 Course Title: Desert Vegetable Production (Code:HO 0209, PrRq:AB 0810)

Course Description: The course involves the history and importance of vegetable production and tolerance and adaptation to environmental stress under desert conditions. Propagation, nursery operations, vegetable growth, flowering, fruit setting, development and harvesting are included.

Course Contents: Introduction with an overview of vegetable production under desert zones - Effect of environmental stress (drought, salinity, heat) on vegetable crops - Production of vegetables (e.g. tomato, potato, and cucumber) in desert zones - Propagation and nursery operations - Successful initiation of vegetable plant orchard in desert conditions - Choice of suitable sites, proper soil preparation, irrigation and water quality - Propagation, setting and development of fruits, and harvesting.

References:

1) **Gopalakrishnan, T. 2007.** Vegetable crops. New India Publ. Agency (NIPA), New Delhi, India**.** http://books.google.de/books?id=-mTUBjSyo_UC&printsec= frontcover&dq =Vegetable+ crops&hl=en&sa=X&ei=Yj33Ur_OJMbMsgaTyoGIBQ&ved=0CC4Q6 AEwAA#v= onepage & q=Vegetable%20crops&f=false

2) **Thompson, A.K. 2003.** Fruit and vegetable harvesting, handling and storage. Blackwell Publ., Oxford, UK. http://books.google.de/books?id=5tijQBNixoC&printsec=frontcover&dq=Fruit+and+vegetable+harvesting&hl=en&sa=X&ei=gT33Usb6FcHOtQaWlYHQDg&ved=0CC4Q6AEwAA#v=onepage&q=Fruit%20and%20 vegetable%20harvesting&f=false

3) **Ware, G. and Swiader, J.M. 2002**. Producing vegetable crops. Interstate Publ. Madison, WI, USA. http://books.google.de/books?id=UjgjAQAAMAAJ&q=Producing+vegetable+crops&dq=Producing+vegetable+crops&hl=en&sa=X&ei=oD33UoeCIYPfswbcloCQCg&ved=0CC4Q6AEwAA

6.3.2 Course Title: Desert Fruit Production (Code:HO 0210, PrRq: None)

Course Description: The course involves history and importance of fruit production in desert zone. Tolerance and adaptation of trees to the adverse conditions are covered. Propagation and nursery operations, vegetative growth, flowering, fruit set, development and harvesting are included.

Course Contents: Overview of fruit production under in desert zones - Tolerance and adaptation of rootstocks and scions to desert stress - Performance of adapted evergreen and deciduous fruit trees to stress - Propagation and nursery operations - Initiation of fruit orchards: site, soil, irrigation and water quality, wind-breaks - Tree planting, cultural operations and management, tree growth, flowering, fruit set and development and harvesting.

References :

1) **Singh, A. 2004**. Fruit physiology and production . 3rd Ed, Kalyani Publ., New Delhi, India . https://www.google.com.eg/search?q=google&ie=utf8&oe=utf8&client=firefoxb&gfe_rd=cr&ei=ZH1SWaeLOK2s8wfH_71A#q=Singh,+A.+2004+.+Fruit+Physiologyand+Production+.+3rd+Ed+,+Kalyani+publishers+,+New+Delhi+,+India+++AVI+Publishing+Company.+INC.,+Westport,+Connecticut,+USA...+.+

2) **Childers, N F . 1971** . Modern fruit science . Hort. Publ., Gainesville, FL., USA . https://www.google.com.eg/search?q=g&ie=utf8&oe=utf8&client=firefoxb&gfe_rd=cr&ei=DqZSWeXhF8HA8geq7JLACQ#q=Childers+,+N+F+.+1971+.+Modern+Fruit+Science+.+Horticultural+Publications+,+Gainesville+,+Fl+.,+USA++.

3) **Childers, N . F . and Abdalla, D.A. 1971** . Modern fruit science. Lab. Manual., Rutgers Univ., New Brunswick, NJ, USA . https://www.google.com.eg/search?q=g&ie=utf8&oe=utf8&client=firefoxb&gfe_rd=cr&ei=DqZSWeXhF8HA8geq7JLACQ#q=Childers+,+N+.+F+.+and+Abdalla,+D.A.+1971++Modern+fruit+science.++Lab.+Manuel+.,+Rutgers+Univ.,+New+Brunswick+,+NJ,+USA+.+.

6.3.3 Course Title: Desert Aromatic & Medicinal Plants (Code:HO 0211,PrRq:AB 0810)

Course Description: The course informs students on the importance of medical and aromatic plants. Tradition and commercial use of medicinal plants for drug industry are covered. Importance of high quality plants and gaining a share in global trade.

Course Contents: Introduction on importance and economy of medical and aromatic plants - History and importance of medical and aromatic plants - Growth of medical and aromatic plants in desert zones - Quality standards of medicinal plants and crude drugs - Desert environment and implications on medicinal and aromatic plants- Up-to-date methods of cultivation and propagation of plants - Agro techniques of

medicinal, aromatic and oil plant culture - Drug plants culture and quality control - Biodiversity conservation.

References:

1) **Bogers, R.J., Craker, L.E., Lange, D. 2006**. Medicinal and aromatic plants: Agricultural, commercial, ecological, legal, pharmacological and social aspects. Springer, Netherlands. https://www.google.com.eg/search?q=g&ie=utf8&oe=utf8&client=firefoxb&gferd=cr&ei=DqZSWeXhF8HA8geq7JLACQ#q=Bogers,+R.+J.,+Craker,+L.E.,+Lange,+D.+2006.+Medicinal+and+aromatic+plants+:+Agricultural,+commercial,+ecological,+legal,+pharmacological+and+social+Aspects.+Springer,+Netherlands+.+.

2) **Gladstar, R. 2012**. Rosemary Gladstar`s medicinal herbs: A. beginner`s guide. Storey Publ., MA., USA. http://books.google.de/books?id=Aa7isKZDmAYC&pg=PP1&dq=Rosemary+Gladstar%60s+medicinal+herbs&hl=en&sa=X&ei=5D33UqelCYHPtAb874DABQ&ved=0CDYQ6AEwAQ#v=onepage&q=Rosemary%20Gladstar%60s%20medicinal%20herbs&f=false

3) **Mase, M. 2013**. The wild medicine solution: Healing with aromatic, bitter and tonic plants. Healing Arts Press, Rochester, VT, USA. http://books.google.de/books?id=asB9MAEACAAJ&dq=The+wild+medicine+solution&hl=en&sa=X&ei=9j33UoqYD4SmtAbVjYHIBA&ved=0CDcQ6AEwAA

6.3.4. Course Title: Desert Timber Plantation (Code:HO 0212, PrRq:SO 0511)

Course Description: The course provides students with facts about growing timber plantation using different kinds of water. The possibility of utilizing waste waters for non-edible, wood plants and shrubs suitable for such use is mentioned.

Course Contents:

Introduction wood plants, shrubs and trees - The use of waste waters in growing plants used as timbre or fuel - Procedures required for successful waste water plantation - Management and operations of timber plantation.

References:

1) **Feigin, A., Ravina, I., Shalhevet, J.1991.**Irrigation with treated sewage ffluent.Springer, Netherlands. https://www.google.com.eg/search?q=g&ie=utf8&oe=utf8&client=firefoxb&gferd=cr&ei=DqZSWeXhF8HA8geq7JLACQ#q=Feigin,+A.,+Ravina,+I.,+Shalhevet,+J.1991Irrigation+with+treated+sewage+effluent+.Springer,+Netherlands+..+.

2) **Hassan, F.A. and El-Haddad, E. H. 2013.** Forestry trees under irrigation with sewage effluent: The impact of sewage effluent on growth of trees and soil characteristics. Lap Lambert Acad. Pub. GmbH & Co, Saarbrücken Germany. https://www.google.com.eg/search?q=g&ie=utf8&oe=utf8&client=firefoxb&gferd=cr&ei=DqZSWeXhF8HA8geq7JLACQ#q=Hassan,+F.A.,+ElHaddad,+E.+H.+2013.+Forestry+trees+under+irrigation+with+sewage+effluent:+The+impact+of+sewage+efflu

ent+on+growth+of+trees+and++soil+characteristics+.+Lap+Lambert+Acad.++Pub.+GmbH+%26+Co, +Saarbr%C3%BCcken+Germany.+...

3) **Ali, H.M. , EL-Mahrouk, E.M., Hassan, F.A. and EL-Tarawy, M.A. 2007** Usage of sewage effluent in irrigation of some woody tree seedlings. Part 3: *Swietenia mahagoni* (L.) *Jacq*. Saudi J . Biol. Sci. 18(2):201–207. https://www.google.com.eg/search?q=g&ie=utf8&oe=utf8&client=firefoxb&gfe_rd=cr&ei=DqZSWeXhF8HA8geq7JLACQ#q=+Ali,H.M.++,+ELMahrouk,E.M.++FatmaA+Hassan,,F.A.+and+ELarawy,+M.A.+2007+++++Usage+of+sewage+effluent+in+irrigation+of+some+woody+tree+seedlings.+Part+3:+Swietenia+mahagoni+(L.)+Jacq.+Saudi++J+.+Biol+Sci.+18(2):+201%E2%80%93207.+...

6.4 Courses of Animal Production Department:

The list of Animal Production Department Courses involved in the program is shown in Table 11.

Table: 11. List of Animal Production Department Courses involved in the program (AP03).

Serial	Course Title		Code
1.	Animal Physiology	Comp.	(AP 0301)
2.	Animal & Poultry Nutrition	Opt.	(AP 0306)
3.	Animal Husbandry in Desert Zones	Opt.	(AP 0308)
4.	Animal & Poultry Genetic Improvement	Opt.	(AP 0309)
5.	Poultry Production under desert Environment	Comp.	(AP 0310)
6.	Desert Fish Farming	Comp.	(AP 0311)
7.	Camels, Sheep & Goat Production	Comp.	(AP 0313)

6.4.1. Course Title. Animal Physiology (Code:AP 0301, PrRq:none)

Course Description: The course defines functions of animal body systems such as circulatory, digestive, respiratory and reproductive systems.

Course Contents: Animal cell – Homeostasis - Heat regulation - The circulation system - The respiratory system - The nervous system - The digestive system - The excretory and urine system - The endocrine glands - The reproduction system.

References:

1) **Hall, J. E. 2010.** Guyton and Hall textbook of medical physiology. 12th Ed., W.B. Saunders Co.UK. http://www.amazon.com/Guyton-Hall-Textbook-Medical-Physiology/dp/1416045740/

2) **Hafez, E.S.E. and Hafez, B. 2000.** Reproduction in farm animals. 7th Ed. Lea and Fibiger, Philadelphia, PA, USA. http://www.amazon.com/Reproduction-Farm-Animals-E-Hafez/dp/0683305778/

6.4.2: Course Title : Animal and Poultry Nutrition(Code:AP 0306, PrRq:None)

Course Description: The course gives an in-depth knowledge on animal and poultry nutrition. It covers the fundamentals of animal nutrition and the feedstuff materials used in feeding animals and poultry. Formulation of feedstuff is covered. .

Course Contents: Fundamentals of animal nutrition and kinds of feedstuff - Un-conventional feed stuff and biosynthesis of nutrition - Animal nutrient requirements - Ration diet for different stages of animal growth - Feed manufacture - Poultry requirements of carbohydrates, lipids, nutrients and vitamins for Energy and protein production - Poultry feed additives and regulators - Metabolizable energy efficiency for maintenance, and those for, meat - Milk and egg production - Calculating maintenance, productive and protein requirements.

References:

1) **Cheeke, P.R. 2004.** Applied animal nutrition. 3rdEd. Prentice Hall Inc., NY, USA. http://books.google.de/books?id=baz2TC1y2esC&dq=Reproduction+in+farm+animals&hl=en&sa=X&ei=Uj_3UoaUAoWNtQad7YD4BA&ved=0CC4Q6AEwAA
2) **Garnsworthy P.C. and Wiseman J. 2009**. Recent advances in animal nutrition. Nottingham Univ. Press, UK. http://books.google.de/books?id=UvspAQAAMAAJ&q=Recent+Advances+in+Animal+Nutrition&dq=Recent+Advances+in+Animal+Nutrition&hl=en&sa=X&ei=-D_3UuvhEcSgtAbKuYGQCg&ved=0CDcQ6AEwAA evaluation models. CABI Publ., Wallingford, UK. http://books.google.de/books?id=E-MqAQAAMAAJ&q=Feeding+systems+ and+feed+ evaluation+models&dq=Feeding +systems+and+feed+evaluation+models&hl=en&sa=X&ei=IED3Uuz3JYXdswaP3oHYBg&ved=0CC4Q6AEwAA
4) **Wallace, R. J. and Chesson, A. 2008**. Biotechnology in animal feeds and animal feeding. John Wiley & Sons, UK. http://books.google.com.eg/books?id=ZPe8JECZAtYC&printsec=frontcover#v=onepage&q&f=false

6.4.3. Course Title: Animal Husbandry in Desert Zones (Code:AP 0308, PrRq:AP 0301)

Course description: The course provides students with a basic of animal production will also be covered. The roles of animals in society, livestock in agricultural systems and the equine enterprise are covered. Biology and husbandry and effects of animal welfare with practical exercises are included.

Course Contents: Introduction to animal husbandry - Economic importance - Breeds of farm animals - Management of farm animals - Establishment of animal farms - Evaluation of farm animals - Health of farm animal - Marketing of animal and their products - Recording systems of farm animals.

References

1) **Sastry, N.S., Singh, R.A. and Thomas, C.K. 2012** .Livestock production management. Kalyani Publ., India. https://www.abebooks.com/servlet/BookDetailsPL?bi=16783115936&tab=1&searchurl=sortby%3D17%26an%3Dn%2Bs%2Br%2Bsastry%2Bc%2Bk%2Bthomas

2) **Banerjee,C.G. 1991.** A Textbook of animal husbandry. Oxford Publ.Co., UK. https://books.google.com.eg/books/about/A_Textbook_of_Animal_Husbandry.html?id=yWkEPgAACAAJ&redir_esc=y

6.4.4. Course Title: Animal & Poultry Genetic Improvement (Code: AP 0309, PrRq:GE 1001)

Course Description: The course acquaints students with conventional and modern breeding technologies in animals and poultry. Methods used for selection and faster multiplication of superior cattle and buffalo germplasm are included. Quantitative genetics and reproductive biology are covered.

Course Contents: Introduction to genetic improvements for animals and poultry - Contributions of genetic improvement to increase productivities of farm livestock - Technologies in quantitative genetics and reproductive biology - Modern developments in molecular marker systems genome maps, detecting QTL (Quantitative Trait Loci) linkages, MAS(Marker Assisted Selection) - Integration of molecular markers with conventional breeding technologies.

References:

1) **Singh C.V. 2013** . Genetic improvement of livestock and poultry. New India publishing Agency (NIPA), New Delhi, India https://www.amazon.com/Genetic-Improvement-Livestock-Poultry-Singh/dp/938145082X

2) Piper, L. and Ruvinsky, A. 1997. The genetics of sheep. CAB,Oxford,,UK. https://www.google.com.eg/search?q=equine+meaning&ie=utf-8&oe=utf-8&client=firefox-b&gfe_rd=cr&ei=FVFZWeqjFqWs8wf3ypKQDA#q=2-+Piper,+L+and++Ruvinsky,+A..+1997.++The+genetics+of+sheep.+CAB+,OxfordUK.+l

6.4.5.Course Title: Poultry Production under Desert Environment (Code:AP 0310, PrRq:AP 0311)

Course description: The course covers the importance of poultry industry and gives a general description of poultry farms, and the reproductive aspects of poultry. Incubation, brooding and meat and egg production are included along with the productive performance of poultry birds.

Course contents: The poultry industry - Biology of domestic fowl - Reproduction of birds - Incubation and hatcher management - Development of the embryo - Brooding and rearing - Poultry house and equipment - Meat production and broiler industry - Egg production and egg quality.

References:

1) **Scanes, C.G.,Brant,G.and Ensminger,M.E.2003.**PoultrySci.4thEd.Prentice Hall, UK. https://www.google.com.eg/search?q=Sheep+and+Goat+production++by++Mdukatshani+Heifer%2C+Stefan+de+Vos&ie=utf-8&oe=utf-8&client=firefox-b&gfe_rd=cr&ei= RHBZWZTbKcKs8weIl5eoBw#q=1-++Scanes,+C.G.+eorge+,+Brant,+G.+and++Ensminger,+M.E.+2003.+Poultry+science.+ 4th+Ed .,+Prentice+Hall,+UK.,++
2) **Bell, D. D. and Weaver, W. JR.D. 2001.** Commercial chicken meat and egg production. 5th Ed. Springer, USA. https://www.google.com.eg/search?q=Sheep+and+Goat+production++by++Mdukatshani+Heifer%2C+Stefan+de+Vos&ie=utf-8&oe=utf-8&client=firefoxb&gfe_rd=cr&ei= RHBZWZTbKcKs8weIl5eoBw#q=Donald,+D.+Bell,+William,+D.+Weaver,+JR.+2001.+Commercial+chicken+meat+and+egg+production.+Fifth+Edition.+Library+of+congress+cataloging+in+%E2%80%93+publication+
3) **Daghir, N.J. 2008**. Poultry production in hot climates. CABI,,UK. https://books.google.com.eg/books/about/Poultry_Production_in_Hot_Climates.html?id=ae4tJGRO-nYC&redir_esc=y
4) **Heinriche, C. 2016**.The backyard field guide to chickens: Chicken breeds for your home flock. Voyageur Press. Minneapolis, Mn, USA. https://books.google.com.eg/books?id=hGMmDAAAQBAJ&source=gbs_similarbooks.

6.4.6. Course Title: Desert Fish Farming (Code: AP 0311, PrRq: None)

Course Description: The course concerns fish farming and gives descriptions on the operations associated with it. Means and technologies of aquaculture are covered.

Course Contents: Introduction on of fish resources - Marine fish resources - Inland lake fisheries - Aquaculture constraints - Water quality and fish aquaculture - Methods of fish culture, and kinds of fish farms - Cages and pens - Fish culture in rice fields - Integrated fish culture and duck farms - Fish marketing - Fish disease.

References:

1) **Little, D,C. and Edwards, P. 2003.** Integrated livestock-fish farming systems.FAO, Rome. http://books.google.de/books?id=zozZba_SN7kC&printsec=frontcover&dq=Integrated+livestock-fish+farming+systems&hl=en&sa=X&ei=5D73UuiEO47HtAbw9ID4Bg&ved=0CDcQ6AEwAA#v=onepage&q=Integrated%20livestock-fish%20farming%20systems&f=false

2) **Martin, R., and Vassik, V. 2008.** Fish farming. Era Publ. Int., Copenhagen, Denmark. http://books.google.de/books?id=2Um9MzJbWUoC&printsec=frontcover&dq=Fish+farming&hl=en&sa=X&ei=9z73UtPxAY3KsgbdioC4Cw&ved=0CC4Q6AEwAA#v=onepage&q=Fish%20farming&f=false.

6.4.7. Course Title: Camel, Sheep and Goat Production (Code:AP 0313, PrRq:AP 0301)

Course description: The course provides students with understanding on Camel, sheep and goat production and management. Application of principles of nutrition, breeding, physiology and health is included. Facilities of marketing and product development are covered.

Course contents: Economic importance of Camels, sheep and goats - Camel, sheep and goat breeds - Classification and biological characteristics - Feeding and fattening - Production of wool, meat and milk - Establishment of flocks - Selection and judgment - Recording systems and modern technologies to increase reproductively.

References:

1) **Ayalew, M. 2016**. Sheep and goat production. Text Book . LAP Lambert Acad. Publ. https://www.amazon.co.uk/d/Books/Sheep-Goat-Production-Text-Mulugeta-Ayalew/ 3659901059

2) **Yami, A. and Merkel, R. C. 2011**. Sheep and goat production handbook for Ethiopia, USAID, USA. https://www.google.com.eg/search?q=Sheep+and+Goat+production++by++Mdukatshani+Heifer%2C+Stefan+de+Vos&ie=utf-8&oe=utf-8&client=firefox-b&gfe_rd=cr&ei=RHBZWZTb KcKs8weIl5eoBw#q= Books+on+ Sheep +and +Goat+production++

3) **Tadesse,Y., Urge,M., Abegaz,S., Kurtu,M., Cabede,K. and Dessie,T. 2014**.Husbandry and breeding of dromedary camels among pastoral communities of Afar and Somali regional states, Ethiopia. J. Afr. Env. Int. Dev. 108(2):167-189. http://www.iao.florence.it/ojs/index.php/JAEID/article/viewFile/238/135

4) **CSIRO 2006.** Model Code of practice for the welfare of animals: The camel. Commonwealth Scientific and Industrial Research Organisation (**CSIRO**), Australia. http://www.publish.csiro.au/ebook/download/pdf/5204

6.5 Courses of Plant Protection Department:

The list of Plant Protection Department Courses involved in the program is shown in Table 12.

Table: 12. List of Plant Protection Department Courses involved in the program (PP 04).

Serial	Course Title		Code
1.	Zoology	Comp.	(PP 0401)
2.	Entomology	Comp.	(PP 0402)
3.	Desert Economic Entomology	Opt.	(PP 0408)
4.	Desert Integrated Pest Control	Opt.	(PP 0409)

6.5.1. Course Title: Zoology (Code:PP 0401, PrRq:None)

Course Description: The course aims at surveying major taxa of the animal kingdom and provides an introduction to animal anatomy, physiology, ecology and evolution. Knowledge of biological science and animal cell and taxonomy with emphasis on characteristics of major phyla is given. The course covers the most important animal parasites affecting human, animal and plant. It develops laboratory skills necessary for biological studies.

Course Contents: Introduction - Nature and manifestation of life, the cell and its division - Embryonic development - Symmetry in animals and Animal taxonomy - Protozoa general morphology - Parasites (Trypanosoma, Entamoeba, Plasmodiophora, Sporongospora and plasmodium) - Parazoa and metozoa; Types oand division - Phyla: Platyhelminthes; Nematoda; Annelida; Arthropoda; Mollusca; Chordata.

References:

1) **Springer, J., 2012.** An Introduction to zoology. John and Bartlett Publ.NY, USA. http://books.google.de/books?id=uID05JQqG-wC&printsec=frontcover&dq=An+Introduction+to+Zoology&hl=en&sa=X&ei=-fsAUvNejW4gT6qYBo&ved=0CC4Q6AEwAA#v=onepage&q=An%20Introduction%20to%20Zoology&f=false
2) **Bhamrah, H.S. and Juneja, K. 2002.** An introduction to mammals. Anmol Publ. PVT. Ltd New Delhi, India. http://books.google.de/books?id=DusgAQAAIAAJ&q=An+Introduction+to+Mammals&dq=An+Introduction+to+Mammals&hl=en&sa=X&ei=DPwAU8_qNIOe4gS_54B4&ved=0CDMQ6AEwAQ
3) **Gamil, N.S. 2001.** Invertebrate zoology. Part II: The coelomates. The Plam Press, Washington, DC. USA. http://books.google.de/books?id=fftsbwAACAAJ&dq=The+Coelomates&hl=en&sa=X&ei=JfwAU7GTPIfk4QTAmYHgCA&ved=0CDMQ6AEwAQ

6.5.2. Course Title: Entomology (CodePP 0402:, PrRq:None)

Course Description: The course provides knowledge on insects, their importance and effects on human life. It mentions insect body and appendages, anatomy, external and internal morphology, ecology, classification and taxonomy.

Course Contents: Introduction – Taxonomy - Distribution of insects - Harms and benefits of insects - Main parts of insect body and appendages - External morphology - Internal anatomy and systems - Ecology (life-cycle, distribution, immature stages) – Classification - Insects harmful to agriculture and products affected by them - Beneficial insects (honey bee, silkworm, predacious of parasites).

References:

1) **Borror, D.J., Triplehorn C.A., and Johnson, N.F. 1989**. An introduction to the study of insects. 6th Ed., Saunders College Publ., Philadelphia,PA, USA.
2) http://books.google.de/books?id=HVMfnQEACAAJ&dq=An+Introduction+to+the+Study+of+Insects&hl=en&sa=X&ei=X_0AU_XODKeK5ATTqIDQBg&ved=0CDoQ6AEwAg
3) **Gamil, N.S. 2001.** Invertebrate zoology: Part II; The coelomates. Palm Press, Washington DC, USA.
4) http://books.google.de/books?id=YTcJPwfYGzgC&dq=Invertebrate++zoology&hl=en&sa=X&ei=f0D3UuWNNcPbswaN34GYCw&ved=0CC4Q6AEwAA
5) **Harwood, R.F. and James M.T. 1979.** Entomology in human and animal health. McMillan Publ. Co., NY, USA.
6) http://books.google.de/books?id=uU0gAQAAMAAJ&q=Entomology+in+Human+and+++Animal+Health&dq=Entomology+in+Human+and+++Animal+Health&hl=en&sa=X&ei=SAcBU9zTE8Wz4AS3_4HQBw&ved=0CC4Q6AEwAA

6.5.3 Course Title: Desert Economic Entomology (Code:PP 0408, PrRq:PP 0402)

Course Description: The course concerns insects attacking economic crops (field crops or horticulture crops), or crop products including store insects (e.g. grain stores), with particular references to desert zones. Description and behavior of these insects and methods of controlling their harmful effects especially in desert zones are included.

Course Contents: Introduction to the different control methods particularly in desert zones - General and polyphagous insect pests - Insects attacking field crops - Vegetable crops insect pests - Orchard or fruit trees insect pests - Wood trees insect pests - Ornamental plant pests - Medical and aromatic plant pests - Stored products pests - Most important methods and materials minimizing pest population.

References:

1) **Dreistadt, S. H., Clark, J. K. and Flint, M. L.1994.** Pests of landscape trees and shrubs: An integrated pest management guide. Div. Agric., Univ. California, CA, USA.

http://books.google.de/books?id=NEOLaUHPVdwC&printsec=frontcover&dq=Pests+of+landscape+trees+and+shrubs&hl=en&sa=X&ei=YgcBU9SFCISj4gTTooHwCg&ved=0CC4Q6AEwAA#v=onepage&q=Pests%20of%20landscape%20trees%20and%20shrubs&f=false

2) **Hoover, G. A. 2000**. Insects and mites, *In* W. K. Hock, G. A. Hoover, and G. W. Moorman, eds, "Woody ornamental insect, mite, and disease pest management. College of Agric. Pennsylvania State Univ., PA,USA. http://books.google.de/books?id=iuEqAQAAMAAJ&q=Woody+ornamental+insect,+mite,+and+disease+pest+management&dq=Woody+ornamental+insect,+mite,+and+disease+pest+management&hl=en&sa=X&ei=gQcBU5XWMbLc4QSW9IHQAQ&ved=0CDIQ6AEwA

3) **Radcliffe, E.B., Hutchison, W.D. and Concelado, R.E. 2008.** Integrated pest management: Concepts, tactics, strategies and case studies. Cambridge Univ. Press, UK. http://books.google.de/books?id=xjhr2M1H_9IC&printsec=frontcover&dq=Integrated+pest+management&hl=en&sa=X&ei=10D3Uq-JIdGK swbh6oCg CA&ved=0CC4Q6AEwAA#v =onepage &q=Integrated%20pest%20management&f=false

6.5.4. Course Title: Desert Integrated Pest Control (Code:PP 0409, PrRq:PP 0402)

Course Description: The course provides students with knowledge on management of integrated pest control which includes a range of practices to control or suppress pest population below the economic injury level. It focuses on minimizing the risk of pesticides to human health and environment.

Course Contents: Integrated pest management (IPM), and its advantages - Problems of repeated use of pesticides - Identification, inspection and survey of insect pests - Monitoring of targeted pests and deciding acceptable pest levels - Preventive practices (control means: mechanical, biological and behavioral) - Using biological control in pest control programs - Formulation and storage technology of pesticides - Insect diseases - Bait formulation for rodents and snails - Commercial products - Pheromones in pest management - Commercial pheromones: Problems and benefits - Injury levels and economic threshold of infestation - Using pesticides as a final option - Preparation of pest management programs.

References:

1) **Dyck, V.A., Hendrichs, J. and Robinson, A.S. 2005**. Sterile insect technique: Principles and practice in area-wide integrated pest management, Springer, London, UK. http://books.google.de/books?id=-vOLhFewchoC&printsec= frontcover &dq=Sterile+Insect+Technique&hl=en&sa=X&ei=7UD3Uo3VFIPPtAa0h4GwDw&ved=0CDcQ6AEwAA#v=onepage&q=Sterile%20Insect%20Technique&f=false

2) **Panizzi, A.R. 2012.** Bio-ecology and insert nutrition for integrated pest management. CRC, Press, Inc., NY, USA.

http://books.google.de/books?id=NqzcD2r3jBYC&pg=PA3&dq=Bioecology+%26+Insert+Nutrition+for+Integrated+pest+Management&hl=en&sa=X&ei=qgcBU6-BD-Gt4ATryI DwBg&ved=0CDoQ6AEwAA#v=onepage&q=Bioecology%20%26%20Insert%20Nutrition%20for%20 Integrated%20pest%20Management&f=false

3) **Radcliffe, E.B., Hutchison, W.D. and Concelado, R.E. 2008.** Integrated pest management: Concepts, tactics, strategies and case studies. Cambridge Univ. Press, UK. http://books.google.de/books?id=xjhr2M1H_9IC&printsec=frontcover&dq=Integrated+pest+management&hl=en&sa=X&ei=AUH3UpugLYbctAb2gIHIDg&ved=0CC4Q6AEwAA#v=onepage&q=Integrated%20pest%20management&f=false

6.6 Courses of Soils and Water Science Department:

The list of Soils and Water Science Department Courses involved in the program is shown in Table 13.

Table: 13. List of Soils and Water Science Department Courses involved in the program (SO05).

Serial	Course Title		Code
1-	Soils and Water Science	Comp.	(SO 0501)
2-	Fertility and Plant Nutrition in Desert Soils	Comp.	(SO 0507)
3-	Booster Amendments for Desert Lands	Comp.	(SO 0508)
4-	Tillage & Conservation of Desert Soils	Opt.	(SO 0509)
5-	Desert Land Reclamation & Rehabilitation	Comp.	(SO 0510)
6-	Desert Water Resources	Comp.	(SO 0511)
7-	Soil Chemistry	Opt.	(SO 0512)
8-	Soil Physics and Sand Dune Fixation	Opt.	(SO 0513)

6.6.1. Course Title: Soils and Water Science (CodeSO 0501:, PrRq: None)

Course Description: The course provides students with knowledge, and understanding on fundamentals of soil and water. Different concepts of soil are viewed. Soil properties (biological, physical, chemical) and modern classification of Soil Taxonomy are covered. Parameters of organic matter, microbial biomass as fertility indicators are viewed. Thorough knowledge, understanding and skills relating irrigation, its use, and relations to environment, are included.

Course Contents: Introduction on concepts of soil - Soil formation and classification - The 3 phases of soil: liquid, gaseous and solid - Soil chemistry and mineralogy - Soil microbiology and microbial biomass - Soil organic matter - Soil physics and physical parameters - Soil-water relationships - Water quality and water use - Options for the future (Balancing water demand with water resources) - Water loss control and water productivity - Water pollution and scarcity.

References:

1) **Amberger, A. 2006**. Soil fertility and plant nutrition in the tropics and subtropics. Intl. Potash Inst. Horgen, Switzerland. https://www.google.com.eg/search?q=2%29%09Stuart+A.+Kallen+2004.+Food+safety.+Green+haven%3B+1st+Edition+&ie=utf-8&oe=utf-8&client=firefox-b&gfe_rd=cr&ei =qfBUW ez2O t Ss 8weOpIrgAw#q=Amberger+,++A.+2006.+Soil+fertility+and +plant +nutrition+in+ the + tropics+and+subtropics.+Intl.+Potash +Institute,++ Horgen+, +Switzerland.+++
2) **Biswas, S.K. 2001.** A Text book of soil science. McGraw-Hill,NY,USA. http://books.google.de/books?id=EVkunzkyvmQC&printsec=frontcover&dq=A+Textbook+of+soil+science&hl=en&sa=X&ei=E0L3UuTHFsaetAbylICoBQ&ved=0CDcQ6AEwAA#v=onepage&q=A%20Textbook%20of%20soil%20science&f=false
3) **Brady, N.C. and Weil, R.R. 2001**.The nature and properties of soil. Prentice-Hall, London.UK. https://www.google.com.eg/search?q=2%29%09Stuart+A.+Kallen+2004.+Food+safety.+Green+haven%3B+1st+Edition+&ie=utf8&oe=utf8&client=firefoxb&gfe_rd=cr&ei=qfBUWez2OtSs8weOpIrgAw#q=Brady,+N.C.,+Weil,+R.R.+2001.+The+nature+and+properties+of+soil.+Prentice-+++++ +Hall,+London.UK.+
4) **Matma. T. 2013**. Quality assessment of water and waste water. 3rd Ed. Lewis Publ. Inc., NY, USA. http://books.google.de/books?id=ishs2cY6iUoC&printsec=frontcover&dq=Quality+assessment+of+water+and+waste+water&hl=en&sa=X&ei=NkL3UvuDL8PVtAbtsYDQBQ&ved=0CEMQ6AEwAA#v=onepage&q=Quality%20assessment%20of%20water%20and%20waste%20water&f=false

6.6.2. Course Title: Fertility and Plant Nutrition in Desert Soils (CodeSO 0507:, PrRq:SO 0501)

Course description: The course aims at developing profound understanding and knowledge on desert soils fertility and how to enhance their limited fertility for crops. Skill to assess limitations and potentials of soil are involved. Laboratory and analytical methods for assessment and suitable indices are mentioned.

Course Contents: Introduction on fertility of desert soils - Classification of desert oils from the view point of main constraints - Behavior of hampering constituents in desert soils - Chemical and physical main properties of desert soils - Behavior of plant nutrients in desert soils - Forms of plant nutrients in desert soils - Fertilization management of desert soils.

References:

1) **Black, C.A. 1996.** Soil fertility evaluation and control. 2nd Ed.,Lewis Publ., London. UK.

http://books.google.de/books?id=oCh8HQAACAAJ&dq=Soil+Biotechnology&hl=en&sa=X&ei=gUL3UuWFBMKJtQbktoH4Cw&ved=0CE4Q6AEwAg

2) **EIRI . 2007.** Handbook of biofertilizers and vermi-culture. Engineers India Res. Institute (EIRI), Delhi, India. http://books.google.de/books?id=fX6mA1jE72oC&pg=PP4&dq=Handbook+of++biofertilizers++and+vermiculture&hl=en&sa=X&ei=nUL3UrjGGciMtAbHYCwDA&ved=0CDMQ6AEwAQ#v=onepage&q=Handbook%20of%20%20%20biofertilizers%20%20and%20vermiculture&f=false

3) **Faeria, N.K. 2009**. The use of nutrients in crop plants. CRC Press, NY,USA. http://books.google.de/books?id=tOON1NkPieMC&printsec=frontcover&dq=The+use+of+nutrients+in+crop+plants&hl=en&sa=X&ei=vUL3UsK1HIentAbay4DADw&ved=0CC4Q6AEwAA#v=onepage&q=The%20use%20of%20nutrients%20in%20crop%20plants&f=false

6.6.3. Course Title: Booster Amendments for Desert Lands (Code:SO 0508, PrRq:SO 0507)

Course Description: The course teaches students making, preparing and utilizing materials for amending desert lands and boosting their fertility. Materials (mineral, organic, biotic and others) used in this concern are covered. Chemical mechanisms and biological activities and organisms involved are mentioned. Materials used for composting and their suitability are assessed.

Course Contents: Introduction on amendment of desert soils - Mineral matters as amendments (acids for calcareous soils and gypsum for sodic ones) - Organic materials and manures (farmyard manure, compost, sewage, their nature and mode of action and precautions) - Bio-fertilization and biofertilizers(production, use and mode of action) - Compost production and utilization - Mineralization of organic forms of nutrients.

References:

1) **USDE. 2002.** New technologies to reclaim desert lands user's Manual United States. Department of Energy (USDE) USA. https://www.google.com.eg/search?q=g&ie=utf-8&oe=utf-8&client=firefox-b&gferd=cr& ei=uy5UWcq-G7Gs8we8q6GQAg#q=Books+on++soil+amendments+ for+arid +lands+

2) **Larramendy, M.L. and Soloneski, S. 2016**. Organic fertilizers : From basic concepts to applied outcomes. INTECH Publ. Rijeka, Croatia. https://www.intechopen.com/books/organic-fertilizers-from-basic-concepts-to-applied-outcomes/organic-waste-as-fertilizer-in-semi-arid-soils-and-restoration-in-mine-sites

3) **Raman, T. 2017**. Good Soil: Manure, Compost and nourishment for your garden. Frances Lincoln, London UK

https://www.google.com.eg/search?q=g&ie=utf-8&oe=utf-8&client=firefox-b&gfe_rd =cr&ei=uy5UWcq-G7Gs8we8q6GQAg#q=Books+on++ soil+ amendment s+for+arid +lands+amendments+for+arid+lands+

6.6.4. Course Title:Tillage & Conservation of Desert Soils (Code:SO 0509, PrRq:SO 0501)

Course Description: The course aims at informing students of soil tillage and soil conservation practices. Special attentions are directed towards the particular properties of arid land soils and their problems. Different methods of soil tillage for different crops are viewed. Protection against erosion of arid soils, particularly with scarcity of rainfall and water supplies, is taking priority.

Course Contents: Introduction on arid soil tillage and conservation - Principles of tillage practice, and tillage equipment for arid lands - Land degradation: Symptoms and causes - Soil erosion and salinization - Practical solutions to desert land degradation - Conservation practices for sustaining arid soils productivity - Sustainable tillage for desert lands.

References:

1) **Kirby, M.J. and Morgan, R.P.C. l980.** Soil erosion. Wiley, Chichester, UK. https://www.google.com.eg/search?q=google&ie=utf8&oe=utf8&client=firefoxb&gfe_rd=cr&ei=ZH1SWaeLOK2s8wfH_71A#q=Kirby,+M.J.+and+Morgan,+R.P.C.+l980.+Soil+erosion.+Wiley,+Chichester,+UK.

2) **FAO . 1987** .Tillage systems for soil and water conservation. FAO Soils Bul. 54, Food and Agriculture Organization (FAO) of the United Nations,, Rome, Italy. https://www.google.com.eg/search?q=google&ie=utf8&oe=utf8&client=firefoxb&gfe_rd=cr&ei=ZH1SWaeLOK2s8wfH_71A#q=FAO++++1987++.Tillage+systems+for+soil+and+water+conservation

3) **Zarea, M. J. 2011.** Conservation tillage and sustainable agriculture in semi-desertdry land farming.*In* **E. Lichtfouse** (ed.), Biodiversity, biofuels, agroforestry and conservation agriculture. Sustainable Agric. Rev. Springer Science+Business Media B.V https://www.google.com.eg/search?q=google&ie=utf8&oe=utf8&client=firefoxb&gfe_rd=cr&ei=ZH1SWaeLOK2s8wfH_71A#q=E.+Lichtfouse+(ed.),+Biodiversity,+biofuels,+agroforestry+and+conservation+agriculture.+Sustainable+Agric.++Rev.++Springer+Science%2BBusiness+Media+B.V

4) **Schwab, G.O., Fangmeier, D.D., Elliot, W.J. and Frevert, R.K. 1993**. Soil and water conservation engineering. 4th. Ed., Wiley, NY, USA. https://www.google.com.eg/search?q=google&ie=utf8&oe=utf8&client=firefoxb&gfe_rd=cr&ei=ZH1SWaeLOK2s8wfH_71A#q=Schwab,+G.O.,+Fangmeier,+D.D.,+Elliot,+W.J.+and+Frevert,+R.K.+1993.+Soil+and+water+conservation+engineering.+4th.+Ed.,+Wiley,+NY,+USA.+

6.6.5. Course Title: Desert Land Reclamation & Rehabilitation(Code:SO 0510, PrRq: None)

Course Description: The course covers details of problems of desert land, including barren lands and calcareous soils. Survey of the main properties and problems are viewed. Desert, saline and calcareous soils and their nature are studied in details. Methods and techniques of their reclamation are included. Chemical and physical methods are covered.

Course Contents: Introduction on desert land problems - Desert sandy soils and their low fertility - Saline soils and their problems - Calcareous soils and their inherent problems - Reclamation methods and techniques according to soil nature - Stages of land reclamation operation - Suitability of crops as related to the soil problem - Selection of appropriate crops for each stage of land reclamation - Waters for reclamation and irrigation of desert soils - Rational management of reclaimed soils - Early warning systems.

References:

1) **USDA. 1954.** Diagnosis and improvement of saline and alkali soils. Department of Agriculture (USDA)Handbook 60, US Washington, DC, USA. https://www.google.com.eg/search?q=google&ie=utf-8&oe=utf-8&client= firefox-b&gferd=cr&ei =ZH1SWaeLOK2s8wfH_71A#q=Richards,+L.A.+1954.+Diagnosis+and+improvement+of+saline+and+alkali+soils.+Handbook+No.+60

2) **Kannaiyan**, **S. 2001**Biotechnology of biofertilizers. Klwer Academic Publ. New Delhi, India. http://books.google.de/books?id=4CfGOqnN39AC&printsec=frontcover&dq=Biotechnology+of+biofertilizers&hl=en&sa=X&ei=g0P3UtD2I4HZtAbBioDQBg&ved=0CDwQ6AEwAA#v=onepage&q=Biotechnology%20of%20biofertilizers&f=false

3) **Lange, O. L. and Belnap, J. 2003**. Biological soil crusts structure, function and management.. Springer-Verlag, NY, USA. http://books.google.de/books?id=TuLyHQ8h2LgC&printsec=frontcover&dq=Biological+soil+crusts+structure,+function+and+management&hl=en&sa=X&ei=lkP3UoQiyt-0BpbngZAI&ved =0CC4Q6AEwAA#v=onepage&q=Biological%20soil%20crusts%20structure%2C%20function %20and%20management&f=false

4) **Goudie, A. 1990.** Techniques for desert reclamation. Wiley, London, UK. https://www.google.com.eg/search?q=g&ie=utf8&oe=utf8&client=firefoxb&gfe_rd=cr&ei=uy5UWcq-G7Gs8we8q6GQAg#q=Goudie,+A.+1990. +Techniques+for+desert+reclamation.+Wiley,+ London,+UK.

5) **Zarea, M. J. 2011.** Conservation tillage and sustainable agriculture in semi-desert dry land farming. *In* **E. Lichtfouse** (ed.) Biodiversity, biofuels, agroforestry and conservation agriculture. Sustainable Agric. Rev.Springer Science+Business Media B.V

https://www.google.com.eg/search?q=google&ie=utf8&oe=utf8&client=firefoxb&gfe_rd=cr&ei=ZH1SWaeLOK2s8wfH_71A#q=E.+Lichtfouse+(ed.),+Biodiversity+biofuels,+agroforestry+and+conservation+agriculture.+Sustainable+Agric.++Rev.++Springer+Science%2BBusiness+Media+B.V

6) **Schwab, G.O., Fangmeier, D.D., Elliot, W.J. and Frevert, R.K. 1993**. Soil and water conservation engineering. 4th. Ed., Wiley, NY, USA. https://www.google.com.eg/search?q=google&ie=utf8&oe=utf8&client=firefoxb&gfe_rd=cr&ei=ZH1SWaeLOK2s8wfH_71A#q=Schwab,+G.O.,+Fangmeier,+D.D.,+Elliot,+W.J.+and+Frevert,+R.K.+1993.+Soil+and+water+conservation+engineering.+4th.+Ed.,+Wiley,+NY,+USA.+

6.6.6. CourseTitle: Desert Water Resources (CodeSO 0511:, PrRq:SO 0501)

Course Description: The course provides a deep knowledge of the vital role of water resources in desert zones in supporting mankind and his activities. It makes the student aware of the importance of water resources in desert zone countries. A thorough review of different water resources is covered with amounts and quantities of each. Criteria of water quality for irrigation are included. Potential use of water for agriculture is mentioned.

Course Contents: Introduction to water resources - Importance of water in desert zones - World water resources - Socio-economic, cultural and ethical challenges and water - Rain waters and their harvest in desert zone areas - Ground water aquifers and well waters - Quality of water for irrigation.

References

1) **FAO. 1994.** Water quality for agriculture. FAO Irrigation and Drainage Paper No. 29, Rev. Ed., FAO, Rome, Italy https://www.google.com.eg/search?q=google&ie=utf-8&oe=utf-8&client= firefox-b&gfe_rd= cr&ei= ZH1SWaeLOK2s8wfH_71A#q=-+FAO+1994. ++ Water + quality +for+agriculture.+ FAO+ Irrig ation +and+Drainage ++Paper ++No.+29+, +Revised+ Edition+, +FAO+,+Rome, +Italy+.+

2) **Zereini**, F. and **Jaeschke**, W. 2004. Water in the Middle East and in North Africa. Springer-Verlag Berlin Heidelberg, Germany. https://www.google.com.eg/search?q=google&ie=utf-8&oe=utf-8&client= firefox-b&gfe_ rd cr&ei=ZH1SWaeLOK2s8wfH_ 71A#q=Zereini,+F.+and++Jaeschke,+W. ++2004.++Water in+the+Middle+East+and+in+North+Africa.+Springer-Verlag+Berlin+ +,+Germany +.+.

3) **UNESCO.2004.** Ground water resources in the world and their use. United Nations Educational, Scientific and Cultural Organization (UNESCO), Paris France. https://www.google.com.eg/search?q=google&ie=utf-8&oe=utf-8&client= firefox-b&gfe_rd=cr&ei=ZH1SWaeLOK2s8wfH_71A#q=+UNESCO+.+2004.+Groun

d++water+resources+in+the+world+and+their+use+United+Nations+Educational,+Scientific+and+Cultural+Organization+(UNESCO)+7,+place+de+Fontenoy,+Paris+France..+.+

4) **Wheater, H.S., Mathias, S.A. and Li, X. 2010.** Ground water modelling in desert and semidesert areas. Cambridge Univ. Press, UK. https://www.google.com.eg/search?q=google&ie=utf8&oe=utf8&client=firefoxb&gfe_rd=cr&ei=ZH1SWaeLOK2s8wfH_71A#q=Wheater,+H.S.+,+Mathias,+S.A.+and+Li,+X.++2010.+Ground+water+modelling+in+arid+and+semiarid+areas.+Cambridge+Univ.+Press,+UK..+.+
5) **Yaron, B., Danfors, E and Vaadia, Y. 1973**, Arid zone irrigation. Springer NY, USA. https://www.google.com.eg/search?q=google&ie=utf8&oe=utf8&client=firefoxb&gfe_rd=cr&ei=ZH1SWaeLOK2s8wfH_71A#q=Yaron,+B.,+Danfors,+E+and+Vaadia,+Y.++1973.+Arid+zone+irrigation.+Springer-Verlag,+NY,+USA...+.+

6.6.7. Course Title: Soil Chemistry (Code SO 0512:, PrRq: None)

Course Description: The course provides the student with a fundamental knowledge and skills in soil chemistry. Particular attention is focused on chemistry of sandy and calcareous soils prevalent in desert regions. The course enables student to acquire the skill to assess soil properties from the standpoint of chemistry.

Course Contents: Introduction to soil chemistry - Soil chemical properties and inherent characteristics - Soil chemical reactions, complex reactions and interaction relationships - Soil solution and exchange reactions - Soil cation exchange capacity and oxidation/reduction relations - fixation of potassium and phosphorus ant their mechanisms - Management of soil chemistry with laboratory and field techniques - Exchangeable and non-exchangeable cations - Properties of each of sodic, saline, and calcareous soils - Soil minerals and implication on chemical properties.

References:

1) **Bear, F.E. 1969.** Chemistry of the soil. 2nd. Ed**.** Van Nostrand Reinhold Co.NY,USA. https://www.google.com.eg/search?q=google&ie=utf8&oe=utf8&client=firefoxb&gfe_rd=cr&ei=ZH1SWaeLOK2s8wfH_71A#q=Bear,+F.E.+1969.+Chemistry+of+the+soil.+2nd.+Ed.++Van+Nostrand+Reinhold+Co.NY,USA.Y,+USA...+.+
2) **Tan, K.H. 2010.**Principles of soil chemistry .CRC, London, UK. https://www.google.com.eg/search?q=google&ie=utf8&oe=utf8&client=firefoxb&gfe_rd=cr&ei=ZH1SWaeLOK2s8wfH_71A#q=Tan,+K.H.+2010.Principles+of+soil+chemistry+.CRC,+London,+UK.Y,+USA...+.+
3) **Spark, D 2002**. Environmental soil chemistry, 2nd Ed. Academic Press, NY. USA. https://www.google.com.eg/search?q=google&ie=utf-8&oe=utf-8&client=firefox-b&gfe_rd=cr&ei=ZH1SWaeLOK2s8wfH_

71A#q=Spark,+D+2002.+.+Environmental+ Soil+ Chemistry,+ 2nd+Edition.+Academic+Press,+NY.+USA+.+

6.6.8. Course Title: Soil Physics and Sand Dune Fixation (Code:SO 0513, PrRq:SO0501)

Course Description: The course deals with physical, mechanical, and hydrology properties of soil, with particular emphasis on desert and semi-desert soils. The materials include definition of soil physics, mechanics, texture, porosity and moisture. Soil structure, texture, colour, consistency and bulk density are included. Theoretical and practical aspects are covered.

Course Contents: Introduction to sand dunes - Formation of sand dunes - Types and kinds of dunes and locations in deserts - Methods and techniques of dune fixation (mechanicals, vegetation, grasses and shrubs) - Introduction to soil physics with particular reference to sandy soils - Soil texture, structure, air, and density - Soil porosity, permeability and pore size distribution - Soil moisture and different moisture constants - Hydraulic conductivity.

References:

1) **Kohnke, H. 1969**. Soil physics. McGraw-Hill, NY, USA. https://www.google.com.eg/search?q=google&ie=utf8&oe=utf8&client=firefoxb&gfe_rd=cr&ei=ZH1SWaeLOK2s8wfH_71A#q=Kohnke,+H.+1969.+Soil+physics.+McGraw-Hill,+ NY, + USA+.++.

2) **Lal, R. and Shukla, K. 2004.**Principles of soil physics, 3rd. Ed. Cambridge Univ. Press, London, UK. https://www.google.com.eg/search?q=google&ie=utf8&oe=utf8&client=firefoxb&gfe_rd=cr&ei=ZH1SWaeLOK2s8wfH_71A#q=Lal,+R.+and+Shukla+,+K.+2004.Principles+of+Soil+Physics,+3rd.+Ed.+,+Cambridge+University+Press,+London,+UK+.+.

3) **Marshall, T.J., Holmes, J.W. and Rose, C.W.**1999 Soil physics. Amazon, NY, USA https://www.google.com.eg/search?q=google&ie=utf8&oe=utf8&client=firefoxb&gfe_rd=cr&ei=ZH1SWaeLOK2s8wfH_71A#q=+Marshall+,+T.J.,+++Holmes,+J.W.+and+Rose,+C.W.++++1999++++Soil+Physics+Amazon,,+NY,+USA.+.+

4) **FAO.1984.** Sand dune stabilization, shelterbelts and afforestation in dry zones. FAO Cons Guide 10/F2824. Rome, Italy**.** https://www.amazon.com/Stabilization-Shelterbelts-Afforestation-Zones-Guide/dp/9251022615

5) **Qiu,G.Y., Lee,In-Bok,Shimizu,H., Gao,Y. and Ding,G. 2004.** Principles of sand dune fixation with straw checkerboard technology and its effect on the environment. J. Arid Environ.56(3)446-464.http://www.sciencedirect.com/science/article/pii/ S0140196303000661

6.7 Courses of Agricultural Economics and Extension Department:

The list of Agricultural Economics and Extension Department Courses involved in the program is shown in Table 14.

Table: 14. List of Agricultural Economics and Extension Department Courses involved in the program (EE06).

Serial	Course Title		Code
1.	Agricultural Economics and extension	Comp.	(EE 0602)
2.	Technology Transfer & Diffusion	Opt.	(EE 0605)
3.	Feasibility Studies & Project Evaluation	Comp.	(EE 0623)
4.	Environmental Extension	Opt.	(EE 0629)

6.7.1. Course Title: Agricultural Economics and Extension (Code:EE 0602, PrRq:None)

Course Description: The course acquaints students with the science of economics which involves inter-relationship analysis of production, distribution and consumption of goods and services. It covers the law of supply and demand and other related topics. A background on the economic system, resources and goals of the system is included. Agricultural extension and its role as an advisory tool for increasing agriculture production service are included.

Course Contents: Introduction and goals of studying economics and agricultural extension - Macro-economics: National income, economy performance, unemployment - Fiscal policy and public debt - Money, Banking, Monetary policy, fiscal-monetary mix - Central banking - Economic growth and ecology, supply and demand, laws of production and cost - Firm Economics, how price and output are determined, monopoly and competition - Domestic economics. Business and government. Labour unions, industrial relations - International economics, trade, finance and policies - Agricultural extension and its role in advising farmers on efficient agriculture.

References:

1) **Boyes, W. and Melvin, M. 2005**. Fundamentals of economics 3rd Ed. Houghton Miffin Co., Boston, MA, USA. http://books.google.de/books?id=UYoWAAAAQBAJ&printsec=frontcover&dq=Fundamentals+of+economics&hl=en&sa=X&ei=x0P3UrO-JIestAb-4IDIBA&ved=0CC4Q6AEwAA#v= onepage&q=Fundamentals%20of%20economics&f=false

2) **Melvin, M. and Boys 2011**. Fundamentals of economics, 5th Ed. South-Western College Publ., Chula Vista, CA, USA. http://books.google.de/books?id=UYoWAAAAQBAJ&printsec=frontcover&dq=Fundamentals+of+economics&hl=en&sa=X&ei=8UP3UvC5HYiSswbVloGABA&ved=0CC4Q6AEwAA#v=onepage&q=Fundamentals%20of%20economics&f=false.

6.7.2: Course Title: Technology Transfer & Diffusion (CodeEE 0605:, PrRq:CJ 1207)

Course description: The course concerns technology transfer in agriculture: its concepts and how it is transferred, dissipated (defused) and the role of agriculture extension (agricultural advisory) bodies in this concern. Conditions for successful technology transfer processes and examples of successful cases are included.

Course Contents: Introduction on characteristics of agriculture technology and its transfer - Technology adaptation and dissemination (diffusion) - Stages and areas of transfer and conditions for its success - Role of agricultural extension (advisory) in transfer - Nature of relationships among various systems - Dissemination, diffusion and spreading of technology - Technology transfer approach and alternatives: A comparative assessment - Agriculture extension systems concerning transfer - Successful achievements shown by research - Examples: for private entrances to study extension and technology transfer - Important proposals for enhancing and updating technology transfer.

References:

1) **Inzelt, A. and Hilton, J. 1999.** Technology transfer: from invention to innovation. Kluwer Academic Publ. London, UK. http://books.google.de/books?id=I7JRAAAAMAAJ&q=Technology+transfer&dq=Technology+transfer&hl=en&sa=X&ei=lUT3Uo-tFojEtAbo1oG4Cg &ved= 0CEIQ6AEwAQ
2) **Jacobson, D. and Robertson, P.L. 2011**. Knowledge transfer and technology diffusion. Edward Elgar Publ. UK. http://books.google.de/books?id=IpmG3qs11kC&printsec=frontcover&dq=Knowledge+transfer+and+technology+diffusion&hl=en&sa=X&ei=vET3UrzaL8mPtQaG8IDADg&ved=0CC4Q6AEwAA#v=onepage&q=Knowledge%20transfer%20and%20technology %20diffusion&f=false

6.7.3 Course Title: Feasibility Studies & Project Evaluation (Code:EE 0623, PrRq:EE 0602)

Course Description: The course provides students with tools and methods of feasibility analysis of intended projects for possible success. Correction of direction and expansion,if needed are covered.

Course Contents: Introduction on feasibility studies, marketing,financial and economic aspects - Project management and determining buyer, intake and product analyses - New product marketing studies; Equipment, manpower and buildings - Financial studies: sources, credits and stock selling - Market versus shadow price; national parameters ;integrated analysis - Evaluation of investment projects and commercial profitability - Evaluation of complexes: indirect effects, employment,distribution and others - Implications of environments and technical know-how - National parameters: Social discount, adjusted foreign exchange rate - Uncertainty and Break-even analysis.

References:

1) **Kerzner, H., 2009.** Project management: A system approach to planning, scouting and controlling, Johan Wily & Sons.,UK. http://books.google.de/books?id=1XgFAzUQXqsC&printsec=frontcover&dq=project+management&hl=en&sa=X&ei=Y_IAU9ChIoa44ASI64HQDg&ved=0CDwQ6AEwAA#v=onepage&q=project%20management&f=false
2) **Gittinger, J.P. 1982**. Economic analysis of agricultural projects. John Hopkins University Press, Baltimore, MD, USA. http://books.google.de/books?id=bN9rmAEACAAJ&dq=Economic+Analysis+of+Agricultural+Projects&hl=en&sa=X&ei=iIAU3xMtDQ4QSUhoEQ&ved=0CCwQ6AEwAA

6.7.4. Course Title: Environmental Extension (Code:EE 0629, PrRq:EE 0602)

Course Description: The course provides students with understanding of agricultural extension (advisory) and related programs. Programs initiation compilation procedures are included. Monitoring and assessment tools are covered.

Course Contents:

Definition of agricultural extension (Agricultural advisory) - Terms of agricultural extension programs - Elements of agricultural extension - Stages of initiating extension programs - Agricultural extension work plan and their components - Preparation and implementation of extension plans - Monitoring of agricultural extension systems and assessing them - Definition and evaluation stages - Impediments to agricultural extension evaluation - The importance of the agricultural extension evaluation - Agricultural extension evaluation stages.

References:

1) **IFPRI. 2008.** Concepts and practices in agricultural extension in developing Countries. International Fd. Policy Res.Inst.(IFPRI),Washington, DC,U.S.A. http://books.google.de/books?id=yGftAAAAMAAJ&q=Extension+In+Developing+Countries&dq=Extension+In+Developing+Countries&hl=en&sa=X&ei=Z-wAU7GNN6Ta4w TctYDgCA&ved= 0CDYQ6AEwAg
2) **Tilbury, D. 2004**. Environmental education for sustainability: A force for change in higher education.. Springer Netherlands. https://scholar.google.com.eg/scholar?q=+Tilbury%2C+D.++2004.++Environmental+education+for+sustainability%3A+A+force+for+change+in+higher+education..+Springer+Netherlands.&btnG=&hl=en&as_sdt=0%2C5&as_vis=1
3) **Russell, D and Ison, R. 2000.**Agricultural extension and rural development : Breaking out of knowledge transfer traditions. Cambridge University Press., UK. https://www.google.com.eg/search?q=g&ie=utf-8&oe=utf-8&client=firefox-b&gferd=cr&ei= A8FSWbnKDfDBXoDwuLgP#q=Russell,+D+and++Ison,+R.+2000. Agricultural+ Extension

+and+Rural++++++++++++development:+Breaking+Out+of+Knowledge+Transfer+Traditions.++++++++++++Cambridge+University+Press.,+UK.+.

6.8 Courses of Food Science Department:

The list of Food Science Department Courses involved in the program is shown in Table 15.

Table: 15. List of Food Science Department Courses involved in the program (FS07).

Serial	Course Title		Code
1.	Food preservation and Packaging	Opt.	(FS 0713)
2.	Technology of Cereals, Oils and Sugar	Opt.	(FS 0727)
3.	Food Quality Control	Opt.	(FS 0728)

6.8.1. Course Title: Food Preservation & Packaging (Code:ES 0713, PrRq:AC 0909)

Course description: The course provides students with information on food preservation, purpose and methods. Food spoilage and precautions to avoid it are included. Principals and preparation methods for raw food materials are viewed.

Course Contents: Introduction on food preservation technology - Chilling, freezing, drying and canning technologies - Food packaging and method involved - Graphic design, printing and labeling on food packs - Sources of raw materials: preparation and methods of obtaining them - Classification of preservation methods: refrigeration, freezing and others.

References:

1) **Shafiur-Rahman**, **M 2007**.Handbook of food preservation, 2nd Ed. CRC,UK. http://books.google.com.eg/books?id=sKgtq62GB_gC&printsec=frontcover&dq=Handbook+of+Food+Preservation&hl=en&sa=X&ei=HGvpUvmqNoWd7QaQzYHYBA&ved=0CCoQ6AEwAA#v=onepage&q=Handbook%20of%20Food%20Preservation&f=false

2) **Sivasankar**, **B. 2004**. Food processing and preservation. Prentice-Hall of India Pvt. Ltd, New Delhi, India. http://books.google.com.eg/books?id=tbxGHBUY0BcC&printsec=frontcover&dq=Food+Processing+and+Preservation&hl=en&sa=X&ei=NWvpUq-eDoPH7AasoC4 Ag&ved =0CCoQ6AEwAA v=onepage &q= % 20 Processing%20and%20Preservation&f=false

6.8.2. Course Title: Technology of Cereals, Oils and Sugar (Code:FS 0727, PrRq:AC 0909)

Course Description: This course deals with technologies relating cereals, oils, and sugar, their production and products. Production processes, tests differentiating between nutritional values as well as standard properties are included. Methods of

extraction and refining are given. Raw material for sugars and methods of analysis are covered. Chemical reactions and biochemical properties and sanitation are included.

Course Content: Sources, structures and chemical compositions of cereals, oil and sugar(C,O&S) - Classification the wheat according to characteristics - Rice and wheat: milling processes, flours and nutritive values - Raw materials for breakfast cereals and other products and nutritive values - Bread, macaroni, biscuits and cake manufacture - Tests relating C,O&S and their products - Sugar cane and sugar beet production and quality - Spoilage of C,O&S and method of prevention.

References:

1) **Dendy, D., Bogdan, A.V. and Dobraszczyk, J. 2000.** Cereals and cereal products: Technology and chemistry. Food Products Series,Springer, London, UK. http://books.google.com.eg/books?id=b38oZ0QW-98C&dq=Cereals+ and+ cereal+products:+Technology+and+chemistry&hl=en&sa=X&ei=HGnpUs_KM-ae7AaSsIDg CQ&ved=0CCoQ6AEwAA
2) **O'Brien, R.D. 2010**. Fats and oils: Formulating and processing for applications. 3rd Ed., Taylor & Francis, NY, USA. http://books.google.com.eg/books?id=3wpHj3mvra8C&printsec=frontcover&dq=Fats+and+oils:+Formulating+and+processing+for+applications&hl=en&sa=X&ei=MmnpUpCqA8SN7QbugoDwCg&ved=0CDMQ6AEwAA#v=onepage&q=Fats%20and%20oils%3A%20Formulating%20and%20processing%20for%20applications&f=false
3) **Jackson, E.B. 1995**. Sugar confectionery manufacture. 2nd Ed., Springer, NY,USA. http://books.google.com.eg/books?id=GFw8HEqnLvIC&dq=Sugar+confectionery+manufacture&hl=en&sa=X&ei=6GjpUpj0IbKM7Aazz4C4BA&ved=0CDMQ6AEwAA
4) **William, P.E. 2000**. The science of sugar confectionery. 1st Ed.RSC, Cambridge, UK. http://books.google.com.eg/books?id=JTdUXI9fz2kC&printsec=frontcover&dq=The+Science+of+sugar+confectionery&hl=en&sa=X&ei=BWnpUoGWBsfQ7AaNioEQ&ved=0CCoQ6AEwAA#v=onepage&q=The%20Science%20of%20sugar%20confectionery&f=false

6.8.3. Course Title. Food Quality Control (Code:FS 0728, PrRq:FS 0713)

Course Description: The course focuses on quality control protocols and food sanitation and hygiene. Hazard assessment and critical control points are included. Risk assessment in designing systems is covered. Food standards and legislations are included.

Course Content: Introduction of quality control procedures and protocols - Food safety definition: Local and international - Food sanitation and hygiene - Food hygiene and avoidance of food contamination - Risk assessment and food sanitation

and poisoning - Good manufacture practice, and health instructions for packaging - Exposure assessment and hazard identification - Quality control procedures and cleaning of food factories - Universal methods of quality control of food products.

References:

1) **Smulders, F.J.M. and Collins, J.D. 2005**. Risk management strategies: Monitoring and surveillance (Food safety assurance and veterinary public health). Wageningen Acad. Publ. Netherlands.http://books.google.com.eg/books?id=5gwsBRhEd70C&printsec=frontcover&dq=Risk+management+strategies&hl=en&sa=X&ei=R2rpUrOtDubD7AaYiYCgDA&ved=0CEEQ6AEwAQ

2) **Thornton A.C. 2003**. Variation risk management: Focusing quality improvements in product development and production. 1st Ed, John Wiley & Sons, NY, USA. http://books.google.com.eg/books?id=wt1TAAAAMAAJ&q=Variation+risk+management&dq=Variation+risk+management&hl=en&sa=X&ei=X2rpUpPIGsmf7gbj8oDwCw&ved=0CDgQ6AEwAA

6.9 Courses of Agricultural Botany Department:

The list of Agricultural Botany Department Courses involved in the program is shown in Table 16.

Table: 16. List of Agricultural Botany Department Courses involved in the program (AB08).

Serial	Course Title		Code
1.	**Agricultural Microbiology**	Comp.	(AB 0803)
2.	**Plant Physiology**	Opt	(AB 0806)
3.	**Botany**	Comp.	(AB 0810)
4.	**Soil Microbiology**	Opt.	(AB 0811)
5.	**Organic Farming**	Opt.	(AB 0813)

6.9.1. Course Title: Agricultural Microbiology (Code:AB 0803, PrRq:AB 0810)

Course Description: The course acquaints students with the science of microbiology and the role of microorganisms in agriculture. Microorganisms including bacteria, fungi, alga, and virus are described along with their taxonomy, function, behavior and other related information.

Course Contents: Introduction to applications of microbiology in agriculture - Organic manures (farmyard manure and composts) and importance to soil fertility - Biofertilizer inocula: Preparation of Rhizobia, Azotobacter, Cyanobacteria, *Azolla*, *Frankia*, *Azospirillum* inocula, Phosphate-solubilizing inocula - Composting: compost preparation and use as a manure - Silage production as animal feed stuff - Rotting of fiber plants - Biological control: Microorganisms used in biological control and their application.

References:

1) **Dworkin, M., Falkow, S. E. and Rosenberg, K2006.** The prokaryotes. Springer, NY, USA.http://books.google.de/books?id=sTsC65kCJbUC&printsec=frontcover&dq=The+prokaryotes&hl=en&sa=X&ei=80b3UvzQBYLmswb6wICICw&ved=0CDMQ6AEwAQ#v=onepage&q=The%20prokaryotes&f=false
2) **Garrity, G.M., Brenner, D.J., Krieg, N.R. and Staley, J.T.2005.** Bergey's manual of systematic bacteriology. 2nd Ed., Springer, NY, USA. http://books.google.de/books?id=0kghF7qBE98C&printsec=frontcover&dq=Bergey%E2%80%99s+Manual+of+Systematic+Bacteriology&hl=en&sa=X&ei=CEf3Uo75LYOqtAajYGQAQ&ved=0CDcQ6AEwAA#v=onepage&q=Bergey%%80%%20Manual%20of%20 Systematic%20Bacteriology&f=false
3) **Totora, R. and Gu, J. 2010.**Enviromnmental microbiology. 2nd Ed., John Wiley and Sons Inc. NY, USA. https://www.google.com.eg/search?q=g&ie=utf8&oe=utf8&client=firefoxb&gfe_rd=cr&ei=DqZSWeXhF8HA8geq7JLACQ#q=)++Totora+,R.+and+Gu,+J.+2010.Enviromnmental+microbiology.+2nd+Ed.,+John+Wiley+and+Sons+Inc.+NY,+USA..++.+.++....+.
4) **Tortora, G.J. Funke, B.R. and Case, C.L. 2016 .** Microbiology: An introduction. 12th. Ed. Pearson Education Inc., NY, USA. https://www.google.com.eg/search?q=g&ie=utf-8&oe=utf-8&client=firefox-b&gfe_rd=cr&ei =DqZSWeXhF8HA8geq7JLACQ#q =Tortora,+ G.J.+Funke,++B.R.+and+Case,+ C.L.+2016+.+ Microbiology:+An+I ntroduction.+12th.+ Ed.+Pearson+Education+Inc.,+NY,+USA..++.+.++...+

6.9.2. Course Title: Plant Physiology (Code:AB 0806, PrRq: None)

Course Description: The course provides students with physiological function in plant. Photosynthesis, plasmolysis, transpiration, water and nutrient uptake, metabolic activities and other activities are covered.

Course Contents: Introduction to plant physiology and the physiological unit - Plant water relations:(osmosis, imbibition, diffusion, water potential,water absorption, plasmolysis, cohesion, and other mechanisms - Photosynthesis:(sites, electron transport chain, photophosphorylation, biosynthetic phase,Calvin cycle, photorespiration, law of limiting factors, plant nutrients) - Plant growth, auxins, gibberellins, cytokines ethylene, abscisic acid - Photo-periodism and Vernalization ;stress Physiology.

References:

1) **Jain, V. K. 2005.** Fundamentals of plant physiology. S. Chand & Co. Ltd. Ramnagar New Delhi, India. http://books.google.de/books?id=w60OAQAAMAAJ&q= Fundamentals+of+plant+physiology&dq=Fundamentals+of+plant+physiology&hl=en&sa=X&ei=aEf3UtimGsjctAbHtoDwAw&ved=0CC4Q6AEwAA

2) **Stern, K. R. 2000**. Introductory plant biology. 8th. Ed. McGraw-Hill Co. London, UK. http://books.google.de/books?id=KCI8PwAACAAJ&dq=Introductory+plant+biology&hl=en&sa=X&ei=d0f3UoDNMIqRtAa82YCICA&ved=0CC4Q6AEwAA

3) **Verma, S.K and Mohit, V. 2008.** A text book of plant physiology, biochemistry and biotechnology. S. Chand & Company Ltd, Ramnagar New Delhi, India. http://books.google.de/books?id=GtL0UQR8QDYC&dq=A+text+book+of+plant+physiology&hl=en&sa=X&ei=iEf3UralAcTXswbdmID4AQ&ved=0CD0Q6AEwAg

6.9.3. Course Title: Botany (Code:AB 0810, PrRq:None)

Course Description: The course informs the student with the science of plants "botany". The course involves plant morphology and organ modification. Plant cell, tissue, secretion and vesicular tissues, types of vascular bundles are included. Anatomy of flowering plants and general taxonomy of plant kingdom are given.

Course Contents: Introduction to botany and its branches, external morphology of flowering plants (roots, stems and leaves) organs modification - Plant cell, plant tissue, (meristem and meristematic cells, epidermis, paranchematic, cholarancheima, schelarancheima, secretion and vascular tissues) types of bundles - Anatomy of flowering plants (root, stem and leaves in mono and dicot plants) primary and secondary growth - Environment and effect on morphology (hydrophytes and xerophytes - Pollination and fertilization - Taxonomy and plant kingdom specially regional and horticultural plants - Cruciferacae, eguminosae, Cucurbitaceae, Solonaceae, Malvaceae, Elementary Knowledge of mosses, ferns, fungi, bacteria.

References:

1) **Bold, H.C. 1989**. The plant kingdom. 5th Ed. Prentice-Hall, London, UK. http://books.google.de/books?id=fTf6XaCWY5UC&dq=Textbook+of+botany&hl=en&sa=X&ei=pEb3UsnPDcjkswbiy4GICg&ved=0CDQQ6AEwAQ

2) **Singh, M.P. and Sharma, A. K. 2005**. A Textbook of botany, Anm Publ. Pvt. Ltd., New Delhi, India. https://www.google.com.eg/search?q=g&ie=utf-8&oe=utf-8&client= firefoxb & gfe_rd=cr&ei=DqZSWeXhF8HA8geq7JLACQ#q=Singh,+M.P .+and+ Sharma, +A.+K.+2005.+A+Textbook+of+botany,+Anmof+ Publications+Pvt.+Ltd.,+ New+Delhi,+India.+.+.++....+.

3) **Stern, K. R. 2000.** Introductory plant biology (8th. Ed. McGraw-Hill Co.,London, U. K. https://www.google.com.eg/search?q=g&ie=utf-8&oe=utf-8&client= firefox -b&gferd= cr&ei=DqZSWeXhF8HA8geq7JLACQ#q=Stern,+K.+R.+2000.+Introductory+plant+biology+(8th.+Ed.++McGrawHill+Co.,+London,+U.+K.++.+.++....+.

6.9.4 Course Title: Soil Microbiology (Code:AB 0811, PrRq: None)

Course Description: The course gives students information on soil microbiology, with particular references of sandy soils. Relationships of soil microbiology with the environments, including plants and other soil fauna is included. Photosynthesis, respiration metabolism and certain substances and materials in soil and their impact on activities of soil microorganisms are covered.

Course Contents: Introduction to soil microbiology with particular reference to sandy soils - Bio-transformations of plant nutrients in desert soils particularly N and P - Immobilization-mineralization of N and C/ N ratio of organic matter - Carbohydrate, protein, and lipid metabolism and roles of soil microorganisms.

References:

1) **Tate, R.L. 1995** . Soil microbiology . 2nd Ed. John Wiley, NY, USA. https://www.google.com.eg/search?q=g&ie=utf-8&oe=utf-8&client=firefox-b&gfe rd=cr&ei=DqZSWeXhF8HA8geq7JLACQ#q=Tate,+R.L.+1995+.++Soil+microbiology+.+2nd+Ed.+John+Wiley+,+NY,+USA....++.+.++....+.

2) **Dommergues, Y.R. and Diem, G.H. 2012** .Microbiology of Tropical Soils and Plant Productivity. Springer Sci.& Business Media. https://www.google.com.eg/search?q=g&ie=utf-8&oe=utf-8&client=firefox-b&gfe_rd=cr&ei=DqZSWeXhF8HA8geq7JLACQ#q=Dommergues,+Y.R.+and++Diem,+G.H.+2012+.Microbiology+of+Tropical+Soils+and+Plant+Productivity.+Springer+Sci.%26+Business+Media.

3)**Entry,J.A., Gottlieb,A.D., Jayachandran,K and Ogram,A. 2011.** Microbiology of the everglades ecosystem .CRC, NY, USA. https://www.google.com.eg/search?q=g&ie=utf-8&oe=utf-8&client=firefox-b&gfe-d=cr&ei=DqZSWeXhF8HA8geq7JLACQ#q=Entry,J.A.+,+++Gottlieb,A.D.+,+++Jayachandran,K+and++Ogram,A.+2011.+Microbiology+of+the+everglades+ecosystem+.CRC,+NY,+USA..

4) **Van-Elsas, Jansson, J. and Trevors,J.T. 2007.**Modern soil microbiology. CRC,NY, USA. https://www.google.com.eg/search?q=g&ie=utf-8&oe=utf-8&client=firefox-b&gfe_rd =cr&ei=DqZSWeXhF8HA8geq7JLACQ#q=Van-Elsas,+Jansson,+J.+and+Trevors,J.T.+2007.+Modern+sol+micicrobiology.+CRC+,NY, +USA.

6.9.5. Course Title: Organic Farming (Code:AB 0813, PrRq: None)

Course Description: The course informs students on organic farming and cropping without fertilizers or pesticides and using natural materials,mainly organic manures and biofertilizers. Some natural minerals are mentioned such as rock phosphates and potassium silicates.

Course Content: Introduction to organic farming and its importance - Organic manures such as farmyard manures, and composts - Management of organic farming - Natural materials used as alternatives for plant protection - Comprehensive precautions in organic farming.

References.

1) **NIIR . 2012 .** The complete technology book on biofertilizer and organic farming . 2nd revised Ed., National Inst. Indus. Res., Powai, Mumbai, India. https://www.google.com.eg/search?q=Hansen%2C+A.L.++2010+.+Organic+farming+manual.+Google+Books.&ie=utf-8&oe=utf-8&client=firefox-b&gfe_rd=cr&ei=ep5WWcHvLaus8wfNmYHoDQ#q=NIIR+.+2012+.+The+complete+technology+book+on+bio fertilizer+and+organic +farming+.+2nd+revised++Ed.+,++National++Inst.++Indus.+Res.+,+Powai,+Mumbai,+India.

2) **Hansen, A. L. 2010**. The Organic farming manual: A Comprehensive guide to starting and running a certified organic farm. Storey Publ. MA, USA. https://www.google.com.eg/search?q=Hansen%2C+A.L.++2010+.+Organic+farming+manual.+Google+Books.&ie=utf-8&oe=utf-8&client=firefox-b&gferd=cr&ei=ep5 WWcHvLaus8wfNmYHoDQ

3) **Coleman, E. 1989** The new organic grower. Chelsea Green Publ.,White River Junction, VT, USAhttps://www.google.com.eg/search?q=EIRI++2007+.+Handbook+of+biofertilizers+and+vermicultures.+Ingineers+India+Research+Institute+%28EIRI%29+%2C+New+Delhi%2C+India.&ie=utf-8&oe=utf-8&client=firefox-b-ab&gferd=cr&ei= Y71SWb 2mJ4jA8gfj3 aH ACQ#q=)++Coleman, +E.++1989++The+New+Organic+Grower.+Chelsea+Green+ Pub.+White+River+ Junction, + VT,+USAw+Delhi,+India.

4) **Lockeretz, W. 2007.** Organic farming. An international history. Centre for Agric. & Biosci. International (CABI). https://www.google.com.eg/search?q=EIRI++2007+.+Handbook+of+biofertilizers+and+vermicultures.+Ingineers+India+Research+Institute+%28EIRI%29+%2C+New+Delhi%2C+India.&ie=utf-8&oe=utf-8&client=firefox-b-ab&gferd=cr&ei=Y71SWb2 mJ4jA8gfj3aHACQ#q=Lockeretz,+W.+2007.+Organic+farming.+An+international +history.+Centre+for+Agriculture+and+Biosciences+International+(CABI).w+Delhi,+India.

6.10 Courses of Agricultural Biochemistry Department:

The list of Agricultural Biochemistry Department Courses involved in the program is shown in Table 17.

Table: 17. List of Agricultural Biochemistry Department Courses involved in the program (AC09).

Serial	Course Title		Code
1	Organic and Analytical Chemistry	Comp.	(AC 0908)
2	Biochemistry	Comp.	(AC 0909)
3	Chelate and Heavy Metals Chemistry	Opt.	(AC 0910)

6.10.1. Course Title: Organic and Analytical Chemistry (Code:AC 0908, PrRq: None)

Course description: The course provides students with knowledge on organic chemistry and techniques of chemical analysis. It enables students to identify principles and procedures of chromatography and spectroscopy.

Course Contents: Instruments of spectrum analysis:Spectrophotometry,Ultraviolet, Flame photometry - Instruments of chromatography analysis : Paper chromatography (PC), thin-layer chromatography (TLC) high performance liquid chromatography (HPLC), and gas-liquid chromatography (GLC) - Gas Chromatography-Mass spectroscopy (G.C-Mass), Gel-electrophoresis, and amino-acid analysis - Instruments of atomic absorption and atomic-emission.

References:

1) **Rouessac, F. and Rouessac, A. 2013**. Chemical analysis: Modern instrumentation methods and techniques. 2nd Ed., Wiley,UK.. https://www.google.com.eg/search?q=Rouessac%2C+F.+and+Rouessac%2C+A.+2013.+Chemical+analysis%3A+Modern+instrumentation+methods+and+techniques.+2nd+Ed.%2C+Wiley%2C+UK.+&ie=utf-8&oe=utf-8&client=firefox-b&gfe_rd=cr&ei =yepnWdOvMsO s8weFwYTADA

2) **Sharma B. K. 2000**. Instrumental methods of chemical analysis. GOEL Publ., House-Krishna Prakashan Media, India. http://books.google.de/books?id=igR_jsqfcowC&printsec=frontcover&dq=Instrumental+methods+of+chemical+analysis&hl=en&sa=X&ei=dvP3Uq3RLojItQaL5oC4BQ&ved=0CC4Q6AEwAA#v=onepage&q=Instrumental%20methods%20of%20chemical%20analysis&f=false.

6.10.2. Course Title: Biochemistry (Code:AC 0909, PrRq: None)

Course Description: The course covers the structure and function of the living cell as well as the structure and chemistry of the cell's major components (carbohydrates, proteins, lipids and enzymes). Benefits of these compounds to living organisms, and identifying the physical and chemical properties of base units of these groups and their classification are covered.

Course Contents: Carbohydrates and their classification and reactions - Proteins, amino acids, nucleic acids and their reactions - Lipids (classification, conjugated lipids, derived lipids and their reactions) - Enzymes (classification, mechanisms, kinetics and inhibitions).

References:

1) **Campbell, M.K. and Farrell, S.O. 2010**. Biochemistry. 7th Ed. Cengage Learning, China. http://books.google.de/books?id=J5NVrE_Uf-8C&printsec=frontcover&dq=Biochemistry&hl=en&sa=X&ei=D_T3UvTRGISetAa32oDwBQ&ved=0CC4Q6AEwAA#v=onepage&q=Biochemistry&f=false
2) **Garrett, R.H. and Grisham**, C.M. **2013.** Biochemistry, 5th Ed. Cengage Learning China. ,http://books.google.de/books?id=-Lhp0ppRYWoC&printsec=frontcover&dq=Biochemistry&hl=en&sa=X&ei=D_T3UvTRGISetAa32oDwBQ&ved=0CDoQ6AEwAg#v=onepage&q=Biochemistry&f=false

6.10.3. Course Title: Chelate & Heavy Metals Chemistry (Code:AC 0910, PrRq:SO 0501)

Course Description: The course give an overview of surfactants as chelating agents for transition elements. **C**helating agent and their strong binding to heavy metals are elucidated. Role of chelation on immobilization or dissolution of heavy metals in different media and implications on environmental pollution and remediation are included..

Course Contents: Introduction to heavy and transitional metals and their properties - Chelation phenomenon and its mechanisms - Chelation by organic ligands - Practical implications of chelation.

References:

1) **Fullerton, T. 2004**. "Chelated micronutrients." Agro Services Intl. Inc.,USA. http://www.agroservicesinternational.com/Articles/Chelates.pdf.
2) **Lindsay, W. L. 1974**. "Role of chelation in micronutrient availability." In: E. E. Carson. ed. The Plant root and its environment, Charlottesville Univ. Press,VA, USA. https://www.google.com.eg/search?tbm=bks&hl=en&q=Sposito%2C+G.+1989.+The+Chemistry+of+Soils%2C+Oxford+University+Press%2C+NY#hl=en&tbm=bks&q=E.+E.+Carson++Ed.+The+Plant+root+and+its+environment,+Charlottesville+University+Press+,+VA,++USA.+
3) **Norvell, W. A. 1972**. Equilibria of metal chelates in soil solution. *In:* J. J. Mortvedt, P. M. Giordano, and W. L. Lindsay Ed. Micronutrients in agriculture. Soil Science Society of America, Madison, WI,USA. https://www.google.com.eg/ search?tbm=bks&hl=en&q=Sposito%2C+G.+1989.+The+Chemistry+of+Soils%2C+Oxford+University+Press%2C+NY
4) **Sekhon, B. S. 2003**. Chelates for micronutrient nutrition among crops. Resonance 8(7): 46–53. http://www.springerlink.com/content/8x4gr6850h346718/.

5) **Sposito, G. 1989**. The Chemistry of Soils, Oxford University Press, NY. https:// books.google.com.eg/books?hl=en&lr=&id=XCJnDAAAQBAJ&oi=fnd&pg =PR9&dq=Sposito,+G.+1989.+The+Chemistry+of+Soils,+Oxford+University+ Press,+NY&ots=iFtbc2GX6x&sig=_- Q1jkhKd7HDPXkIM6mHuxOFU7U&redir_esc=y#v= onepage&q&f=false

6.11 Courses of Genetics and Genetic Engineering Department:

The list of Genetics and Genetic Engineering Department Courses involved in the program is shown in Table 18.

Table: 18. List of Genetics and Genetic Engineering Department Courses involved in the program (GE10).

Serial	Course Title		Code
1.	**Genetics**	Comp.	(GE 1001)
2.	**Desert Plant Breeding**	Comp.	(GE 1010)
3.	**Genetically Modified Plants**	Opt.	(GE 1011)

6.11.1. Course Title: Genetics (Code:GE 1001, PrRq: None)

Course Description: The course gives the student the principles of the science of genetics. An overview is given covering genetics starting from the Mendel time up to the present time. Different genetics disciplines: classical, molecular, and evolutionary are included.

Course Contents: Introduction and historical overview of genetics - Mendelism and the chromosome theory - Extension of Mendelism - Linkage and Crossing-over - Allelic variation and gene function - Non-Mendelian inheritance and cytoplasmic factors - Pedigree analysis - Chromosomal variations.

References:

1) **Brooker, R. J. 2011**. Genetics: Analysis and principles. McGraw-Hill, NY,USA. http://books.google.de/books?id=GVgUSgAACAAJ&dq=Genetics:+Analysis+ and+principles&hl=en&sa=X&ei=3vL3UtH0HMW0tQaR44Aw&ved=0CDIQ6 AEwAQ
2) **Hartl, D.L. and Ruvolo, M. 2011.** Analysis of genes and genome. Jones&Bartlett Bubl., Burlington, MA.USA. http://books.google.de/books?id=0l9eyuzCP4gC&printsec=frontcover&dq=ina uthor:%22Maryellen+Ruvolo%22&hl=ar&sa=X&ei=PgT6UqaZFKPp4gTJ9oG gCQ&ved=0CC0Q6wEwAA#v=onepage&q&f=false

6.11.2. Course Title: Desert Plant Breeding (Code:GE 1010, PrRq:GE 1001)

Course Description: The course aims at acquainting the student with the discipline of plant breeding. Particular stress on methods used in obtaining plant cultivars suited for desert environment are involved. Self and cross pollinated species are included.

Course Contents: Introduction to plant breeding - Self-pollinating breeding techniques (mass selection, pedigree selection and bulk population) - Single-seed descent, double-haploid synthesis and backcross breeding - Cross-pollinating breeding techniques (recurrent mass selection, half-sibling family selection, full-sibling family selection) - Family breeding techniques for vegetative propagated plants in the genomic era.

Marker-assisted techniques - Hybridization and tissue culture - Transgenic methodology.

References:

1) **Bass, H.W. and Birchler, J.A. 2012.**Plant cytogenetics : Genome structure and chromosome function. Springer Pub.,NY, USA. https://www.google.com.eg/search?q=EIRI++2007+.+Handbook+of+biofertilizers+and+vermicultures.+Ingineers+India+Research+Institute+%28EIRI%29+%2C+New+Delhi%2C+India.&ie=utf-8&oe=utf-8&client=firefox-b-ab&gferd=cr&ei=Y71SWb2mJ4jA8gfj3aHACQ#q=Bass, +H.W. +and++Birchler,+J.A.+2012.Plant++cytogenetics+:+Genome+structure+and+chromosome+ function.+Springer++Pub.+,NY,+USA..w+Delhi,+India.

2) **Kozlowski, T.T. 2012**. Soil water measurement, plant responses, and breeding for drought resistance. Elsevier Pub. NY, USA. https://www.google.com.eg/search?q=g&ie=utf-8&oe=utf-8&client=firefox-b&gfe_rd=c r&ei=rL9SWZy0OqHCXumXhYgN# q=Kozlowski,+ T.T.+2012.+Soil+water+measurement,+plant+responses,+and+breeding+ for+drought+resistance. + Elsevier+Pub.++NY,+USA.

3) **Walker, M.R. and Rapley, R. 2017 .**Route map in gene technology. John Wiley & Sons, Inc., NY, USA. https://www.google.com.eg/search?q=g&ie=utf-8&oe=utf-8&client= firefox-b&gfe_rd=cr&ei=rL9SWZy0OqHCXumXhYgN#q=Walker,+ M.R.+and+ Rapley,+R.+2017+.Route+map+in +gene+technology.+John+Wiley+%26 +Sons,+Inc.,+NY,+ USA.

6.11.3. Course Title: Genetically Modified Plants (Code:GE 1011, PrRq:GE 1001)

Course Description: The course acquaints students with the role of molecular biology in modifying plants for particular purposes. It covers development of techniques of plant biotechnology to obtain cultivars needed for desert conditions. Plant genes and genomes with techniques for incorporating modified genes into plants are involved.

Course Contents: Introduction on genetically modified plants (GM plants) - Techniques for genetic modification - Successes and failures of present GM crops,

new varieties presently developed - GM crops grown commercially in the world - Concerns and legislations relating the use of genetically modified plants - Future of GM plants.

References:

1) **Halford, N. G. 2003** Genetically Modified Crops, 2nd Edition . Imperial Colledge Press, London, UK. https://www.google.com.eg/search?q=g&ie=utf-8&oe=utf-8&client=firefox–b&gfe_rd=cr&ei=A8FSWbnKDfDBXoDwuLgP#q=+Halford,+N.+G.+2003++Genetically+Modified+Crops,++2nd +Edition +.+ Imperial++Colledge+Press,+London,+UK.

2) **Tzotzos, G.T., Head, G.P. and Hull, R. 2009** Genetically modified plants: Assessing safety and managing risk. Elsevier Inc., NY, USA. https://www.google. com.eg/search?q= g&ie=utf-8&oe=utf-8&client=firefox-b&gfe_rd=cr&ei= A8FSWbnKDfDBXoDwuLgP# q=Tzotzos,+G.T.+,++Head,+G.P.+and++Hull,++R.+2009++Genetically+modified++++++++++plants+:Assessing+safety+and+managing+risk.+Elsevier+Inc.,++NY,+USA

6.12 Courses of Agricultural Engineering Department:

The list of Agricultural Engineering Department Courses involved in the program is shown in Table 19.

Table: 19. List of Agricultural Engineering Department Courses involved in the program (AE11).

Serial	Course Title		Code
1.	Agricultural Engineering	Comp.	(AE 1101)
2.	Agricultural Structures Planning for Desert Zones.	Comp.	(AE 1107)
3.	Irrigation Systems in Desert Lands	Comp.	(AE 1108)
4.	Power & Farm Machinery for Desert Lands	Comp.	(AE 1109)
5.	Post-harvest Processing	Comp.	(AE 1110)
6.	Field Irrigation Management	Opt.	(AE 1111)
7.	Renewable Energy in Desert Zones	Opt.	(AE 1112)

6.12.1 Course Title: Agricultural Engineering (CodeAE 1101; PrRq:AE SO 0501)

Course Description: The course teaches students engineering principles in desert land agriculture. Soil and water conservation, agricultural power, machinery, electricity, structures, and animal environments are included. Material handling and processing are covered.

Course Contents: Introduction to mechanic fundamentals-tractor types; and farm machinery - Irrigation and drainage basics: hydraulics, water sources, canal and drain-nets - Types of drains, and comparisons among drains - Planning and designing of drain-networks - SI units "***Systeme International de'Unites***" and other systems of measuring units - Bio-systems engineering, environment control, waste-recycling, compost, biogas - Aquaculture engineering and food processing engineering**:** Basics and properties - Thermodynamics and heat transfer and relationships with food processing - Farm buildings and environmental implications in desert regions.

References:

1) **Bello, S.R. 2012.** Agricultural engineering: Principles and practice .Create Space Independent Publ. Platform. Amazon, London, UK. http://books.google.de/books?id=uJvu_qnUKFsC&pg=PA64&dq=Agricultural+engineering:+Principles+and+practice&hl=en&sa=X&ei=afD3UouhNMbQtAbF24CYCQ&ved=0CD8Q6AEwAw#v=onepage&q=Agricultural%20engineering%3A%20Principles%20and%20practice&f=false
2) **Yadav, S.N. 2011.** Agricultural engineering: Fundamentals and applications. Biotech Books, Vedamb Books Ltd. New Delhi, India. http://books.google.de/books?id=rk4otwAACAAJ&dq=Agricultural+engineering:+Fundamentals+and+applications&hl=en&sa=X&ei=hfD3Ut3ABorGtQabr4GYCg&ved=0CDkQ6AEwAg

6.12.2. Course Title: Agricultural Structure Planning for Desert Zones (Code:AE 1107, PrRq:AE 1101)

Course Description : The course deals with basic structural analysis and forms of structures. Arches and trusses and their forms. Suitability to desert environment of agricultural buildings is included. Properties of earth building materials and environmentally controlled facilities are described.

Course Contents: Introduction to structure planning and types of structures - Types of farm buildings, and suitability in desert regions - Statically determinate and indeterminate structures - Arches and their types - Struss :Plane struss and space struss - Rolling loads and influence on lines - Formulation of structural problems - Transformation of Information in Structures through Matrices.

References:

1) **Timoshenko, S.P.and D.H.Young, 1965.** Theory of structures, McGraw-Hill Int. UK. https://docs.google.com/file/d/0Bw8MfqmgWLS4RlNqaE1oUzdOajQ/view
2) **Reddy, C.S. 2010**. Basic structural analysis . 3rd Ed. Tata McGraw-Hill India. https://www.abebooks.com/Basic-Structural-AnalysisThirdEditionC.S/5004213570/bd

6.12.3. Course Title: Irrigation Systems in Desert Lands (Code:AE 1108, PrRq: None)

Course Description: The course makes students aware of the different types of on-farm irrigation systems and landscape. Planning, design and operation of surface, sprinkler and drip irrigation systems are covered. Pipeline design, connections and pump selection are discussed in details.

Course Contents: Introduction on irrigation systems and their types - Planning, design and evaluation of main systems - Surface, sprinkler and drip systems in relation to desert lands.

Water use efficiency - Evaluation of wells and their capacity and water pumps - Selection of appropriate systems based on cost, return and feasibility.

References:

1) **Hoffman, G.J., Evans, R.G. Jensen, M.E., Martin, D.L. and Illiot, R.L. 2007** . Design and Operation of Farm Irrigation Systems. 2nd Ed. American Society of Agricultural and Biological Engineers (ASABE), St Joseph, MI, USA. https://www.scribd.com/document/332446646/Design-and-Operation-of-Farm-Irrigation-Systems-2nd-Edition

2) **Jensen, M. E. -1983** Design and operation of farm irrigation systems. American Society of Agricultural Engineers(ASAE), MI, USA. https://www.google.com.eg/search?q=Jensen%2C+M.+E.+-1983+Design+and+operation +of+farm+irrigation+systems&ie=utf-8&oe=utf-8&client=firefox-b&gfe_rd=cr&ei= pvdnWe2 pNKes8wf5qrzoDA

3) **Glenn J. Hoffman, Robert G. Evans, Marvin E. Jensen, Derrel L. Martin and Ronald L. Elliott (2007)** Design and operation of farm irrigation systems (2nd edition). ASABE, 2950 Niles Rd., St. Joseph, MI 49085-9659 USA.

6.12.4. Course Title: Power and Farm Machinery for Desert Lands (Code:AE 1109, PrRq:AE 1101)

Course Description: This course introduces students to various aspects of agricultural power and machinery used in agricultural production systems, field crops, horticultural crops and livestock .Students will be able to determine the appropriate mechanization systems which are technically applicable and economically feasible.

Course Contents: Farm tractors, soil tillage, laser leveling, seeders, planters, trans planters - Inter-row techniques and harvesting systems - Mechanization systems for livestock production, selection, sizing and operations - Operational principles required for appropriate systems - Cost analysis and computer technology for planning and management of machinery.

References:

1) Hunt, D. 2012. Farm power and Machinery Management, CBS, London,UK http://books.google.de/books?id=UTkXAAAAQBAJ&printsec=frontcover&dq=Farm+power+and+Machinery+Management&hl=en&sa=X&ei=VvUAU8esHamN

4wS534GIBg&ved=0CDwQ6AEwAA#v=onepage&q=Farm%20power%20and%20Machinery%20Management&f=false

2) Meij, J.L. 1960. Mechanization in Agriculture. North Holland Publ.Netherlands . http://books.google.de/books?id=PWJDAAAAIAAJ&q=Mechanization+in+Agriculture&dq=Mechanization+in+Agriculture&hl=en&sa=X&ei=avUAU8U_qtXgBOqLgaAG&ved=0CC4Q6AEwAA

6.12.5. Course Title: Post-harvest Processing (Code:AE 1110, PrRq: None)

Course Description: The course provides a conceptual awareness of the engineering aspects of postharvest technology. It gives knowledge on factors affecting quality of agricultural products after harvest, and engineering aspects on handling and storage. Techniques of cleaning, sorting, grading, packaging, transporting and storing are covered.

Course Contents: Introduction on postharvest processing - Engineering properties of products (physical, mechanical, thermal and aerodynamics) - Means of handling and transport fresh produce (e.g. belts, screws, forklifts, cranes) - Cleaning, sorting, grading techniques and Pre-cooling of fruits and vegetables - Packaging, package types, design and evaluation - Storage, methods, and the principals and factors affecting the products during storage.

References:

1) **Kader, A. A. 2002.** Postharvest technology of horticultural crops. UCANR Publ.,Ca, USA. https://www.amazon.com/Postharvest-Technology-Horticultural-Crops-3rd/dp/1879906511

2) **Chakraverty, A. and R. Paul Singh 2016**. Postharvest Technology and Food Process Engineering. CRC Press, Boca Raton, FL,USA. https://www.crcpress.com/Postharvest-Technology-and-Food-Process-Engineering/ Chakraverty- Singh/p/book/ 9781138198852

6.12.6. Course Title: Field Irrigation Management (Code:AE 1111, PrRq:AE 1101)

Course Description: The course aim at giving students knowledge on Plant/soil/ water relationships and relations with irrigation systems, requirements determination and measurements.

Course Contents : Introduction on irrigation management - Soil-water-plant relationships and relations to irrigation - Irrigation situation : rainfall, evaporation, evapotranspiration -

Aspects of irrigation - Irrigation methods suitable for cropping patterns and desert regions - Scheduling Irrigation according to the type of crop.

References:

1) **Michael, A.M. -2007.** Irrigation theory and practice, 2nd Ed. Vikas Pub.House Pvt Ltd New Delhi, India.

https://www.abebooks.com/servlet/BookDetailsPL?bi=204811858852)

2) **Majumdar, D.K. 2009 .** Irrigation water management: Principles and practice. PHI Learning New Delhi, India.https://www.abebooks.com/Irrigation-Water-Management-Principles-Prctice-D.K/4319796917/bd

6.12.7. Course Title: Renewable Energy in Desert Zones (Code:AE 1112, PrRq:AE 1101)

Course Description: The course covers traditional energy and renewable energy. Sources and efficiency of non-traditional energy; examples of them (solar, biogas, wind, geothermal) and their application are covered.

Course Contents: Introduction on renewable energy and their efficiency - Technologies and assessment of their sources - Technology from scientific and environmental perspectives - Energies:Solar,photovoltaic,wind, wave, tidal,hydro power, biofuel, geothermal - Extra worked problems: Study cases putting theory into practice.

Refernces:

1) **Twidell, J. and Weir, T. 2006** Renewable energy resources. 2nd Ed. Routledge,London,UK.https://www.amazon.com/Renewable-Energy-Resources-John-Twidell/dp/ 0415584388/ref = dpobimagebk.

2) **Boyle, G. .2012**.Renewable energy: Power for a sustainable future. 3rd Ed. OxfordUniv.Press.UK.https://www.amazon.com/Renewable-Energy-Power-Sustainable-Future/dp/0199545332 /ref=pd_sbs_14_3?_encoding=UTF8&psc=1&refRID= 9JBVGPC04DB2KAQEK41J

3) **Duffie, J. A. and W. A. Beckman.2013** Solar engineering of thermal processes,4th ed.JohnWiley,Chichester,UK. http://eu.wiley.com/ WileyCDA /WileyTitle/ productCd-0470873663.html#

6.13 Courses of Dairy Science Department:

The list Dairy Science Department Courses involved in the program is shown in Table 20.

Table: 20. List of Dairy Science Department Courses involved in the program (DS13).

Serial	Course Title		Code
1	Dairy Science	Comp.	(DS 1301)
2	Dairy by-Products and Fermented Milks	Opt.	(DS 1303)
3	Dairy Chemistry & Chemical Analysis	Opt.	(DS 1304)

6.13.1. Course Title: Dairy Science (Code:DS 1301, PrRqAC 0908)

Course description : The course provide students with information on dairy science and milk secretion . Production of clean milk, automated milking, production of fatty

dairy products are covered .Students are acquainted with basic information on milk and its by-products technology.

Course Contents: Introduction on dairy science - Milk secretion, milking and milking machines - Production of clean milk - Starter cultures in dairy products - Dairy products.
Milk adulteration - Making of dairy products.

References:

1) **Walstra, P., Wouters, J.T. and Geurts, T.J. 2006**. Dairy science and technology. 2nd Ed CRC, Taylor & Francis Group, NY, USA. http://www.amazon.com/Dairy-Science-Technology-Second-Food/dp /0824727630/ref =sr 1 1?s=books&ie=UTF8&qid= 1390949383&sr=1-1&keywords=Dairy+Science +and+ technology
2). **Trevor Britz, Richard K. and Robinson 2008.** Advanced Dairy Science and Technology. Wiley-Blackwell. http://www.amazon.com/Advanced-Dairy-Science-Technology-Trevor/dp/ 1405136189/ ref=sr_ 1_1?s=books&ie = UTF8 &qid=1390949453&sr=1-1&keywords= Advanced +Dairy+Science+ and+Technology

6.13.2. Course title: Dairy by-Products and Fermented Milks (Code:DS 1303, PrRq:DS 1301)

Course description: The course provides students with information on dairy by-products and fermented milk. Technologies and skills are involved. Sensory assessment and scales relating different sectors are included. Continued training in fermented milks and dairy by-products is involved.

Course Contents: Fermented milks and their rots - Most important bacteria and yeasts used in fermented milks - Health benefits of using fermented milks - National and international fermented milks and methods of their making - Dairy by-products (composition and utilization) - Methods of making dairy by-products and their utilization.

References:

1) **Tamime, A.Y. 2006.** Fermented milks. Blackwell Publ., NY, USA. http://books.google.com.eg/books?id=xKAu9IYnK2wC&printsec=frontcover&dq =Fermented+Milks&hl=en&sa=X&ei=imjpUs2EEIG57Aa9rIHADg&ved=0CC8 Q6AEwAQ
2) **Chandan, R. and Arun-Kilara C. 2013**. Manufacturing yogurt and fermented milks. Blackwell Publ., NY, USA. http://books.google.com.eg/books?id= hPY5ojw4iVsC& printsec=frontcover&dq=Manufacturing+yogurt+and+fermented+milks&hl=en&sa=X&ei=oGjpUoWiOISt7Qb7yYCwAQ&ved=0CCoQ6AEwAA#v=onepage&q=Manufacturing%20yogurt%20and%20fermented%20milks&f=false

6.13.3. Course Title: Dairy Chemistry & Chemical Analysis (Code:DS 1304, PrRq:AC 0909)

Course description: The course provides students with information on **c**hemistry of milk and its products. Main milk components of fats, proteins, carbohydrates as well as others are included. Methods of analyses for such components are involved.

Course Contents: Introduction to chemistry of milk and its products - Main milk components including fats, proteins and carbohydrates - Minor milk components including minerals, vitamins and enzymes - Dairy sampling, preparation of samples and their storage - Chemical indicators and their use in milk analysis.

References:

1) **Weeb B. H., Johnson A. H. and Alford J. A. 1980.** Fundamentals of dairy chemistry, 2nd Ed . AVI Pub. Co. Inc., Westport, CT, USA. https://www.google. com. eg/ search? q= google&ie=utf-8&oe=utf-8&client=firefox-b&gfe_rd=cr&ei= ZH1SWaeLOK2s8 wfH_ 71A# q =1-%09Weeb+B.+H.;+Johnson+A +H.+and+Alford+J.+A.++(1980),+ Fundamentals+of+Dairy+Chemistry,+2nd+ edition,+(ISBN-0-87055-143-4),+the+AVI+ Publishing +Company.+INC.,+Westport,+Connecticut, USA..+.+
2) **Woods A. E. and Aurand L.W. 1977.** Laboratory manual in food chemistry, AVI Publishing Co. Inc., Westport, CT., USA.__https://www.google. com.eg/search?q= google&ie=utf-8&oe=utf-8&client=firefox-b&gfe_rd=cr&ei=ZH1SWaeLOK2s 8wfH_71A#q=2-% 09Woods+A.+E.,+ and+Aurand+ L.W.+(1977),+ Laboratory+ Manualin+ Food+ Chemistry,+AVI+Publishing+Company .+INC.,+Westport, + Connecticut, +USA...+.+
3) **Anon. 2005 .** Manual of methods of analysis of foods (milk and milk products). Directory of Heath Service, Ministry of Health, India https://www.google. com.eg/ search?q= declutter+meaning&ie=utf-8&oe=utf-8&client=firefox-b&gfe_rd=cr&ei= IytTWdC8 FanBXqbeg 5gH#q=1-%09Manual+of+Methods+of+analysis +of +foods+ (Milk+ and+ Milk+Products) +2012

6.14 Courses of Plant Pathology Department:

The list Plant Pathology Department Courses involved in the program is shown in Table 21.

Table: 21. List of Plant Pathology Department Courses involved in the program (PD14).

Serial	Course Title		Code
1.	Plant Pathology	Comp.	(PD 1401)
2.	Desert Soil-borne Disease	Opt.	(PD 1403)
3.	Desert Plant Diseases	Comp.	(PD 1402)
4.	Desert Integrated Plant Diseases Control	Opt.	(PD 1404)

6.14.1. Course Title: Plant Pathology (Code:PD 1401, PrRq:AB 0810)

Course Description: The course acquaints students with harmful organisms cause to .Disease cycles and relationships between pathogens and plants are viewed. Students will observe a range of plant diseases and have experience in working with them. Different sub-disciplines such as epidemiology, genetics and physiology of plant-pathogen are involved.

Course Contents: Introduction to plant pathology and history of plant disease - Disease symptoms, triangle and cycles - Mechanisms of pathogenicity and defense in plant - Diseases caused by fungi & fungal-like organisms - Diseases caused by Myxomcetes, Plasmodiphoromycetes, Oomycetes, Zygomycetes**,** fungi & fungal-like organisms, Basidiomycetes: Rusts - Diseases caused by Ascomycetes, by Deuteromycetes - Rusts and Smuts ; diseases by bacteria, virus, nematodes, and higher parasites - Genetics of plant-pathogen interactions - Plant disease management.

References

1) **Agrios, G. N. 2005**. Plant pathology.5th Ed. Academic Press, NY, USA. http://books.google.de/books?id=xLdSrKhThNEC&pg=PA2&dq=.+Plant+pathology&hl=en&sa=X&ei=n0f3Ut2eNMittAb1zIHACA&ved=0CE8Q6AEwBA#v=onepage&q=.%20Plant%20pathology&f=false
2) **Schumann, G. L. and D'Arcy, C. J. 2010**. Essential plant pathology. American Phyto-pathological Society (APS) Press, https://www.google.com.eg/search?q=g&ie=utf-8&oe=utf-8&client=firefox-b&gfe_rd=cr&ei= uy5UWcq-G7Gs8we8q6GQAg#q=Schumann,+ G.+L.+and+ D% 27Arcy,+ C.+J. +2010.+Essential +plant+pathology.+APS+Press.+

6.14.2. CourseTitle: Desert Soil-borne Diseases (Code: PD 1403, PrRq PD 1401)

Course Description: The course deals with soil-borne plant pathogens and specific components of soil environment which affect them. Relations between roots and infection processes are included. Examination of biological interactions between pathogens and soil micro-organisms are given. Students are taught to recognize some soil-borne diseases attacking plants in desert regions.

Course Contents : Introduction and overview of and principles of soil-borne plant diseases, and their ecology, soil environment and microorganisms - The rhizosphere, root exudates, nutrient interactions, root infection - Soil, plant water relationships soil organic matter, soil atmosphere, soil pH, and salinity and implications on soil-borne disease - Nutrients and their effect on soil microorganisms - Disease suppressive soils: Mechanisms and applications - Biological control: Antagonists, cross protection and competitive infection, and rhizosphere competence and role of mycorrhiza in soil - Pathogen interactions in desert soils - Relationship between soil microorganisms and pesticides and fungicides - Important diseases in desert zones.

References:

1) **Agrios, G. N. 2005**. Plant pathology.5th Ed. Academic Press, NY, USA. http://books.google.de/books?id=xLdSrKhThNEC&pg=PA2&dq=.+Plant+patholo

gy&hl=en&sa=X&ei=n0f3Ut2eNMittAb1zIHACA&ved=0CE8Q6AEwBA#v=onepage&q=.%20Plant%20pathology&f=false

2) **Kranz, J. 2002.** Comparative epidemiology of plant diseases. Springer Press, London, UK. http://books.google.de/books?id=Z3HGFjWIA6UC&printsec=frontcover&dq=Comparative+epidemiology+of+plant+diseases&hl=en&sa=X&ei=zEf3UrXtO8jvswbzg4DgDw&ved=0CC4Q6AEwAA#v=onepage&q=Comparative%20epidemiology%20of%20plant%20diseases&f=false
3) **Manassah J. and Briskey E. 1981**. Advances in food-producing systems for arid and semiarid lands, Part B. Academic Press, London, UK. https://www.google.com.eg/ search?q=g&ie=utf-8&oe=utf-8&client=firefox-b&gfe _rd=cr&ei=DqZSWeXhF8HA8geq7 JLACQ #q=Manassah+J.+and+Briskey+E.+ 1981.+Advances+in+food-producing+ systems+ for+arid+ and+semiarid+lands,+Part+B.+Academic+Press,+London, +UK.++
4) **Naik, M.K. and Devikarani, G.S. 2008**. Advances in soil-borne plant diseases. New India Pub. Agency, Pltam Pura, New Delhi, India. https://www.google.com.eg/search?q=g&ie=utf-8&oe=utf-8&client=firefox-b&gfe_rd=cr&ei =DqZSWeXhF8HA8geq7JLACQ# q=Naik,+ M.K.+ and+Devikarani+,+G.S.+2008.+Advances +in+soil-borne+plant+diseases.+ New+India+ Pub.+Agency,+Pltam+Pura,+New+Delhi,+ India.+.++

6.14.3. Course Title: Desert Plant Diseases (CodePD 1402 PrRq PD 1401)

Course Description: The course gives information on plane diseases which prevails under desert conditions**.** It provides a thorough overview on interaction of hosts and pathogens in desert zones. Induced host resistance and control methods are included.

Course Contents: Introduction on desert zone ecology and diseases occurring under such conditions - Plant diseases in desert zones, symptoms and identification of pathogens - Mechanisms of host resistance and biological control agents - Crop loss, methods of combating and control and effective control management.

References:

1) **Mérillon, J.M. Ramawat, K.G**. Plant Defence : Biological Control. Springer, NY, USA. https://books.google.com.eg/books?id=VmESGm7e7T4C.
2) **Smith, J.L. 1980**.Sierra ecology project: Vol. 2: Proc. of 4th and 5th work-shops "Environmental Impact Statement". Sierra Co-op. Pilot Project, US Dept. Interior, USA. https://books.google.com.eg/books?id=LwAzAQAAMAAJ&pg=PA117&dq=:+++Plant+diseases++in+arid+zones&hl=en&sa=X&ved=0ahUKEwjR7Pnpke3UAhXCOhoKHVo3At8Q6AEILTAC#v=onepage&q=%3A Plant diseases in arid zones&f=false

6.14.4. Course Title: Desert Integrated Plant Diseases Control (Code PD 1404, PrRq PD 1401)

Course Description : The course gives informs on how to integrated disease control with coordinated combination methods including preventive, cultural, biological and chemical ones.

Course Contents: Introduction on the integrated approach of disease control - Coordinated combination of preventive, cultural, biological and chemical means - Plant resistance and tolerance to disease and exploiting these by organisms - Integrated disease control investigations and Surveillance planning - Surveillance planning.

References:

1) **Ciancio, A. and Mukerji, K. G.2008**..Integrated management of diseases caused by fungi, phytoplasma and bacteria. Springer, NY, USA. https://books.google.com.eg/books?id=GR4twJdiF9oC&pg=PA198&dq=Integrated++Disease+Control+in+arid+zones&hl=en&sa=X&ved=0ahUKEwiGpYXrne3UAhVCWRoKHavdBuAQ6AEIPDAF#v=onepage&q=IntegratedDiseaseControlinaridzones&f= false

2) **Awasthi, L.P. 2015** . Recent advances in the diagnosis and management of plant diseases. Springer India, New Delhi, India. https://books.google.com.eg/books?id=anb_CgAAQBAJ&pg=PA54&dq=Integrated++Disease+Control+in+arid+zones&hl=en&sa=X&ved=0ahUKEwiGpYXrne3UAhVCWRoKHavdBuAQ6wEIRzAH#v=onepage&q=IntegratedDiseaseControlinaridzones&f= false

APPENDIX 1: Lists of Compulsory (Obligatory) and Selective (Optional) Courses of Desert Land Reclamation and Cultivation Program. Students study a total of **139** credit hours for the BSc degree. Numbers of credit hours in each of the four levels (L) are **L1 =35**; **L2 =35** ; **L3= 36** ; **L4= 33 (139 credit hours)**

COURSES OF LEVEL 1 SEMESTER 1:

Desert Land Reclamation and Cultivation Program				
Compulsory (Obligatory) Courses:				
Department & Code	Course Name	**Unit**	**Theoretical**	**Practical**
PP 0401	Zoology	3	2	2
EE 0602	Agricultural Economics and Extension	3	2	2
AB 0810	Botany	3	2	2
SO 0501	Soil and Water Science	3	2	2
AC 0908	Organic and Analytical Chemistry	3	2	2
CJ 1201	English 1	2	2	0
Selective (Optional) Courses (one course to be selected):				
AB 0806	Plant Physiology	3	2	2
CJ 1203	Computer Science	3	2	2
Departmental Codes: Soil and Water Science (**SO**) - Agricultural Biochemistry (**AC**) - Animal Production (**AP**) - Plant Protection (**PP**) – Agronomy (**AG**) – Horticulture (**HO**) - Agricultural Engineering (**AE**) - Agricultural Economics and Extension (**EE**) - Food Science (**FS**) - Dairy Science (**DS**) - Plant Pathology (**PD**) - Genetics and Genetic Engineering (**GE**) – Agricultural Botany (**AB**) - Common/Joint (**CJ**).				

Total of 20 Credit hours to be studied by the student (17 Compulsory + 3 Selective =20)

COURSES OF LEVEL 1 SEMESTER 2:

Desert Land Reclamation and Cultivation Program					
Compulsory (Obligatory) Courses:					
Department & Code	Course Name	**Unit**	**Theoretical**	**Practical**	**Pre-requisite**
AC 0909	Biochemistry	3	2	2	None
GE 1001	Genetics	3	2	2	”
AP 0301	Animal Physiology	3	2	2	”
PP 0402	Entomology	3	2	2	”
CJ 1206	Human Rights and Agricultural Legislation	-	2	-	”
Selective (Optional) Courses (one course to be selected):					
SO 0513	Soil Physics and Sand Dune Fixation	3	2	2	SO 0501
GE 1011	Genetically Modified Plants	3	2	2	GE 1001
AC 0910	Chelate & heavy metals Chemistry.	3	2	2	SO 0501
Departmental Codes: Soil and Water Science (**SO**) - Agricultural Biochemistry (**AC**) - Animal Production (**AP**) - Plant Protection (**PP**) – Agronomy (**AG**) – Horticulture (**HO**) - Agricultural Engineering (**AE**) - Agricultural Economics and Extension (**EE**) - Food Science (**FS**) - Dairy Science (**DS**) - Plant Pathology (**PD**) - Genetics and Genetic Engineering (**GE**) – Agricultural Botany (**AB**) - Common/Joint (**CJ**).					

Total of 15 Credit hours to be studied by the student: (12 Compulsory + 3 Selective =15)

COURSES OF LEVEL 2 SEMESTER 1:

Desert Land Reclamation and Cultivation Program					
Compulsory (Obligatory) Courses:					
Department & Code	Course Name	**Unit**	**Theoretical**	**Practical**	**Pre- requisite**
SO 0507	Fertility and Plant Nutrition in Desert Soils	3	2	2	SO 0501
HO 0211	Desert Aromatic & Medicinal Plants	3	2	2	AB 0810
AB 0803	Agricultural Microbiology	3	2	2	AB 0810
AG 0107	Field Crops	3	2	2	AB 0810
AE 1101	Agricultural Engineering	3	2	2	None
CJ 1202	English 2	2	2	0	CJ 1201
Selective (Optional) Courses (one course to be selected):					
PP 0408	Desert Economic Entomology	3	2	2	PP 0402
SO 0509	Tillage & Conservation of Desert Soils	3	2	2	None
AB 0811	Soil Microbiology	3	2	2	None
AG 0109	Crop Adaptation for Desert Lands	3	2	2	None

Departmental Codes:
Soil and Water Science (**SO**) - Agricultural Biochemistry (**AC**) - Animal Production (**AP**) - Plant Protection (**PP**) – Agronomy (**AG**) – Horticulture (**HO**) - Agricultural Engineering (**AE**) - Agricultural Economics and Extension (**EE**) - Food Science (**FS**) - Dairy Science (**DS**) - Plant Pathology (**PD**) - Genetics and Genetic Engineering (**GE**) – Agricultural Botany (**AB**) - Common/Joint (**CJ**).

Total of **20** Credit hours to be studied by the student: (**17** Compulsory + **3** Selective =**20)**

COURSES OF LEVEL 2 SEMESTER 2:

Desert Land Reclamation and Cultivation Program					
Compulsory (Obligatory) Courses:					
Department & Code	**Course Name**	**Unit**	**Theoretical**	**Practical**	**Pre-requisite**
AE 1107	Agricultural Structure Planning for Desert Zones	3	2	2	AE 1101
DS 1301	Dairy Science	3	2	2	AC 0908
PD 1401	Plant Pathology	3	2	2	AB 0810
AP 0313	Camel, Sheep and Goat Production	3	2	2	AP 0301
CJ 1207	Effective Communication Skills	-	2	0	EE 0602
Selective (Optional) Courses (one course to be selected):					
DS 1303	Dairy By-products and Fermented Milk	3	2	2	DS 1301
SO 0512	Soil Chemistry	3	2	2	None
EE 0629	Environmental Extension	3	2	2	EE 0602

Departmental Codes:
Soil and Water Science (**SO**) - Agricultural Biochemistry (**AC**) - Animal Production (**AP**) - Plant Protection (**PP**) – Agronomy (**AG**) – Horticulture (**HO**) - Agricultural Engineering (**AE**) - Agricultural Economics and Extension (**EE**) - Food Science (**FS**) - Dairy Science (**DS**) - Plant Pathology (**PD**) - Genetics and Genetic Engineering (**GE**) – Agricultural Botany (**AB**) - Common/Joint (**CJ**).

Total of **15** Credit hours to be studied by the student: (**12**compulsory + **3** Selective =**15)**

COURSES OF LEVEL 3 SEMESTER 1:

Desert Land Reclamation and Cultivation Program					
Compulsory (Obligatory) Courses:					
Department & Code	**Course Name**	**Unit**	**Theoretical**	**Practical**	**Pre-requisite**
SO 0511	Desert Water Resources	3	2	2	SO 0501
AP 0306	Animal & Poultry Nutrition	3	2	2	AC 0909
AE 1108	Irrigation Systems in Desert Lands	3	2	2	None
GE 1010	Desert Plant Breeding	3	2	2	GE 1001
HO 0210	Desert Fruit Production	3	2	2	None
Selective (Optional) Courses (one course to be selected):					
AP 0309	Animal & Poultry Genetic Improvement	3	2	2	GE 1001
AE 1111	Field Irrigation Management	3	2	2	AE 1101
FS 0713	Food Preservation and Packaging	3	2	2	AC 0909
DS 1304	Dairy Chemistry& Chemical Analysis	3	2	2	AC 0909

Departmental Codes:
Soil and Water Science (**SO**) - Agricultural Biochemistry (**AC**) - Animal Production (**AP**) - Plant Protection (**PP**) – Agronomy (**AG**) – Horticulture (**HO**) - Agricultural Engineering (**AE**) - Agricultural Economics and Extension (**EE**) - Food Science (**FS**) - Dairy Science (**DS**) - Plant Pathology (**PD**) - Genetics and Genetic Engineering (**GE**) – Agricultural Botany (**AB**) - Common/Joint (**CJ**).

Total of **18** Credit hours to be studied by the student: (**15** compulsory + **3** Selective =**18)**

COURSES OF LEVEL 3 SEMESTER 2:

Desert Land Reclamation and Cultivation Program					
Compulsory (Obligatory) Courses:					
Department& Code	**Course Name**	**Unit**	**Theoretical**	**Practical**	**Pre-requisite**
AG 0108	Pasture & Fodder Production in Desert lands	3	2	2	AG 0107
AP 0310	Poultry Production under Desert Environment	3	2	2	AP 0301
AE 1109	Power & Farm Machinery for Desert Lands	3	2	2	AE 1101
PD 1402	Desert Plant Diseases	3	2	2	PD 1401
AP 0311	Desert Fish Farming	3	2	2	None
Selective (Optional) Courses (one course to be selected):					
PP 0409	Desert Integrated Pest Control	3	2	2	PP 0402
FS 0727	Technology of Cereal, Oil and Sugar.	3	2	2	AC 0909
EE 0605	Technology Transfer & Diffusion	3	2	2	CJ 1207
PD 1404	Desert Integrated Plant Diseases Control	3	2	2	PD 1401

Departmental Codes:
Soil and Water Science (**SO**) - Agricultural Biochemistry (**AC**) - Animal Production (**AP**) - Plant Protection (**PP**) – Agronomy (**AG**) – Horticulture (**HO**) - Agricultural Engineering (**AE**) - Agricultural Economics and Extension (**EE**) - Food Science (**FS**) - Dairy Science (**DS**) - Plant Pathology (**PD**) - Genetics and Genetic Engineering (**GE**) – Agricultural Botany (**AB**) - Common/Joint (**CJ**).

Total of **18** Credit hours to be studied by student: (**15** compulsory +**3** Selective =**18)**

COURSES OF LEVEL 4 SEMESTER 1:

Desert Land Reclamation and Cultivation Program					
Compulsory (Obligatory) Courses:					
Department & Code	**Course Name**	**Unit**	**Theoretical**	**Practical**	**Pre-requisite**
SO 0508	Booster Amendments For Desert Lands	3	2	2	SO 0507
HO 0209	Desert Vegetable Production	3	2	2	AB 0810
CJ 1210	Meat and Dairy Products	3	2	2	AP 0301
CJ 1208	Graduation Project	3	2	2	None
Selective (Optional) Courses (one course to be selected):					
AE 1112	Renewable Energy in Desert Zones	3	2	2	AE 1101
HO 0212	Desert Timbre Plantation	3	2	2	SO 0511
AG 0110	Desert Crop Breeding	3	2	2	AG 0107
FS 0728	Food Quality Control	3	2	2	FS 0713

Departmental Codes:
Soil and Water Science (**SO**) - Agricultural Biochemistry (**AC**) - Animal Production (**AP**) - Plant Protection (**PP**) – Agronomy (**AG**) – Horticulture (**HO**) - Agricultural Engineering (**AE**) - Agricultural Economics and Extension (**EE**) - Food Science (**FS**) - Dairy Science (**DS**) - Plant Pathology (**PD**) - Genetics and Genetic Engineering (**GE**) – Agricultural Botany (**AB**) - Common/Joint (**CJ**).

Total of **15** Credit hours to be studied by student: (**12** compulsory + **3** Selective =15)

COURSES OF LEVEL 4 SEMESTER 2:

Desert Land Reclamation and Cultivation Program					
Compulsory (Obligatory) Courses:					
Department & Code	**Course Name**	**Unit**	**Theoretical**	**Practical**	**Pre-requisite**
AG 0104	Biostatistics & Experimental Design	3	2	2	
EE 0623	Feasibility Studies & Project Evaluation	3	2	2	EE 0602
SO 0510	Desert Land Reclamation & Rehabilitation.	3	2	2	None
CJ 1208	Graduation Project	3	2	2	CJ 1202
CJ 1209	Agricultural Entrepreneurship	3	2	2	EE 0602
Selective (Optional) Courses (one course to be selected):					
AP 0308	Animal Husbandry in Desert Zones	3	2	2	None
PD1403	Desert Soil-borne Diseases	3	2	2	PD 1401
AE 1110	Post-harvest Processing	3	2	2	None
AB 0813	Organic Farming	3	2	2	None

Departmental Codes:
Soil and Water Science (**SO**) - Agricultural Biochemistry (**AC**) - Animal Production (**AP**) - Plant Protection (**PP**) – Agronomy (**AG**) – Horticulture (**HO**) - Agricultural Engineering (**AE**) - Agricultural Economics and Extension (**EE**) - Food Science (**FS**) - Dairy Science (**DS**) - Plant Pathology (**PD**) - Genetics and Genetic Engineering (**GE**) – Agricultural Botany (**AB**) - Common/Joint (**CJ**).

Total of **18** Credit hours to be studied by the student: (**15** compulsory + **3** Selective=18)

APPENDIX 2.

Distribution of Total Credit Hours (139 Crdt Hrs) for the 4-year BSc. Desert Reclamation & Cultivation Program.

Level (L) & Semester (S)	Compulsory	Selective	Total
L1S1	17	3	20
L1 S2	12	3	15
L1 Total	**29**	**6**	**35**
L2 S1	17	3	20
L2 S2	12	3	15
L2 Total	**29**	**6**	**35**
L3 S1	15	3	18
L3 S2	15	3	18
L3 Total	**30**	**6**	**36**
L4 S1	12	3	15
L4 S2	15	3	18
L4 Total	**27**	**6**	**33**
4-Year Grand Total credit hours	**115**	**24**	**139**

اللائحة الداخلية لبرنامج

إستصلاح و استزراع الأراضي الصحراوية

برنامج ساعات معتمدة باللغة الإنجليزية مشترك بين الأقسام العلمية لطلاب مرحلة البكالوريوس

(برنامج كليـة)

يونيــو 2017